



Supplementary Environmental Information

Cumulative & In-combination Effects

Supplementary Report EX 44.1

June 2012
Revision: 0
ERM & Able UK

1.1.1 This Explanatory Note details other projects in the vicinity of AMEP and the Compensation Site and the resulting cumulative effects. It also details the in-combination impacts attributable to AMEP and the Compensation Site.

1.1.2 The following are the cumulative effects that have been identified:

- In terms of hydrodynamic and sedimentary regime, there may be localised minor impacts on the north bank inter-tidal area near the disposal site, but there will be no estuary wide impact.
- There may be short term, localised impacts on water and sediment quality associated with dredging activities.
- In terms of aquatic ecology, the overall cumulative impact with regard to habitat loss in the Humber Estuary, in the shorter term, is considered to be significant, however this will be minor in nature. It should be noted that the species impacted by this loss are generally reported to be opportunistic and tolerant to change and recover rapidly from disturbance.
- In terms of terrestrial ecology and birds, based upon the Environmental Statement and Habitats Regulations Assessment material for other projects it is concluded that only minor cumulative impacts will occur. With mitigation measures implemented it is likely that cumulative / in-combination impacts across developments will be reduced to minor levels.
- Regarding commercial fisheries, no substantially greater impact than previously concluded is expected due to cumulative or in-combination effects and it is considered here that there is no need to undertake further mitigation actions.
- In terms of drainage and flood risk, none of the projects identified above have any cumulative impacts in combination with the Project.
- In terms of transport, no cumulative impacts over and above those already included inherently in the modelling for the impact assessment have been identified.

- The cumulative noise impact from all developments (including AMEP) during the daytime is considered to be negligible as the resultant cumulative noise level is expected to increase by up to 1 dB. Whereas the cumulative noise impact from all developments (including AMEP) during the night time is expected to increase noise levels by up to 4 dB, and is considered to be of minor significance.
- Due to the distance between the projects detailed and AMEP, and the prevailing meteorological conditions, it is concluded that any cumulative impacts to air quality due to AMEP and these projects are likely to be negligible.
- In relation to the historic environment, there are no cumulative residual impacts identified and, therefore, no further mitigation measures proposed.
- It is not considered that cumulative impacts from light are worse than those reported in the original ES. This is due in part to the level of existing illumination in the night time baseline resulting from the Oil Refinery facility and also due to the distances involved which result in a rapid reduction in Lux levels.
- The majority of residual cumulative impacts on landscape character areas during operation are rated as not significant or minor. There will, however, be residual cumulative impacts of moderate significance on two landscape areas. Similarly, although the majority of residual cumulative impacts on viewers at fixed viewpoint locations are rated as not significant or minor, residual cumulative impacts at three fixed viewpoint locations are rated as moderate, moderate-major, and major.
- With regards to aviation, the cumulative impact of the tall structures on the AMEP site is judged to be relatively low.
- In terms of waste, the cumulative impact is assessed as low and no further mitigation is required.
- Although the cumulative effect of the projects may have a negative effect on the health due to a decreased sense of wellbeing, changes to a sense of place and enjoyment of the area there will be a positive impact in terms of employment levels in the region.

1.1.3

The in-combination effects of the Project (AMEP and the Compensation Sites) are detailed in *Section 5*.

2.1 OVERVIEW

2.1.1 This Explanatory Note expands upon and supersedes the assessment of cumulative and in-combination effects identified and assessed in the Environmental Statement (ES) for the proposed Able Marine Energy Park (AMEP). It has been updated to include several projects for which information was not available when undertaking the Environmental Impact Assessment (EIA).

2.1.2 For the purpose of this cumulative and in-combination assessment the development of AMEP and the Compensation Site are being considered together and are referred to collectively as “the Project”. The Compensation Site consists of the proposed intertidal site known as Cherry Cobb Sands and the proposed managed grassland roosting and feeding habitat located at Old Little Humber Farm.

2.2 METHODOLOGY

2.2.1 Cumulative effects are those effects which arise over time due to the effect of the Project and the effect of other projects.

2.2.2 Other projects in the vicinity of the Project which have been granted permission (whether in outline or full) but not completed, or for which an application for consent has been submitted but not determined, are considered in conjunction with the Project in the assessment of cumulative impacts.

2.2.3 Cumulative effects were considered throughout the EIA process, through considering the Project’s impacts in tandem with the potential impacts of the various projects identified. Consultation was undertaken prior to submitting the application to identify those projects that required consideration within the assessment of cumulative effects. We have, since submitting the application, identified additional information on several projects recently made available, including information on Green Port Hull. This Explanatory Note seeks to consider the cumulative effects of these projects with the Project, alongside previously considered projects. An updated schedule of developments identified as warranting consideration is included as *Annex A*. The locations of these projects, identified as having the potential to act cumulatively with the Project, are set out in *Figure 3.1*.

2.2.4 In-combination effects are those effects which occur where a number of separate effects from the Project, such as noise and air quality, affect a single receptor, for example people.

2.2.5 Receptors which suffer from negative impacts as a result of the combination of more than one impact were identified by developing a matrix. It was based on the individual topic assessments and professional judgement as to whether the identified receptors suffer from in-combination impacts, and whether these impacts are considered not significant or significant.

2.3 *SOURCES OF INFORMATION/DATA*

2.3.1 Information on the projects considered below has been obtained from public sources, such as online planning application portals and project developers' own websites, as well as being sourced directly from project developers.

2.4 *STUDY AREA*

2.4.1 The study area broadly encompasses the area within 10 km of AMEP. However, several projects identified outside the 10 km boundary are considered within this assessment of cumulative effects due to their significance in the region, their impacts on the Humber Estuary or due to specific requests from consultees.

2.5 *IMPACT ASSESSMENT AND SIGNIFICANCE CRITERIA*

2.5.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 No. 2263 (2009 EIA Regulations) require an ES to report on those environmental effects arising from a project that are likely to be significant.

2.5.2 While there is no statutory definition of what constitutes a significant effect, it is clear that the primary purpose of reporting an assessment of any effect of a project is to aid the decision-maker so that it is properly informed when making its decision. In many cases, such as for noise, there are accepted methods for quantifying effects and determining the threshold of significance. In others, such as visual impact, the effects cannot be measured scientifically and only established practice or guidance offers an approach to assessing the significance of effects. In these cases it is necessary to define more qualitative criteria and thresholds.

- 2.5.3 On this basis, a significant effect has been defined for the purposes of this Project, as an effect that, either in isolation or in-combination with others, should – in the opinion of the team carrying out the EIA – be taken into account in the decision-making process.
- 2.5.4 This definition of a significant effect requires a specific framework for each environmental topic considered in the assessment in order to predict the significance of the effects that may arise. The criteria used to judge significance are explained as part of the assessment methodology for each environmental topic.

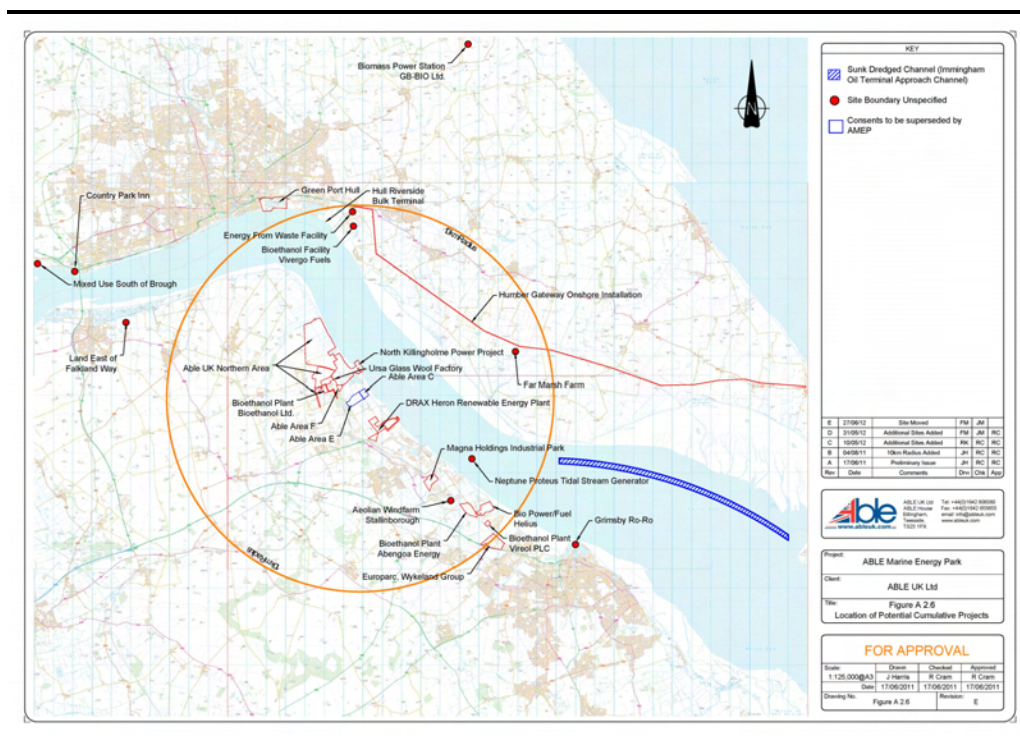
3.1 INTRODUCTION

3.1.1 *Annex 2.3* of the ES identified those projects which were considered within each of the impact assessment chapters. The list of projects considered in the cumulative and in-combination assessment was derived from consultation with all relevant Local Planning Authorities, and statutory consultees; the advice of these bodies was followed in drawing up a list of plans and projects with the potential to act cumulatively with AMEP.

3.1.2 After extensive consultation with planning authorities and statutory regulators, and relying on their advice, a list of projects was identified which was assessed at the time of the application. The following projects are those projects which have been added following the passage of time since the application was entered, and subsequent further consultations; they are assessed for cumulative effects in the subsequent sections:

- Green Port Hull
- Humber Flood Risk Management Strategy
- North Lincolnshire Core Strategy
- Land East of Falkland Way, North Lincolnshire
- North Killingholme Power Project (planned; no application submitted)
- North East Lincolnshire Core Strategy (draft)
- Aeolian Wind Turbines
- Hull City Council Core Strategy
- East Rising of Yorkshire Council Core Strategy (draft)
- Farmmarsh Farm
- Thorgumbald Windfarm
- Country Park Inn

Figure 3.1 Location of Potential Cumulative Projects



3.2 PROJECTS IN THE IMMEDIATE VICINITY

Able UK Area F (Able UK Ltd)

- 3.2.1 This will comprise paving of land currently in agricultural use to accommodate port-related external storage.

Able UK Area C (Able UK Ltd)

- 3.2.2 This will comprise paving of land in agricultural use to accommodate port-related external storage. This project has been partially constructed. This project will be superseded by AMEP.

Able UK Area E (Able UK Ltd)

- 3.2.3 This will comprise paving of land in agricultural use to accommodate port-related external storage. This project has been partially constructed. This project will be superseded by AMEP.

Able UK Northern Area (Able UK Ltd)

- 3.2.4 Planning consent for development has been sought for an area of 379.9 ha. Of this, 235.5 ha would accommodate B1, B2 and B8 land uses for port related storage and associated service facilities. In addition to this, the application seeks consent to develop 138.1 ha on the site for amenity landscaping and habitat creation and a further 1.1 ha of

foreshore would be occupied temporarily to facilitate flood prevention and foreshore repair works necessary to protect the site.

3.3 *PROJECTS IN THE HUMBER ESTUARY*

Donna Nook Managed Realignment Scheme (EA)

- 3.3.1 This is a consented managed realignment site in Lincolnshire to provide compensatory intertidal habitats likely to be lost from the Humber Estuary as a result of implementing the Humber Flood Risk Management Strategy.

Maintenance Dredging

- 3.3.2 ABP and other harbour authorities will undertake an on-going programme of maintenance dredging and disposal that is carried out within the estuary.

Immingham Oil Terminal Approach Channel Deepening (ABP)

- 3.3.3 This consented project involves the deepening of the approach channel to Immingham Oil Terminal, based on a design vessel draught of 15 m, by dredging.
- 3.3.4 The area of seabed directly affected by dredging is 427 ha of which 312 ha is located within the boundaries of the Humber Estuary European Marine Site. Based upon analysis of existing channel depths in relation to the required channel depth an estimated total volume of 3 905 000 m³ will need to be removed – it is not anticipated in the ES that substantial alterations to the maintenance dredge annual volumes will result from the project. The sediment comprises a range of materials encompassing stiff glacial clay, silts and sands. The dredge volume calculations are based upon channel side slopes with a nominal gradient of 1:7 and a base width in the main channel of 200 m through the existing Sunk Dredge Channel and over the Hawke Channel Bar.

Green Port Hull (ABP)

- 3.3.5 Associated British Ports (ABP) wishes to develop a facility at Alexandra Dock, in the Port of Hull, for the manufacture, assembly, testing and shipment of wind turbines for the offshore wind power industry. The proposals include the reclamation of 7.5 ha of land from the Humber Estuary, already consented, as noted below, for development as a Lift-on Lift-off (Lo/Lo) container terminal under a Harbour Revision Order. This will be used as a new quay for the import and export of wind

turbine components and, potentially, the examination and export of fully erected wind turbines.

- 3.3.6 In addition to this consented reclamation, the principal elements of the GPH development will include a factory for the manufacture, assembly and production of wind turbine equipment, related office space, an area for the storage and testing of wind turbines components, a vessel crew facility, a further quay to be constructed within Alexandra Dock, a permanent operational on-site wind turbine, a helicopter landing site and associated infrastructure.

Grimsby Ro-Ro (ABP)

- 3.3.7 ABP Grimsby is constructing a Roll-on Roll-off (Ro-Ro) berth in the River Humber outside the existing entrance to Grimsby docks to accommodate larger vessels, which are unable to enter the existing lock.
- 3.3.8 The proposed works will consist of a dredged berthing pocket to accommodate up to two vessels, which will be moored against a floating pontoon and connected to shore by a linkspan and roadway. The berth is to be dredged to 7.5 m below chart datum (CD) and will provide access for vessels operating at a draught of 7.1 m. In addition a small amount of dredging will be required in the approach channel and turning area to provide access at high water (HW). All three areas will need to be maintained by dredging in the future.

Hull Riverside Bulk Terminal (ABP)

- 3.3.9 ABP proposes additional bulk products handling capacity at the Port of Hull and proposes to construct a new riverside bulk terminal near the eastern boundary of the Port of Hull, between Queen Elizabeth Dock and the Salt End Chemical Works, to be known as the Hull Riverside Bulk Terminal (HRBT).
- 3.3.10 The Terminal will include a new jetty into the Humber. This will be linked to the land side by a conveyor which will be designed to service a bulks product storage and rail distribution facility and, if required, a new biomass-fired power station (which will be the subject of a separate application by its developer, DONG Energy) as well as a bulk products storage and rail distribution facility.
- 3.3.11 Also included within the proposal is an area required as a construction compound and general port use. Dredging will be necessary to create the required depth at the berth and its approach, and also at Halton Middle. HRBT will be designed and constructed to handle a wide

variety of dry bulk products although it is envisaged that it will deal principally with the importation of biomass and coal for use in the power generation industry for the foreseeable future.

Humber Flood Risk Management Strategy (EA)

- 3.3.12 The Environment Agency (EA) plans to control and mitigate for flood risk on the Humber by continuing to maintain, and improve, existing defences where this is sustainable, identifying and providing Local Authorities with advice regarding potentially unsuitable development in the floodplain and providing targeted and timely flood warnings. Over the majority of the estuary the current defence line will be held, to a suitable standard, through maintenance or improvement works as appropriate.
- 3.3.13 Where necessary they will examine other ways of protecting people and property, including building secondary lines of defence, or new lines of defence, in both cases to protect more valuable areas, and advising people on how to prepare for flooding.
- 3.3.14 Where justified they will move or set defences back where doing so will provide flood storage to help manage water levels during serious floods and so benefit adjacent areas, and will allow then to stop maintaining other defences that are uneconomic. They will also create new inter-tidal habitat to compensate for that being lost because of the Strategy (i.e. coastal squeeze against fixed defences).

3.4 PROJECTS IN NORTH LINCOLNSHIRE COUNCIL AREA

North Lincolnshire Core Strategy (North Lincolnshire Council)

- 3.4.1 The adopted core strategy is the main document in the Local Development Framework. It sets out the planning vision and framework for growth and development in North Lincolnshire up until 2026.
- 3.4.2 One of its important roles is to set the overall pattern of development in the area. This means that it will determine which broad areas are suitable for things like housing, employment, retail, leisure and supporting infrastructure in order to meet the future needs of the area. It will not deal with detailed issues such as the location of specific sites. These will be dealt with in future documents. All other documents in the Local Development Framework must conform to the core strategy.

Land East of Falkland Way, North Lincolnshire (Trenport Investments Ltd)

- 3.4.3 These consented plans include the erection of buildings for use for purposes falling within classes B1, B2 and B8 of the Town and Country Planning (Use Classes) Order 1988, to construct a rail link, access road, parking facilities and associated landscaping.

Ursa Glass Wool Factory (Ursa)

- 3.4.4 A planning application was approved in 2008 for a Glass Wool Insulation Products Manufacturing Plant. The plant and associated infrastructure accounts for approximately 5.3 ha of the total site footprint of 15 ha. The remainder comprises open air storage, surface water storage, access parking and landscaping. Access to the site will be via Chase Hill Road.
- 3.4.5 The consent has not been implemented and the developer has sought a time extension.

Bioethanol Plant (Bioethanol Ltd.)

- 3.4.6 A planning application was approved for plant and machinery producing 200 000 tonnes of Bioethanol per year from 650 000 tonnes of a wheat feedstock. This will include a Combined Heat and Power plant, administrative buildings, a plant water lagoon and a new vehicular access onto a private road owned by Centrica.

North Killingholme Power Project (C.GEN)

- 3.4.7 C.GEN proposes to construct and operate a 470 MWe thermal generating station and associated development on land adjacent to the C.RO Ports Killingholme Terminal. The generating station is intended to operate either as a Combined Cycle Gas Turbine (CCGT) plant or as an Integrated Gasification Combined Cycle (IGCC) plant.
- 3.4.8 No application for this project has yet been entered – information is drawn from the Preliminary Environmental Information Report which has been published as part of the pre-application consultation exercise.

Heron Renewable Energy Plant (Drax)

- 3.4.9 Plans for a biomass power station generating up to 290 MW of renewable electricity from the use of around 1.4 million to 2.5 million tonnes per year of biomass fuel have been approved. The design of the Renewable Energy Plant includes a 100 m high stack, a boiler house up

to 68 m tall, a block of plume-abated hybrid cooling towers 31 m tall, a biomass storage shed 41 m tall, and conveyors linking the storage shed to the berth and boiler plant.

3.5 PROJECTS IN NORTH EAST LINCOLNSHIRE COUNCIL AREA

North East Lincolnshire Core Strategy (North East Lincolnshire Council)

- 3.5.1 The Core Strategy document will be the key Development Plan Document for the Borough outlining the Council's overall approach to development. It will cover a period to 2027, but will be reviewed on a regular basis.
- 3.5.2 The Core Strategy will set out the long term spatial vision and objectives for the Borough and the strategic planning policies to deliver that vision. The North East Lincolnshire Core Strategy will also include a suite of Development Management policies aimed at addressing identified Core Strategy issues.
- 3.5.3 The Core Strategy will not set out individual land allocations for specific purposes; this will be covered in the Allocations Development Plan Document.
- 3.5.4 Following the publication of the National Planning Policy Framework (April 2012) (NPPF) the Council is reviewing the preparation of the Local Development Framework. The preparation of the Core Strategy has been put on hold until a decision is made as to how to proceed in the light of the NPPF.

Aeolian Wind Turbines (Aeolian Stallingborough Ltd)

- 3.5.5 The proposed development comprises the erection of two approximately 3 MW wind turbines, associated access tracks and infrastructure. The proposed site is approximately 8 ha in area and is located 1.5 km to the north-east of Stallingborough, North East Lincolnshire.

Bio Power / Fuel (Helius)

- 3.5.6 This facility comprises an integrated biomass-fuelled electricity generating station of approximately 65 MWe capacity, together with an associated biomass processing facility and Bioethanol and biodiesel refinery located on a site at Hobson Way, Stallingborough, near Immingham.

Bioethanol Plant (Abengoa Bioenergy)

- 3.5.7 Abengoa Bioenergy is proposing to construct a grain processing facility (“Wheat Plant”) and a reprocessing ethanol facility (“W.A. Plant”) on a greenfield site near Stallingborough.

Bioethanol Plant (Vireol PLC)

- 3.5.8 Vireol PLC is proposing to construct a plant for the production of Bioethanol from wheat feedstock. The plant is proposed to be capable of producing 540 000 litres per day.

Europarc (Wykeland Group)

- 3.5.9 Europarc is a mixed business park, approximately 60% developed, at Grimsby.

Industrial Park (Magna Holdings)

- 3.5.10 Magna Industrial Park is a mixed-use, predominantly industrial development occupying 29 ha of land at Grimsby.

3.6 PROJECTS IN CITY OF KINGSTON UPON HULL

Hull Core Strategy (Hull City Council)

- 3.6.1 The core strategy is the central document in the Hull development framework and forms part of the development plan. It sets out the priorities for development in Hull until 2026 in terms of where it should be located, how much, when and how it will be delivered.

Tidal Steam Generator (Neptune RE Ltd.)

- 3.6.2 A proposal has been made to install a pilot tidal stream generator in the Humber Estuary close to the Immingham Oil Terminal. The prototype consists of two, under water, vertically oscillating hydrofoils, 11 m in length, each mounted on a pile-driven upright. A generator and access platform sits on the twin piles above the water surface. At high water the device will protrude 5 m above the water and 12 m at low water.

3.7 PROJECTS IN EAST LINDSEY DISTRICT COUNCIL AREA

- 3.7.1 No projects were identified as potentially acting cumulatively with the Project.

3.8 *PROJECTS IN WEST LINDSEY DISTRICT COUNCIL AREA*

- 3.8.1 No projects were identified as potentially acting cumulatively with the Project.

3.9 *PROJECTS IN THE EAST RIDING OF YORKSHIRE*

East Riding of Yorkshire Core Strategy (East Riding of Yorkshire Council)

- 3.9.1 The Core Strategy Development Plan Document (DPD) will set the key elements of the planning framework for the East Riding. It will include a vision and a number of objectives for the area, setting out how the local authority would like the East Riding to look in 2028.
- 3.9.2 The Core Strategy will include:
- A spatial strategy setting out those settlements where development will occur and how much. It will also identify any significant areas of growth in the larger settlements.
 - Core planning policies on a number of important issues relating to housing, economic development, transport, the built and natural environment and community infrastructure.
- 3.9.3 Once completed, all the other documents within the East Riding LDF will need to be in conformity with the Core Strategy.

Farmarsh Farm (Mr A. Wielkopolski)

- 3.9.4 The proposal is for the erection of 3 wind turbines with a maximum tip height of 102 m for a duration of 25 years. The turbines will have a hub height of 75 m. The co-ordinates for each turbine are as follows:
- WTG 1 524,680 421,783
 - WTG 2 524,409 421,724
 - WTG 3 524,906 421,726
- 3.9.5 The proposed turbines will be three bladed horizontal axis machines. The finish and colour of the turbines and blades is likely to be semi matt and pale grey in colour.

Thorngumbald Windfarm

- 3.9.6 Though this project was suggested for consideration by consultees, it is believed to have been withdrawn from the planning system.

Country Park Inn (Keith Brown Properties (Hull) Ltd.)

- 3.9.7 Full planning permission has been granted for an extension to the existing Country Park Inn (which presently provides bar and restaurant facilities, along with a conference suite and function facilities) to provide 44 bedrooms of guest accommodation and conversion of the associated Country Park Lodge (which currently provides 8 guest bedrooms for overnight accommodation) to provide ancillary offices for use in connection with the Country Park Inn business operations.
- 3.9.8 The consented extension is located to the west of the existing Country Park Inn buildings, on the site of the existing parking areas and soft landscaping. The proposals extend the frontage of the existing building along the foreshore by approximately 55 m. Accommodation is to be provided across three floors, and the extension has a maximum ridge height of approximately 15.2 m. The building is designed to be accessed from the existing internal access road to the north. The conversion of the Lodge to ancillary office accommodation does not involve any external alterations to the building.

Bioethanol facility, Saltend, Preston (Vivergo Fuels)

- 3.9.9 The consented Vivergo Bioethanol development site consists of approximately 13 ha of brownfield land within the wider BP Saltend site. Development will comprise a main central processing area (10 ha) and two smaller satellite areas (approximately 1 ha each) to provide Bioethanol storage and road tanker facilities. Further pipelines and cables will connect the development with adjacent BP facilities.

Energy from Waste facility (BP)

- 3.9.10 Consent has been granted for an energy-from-waste facility based on combustion at BP's Saltend site. This project is understood to be on hold indefinitely.

Humber Gateway on-shore installation (E.ON)

- 3.9.11 An underground cable is proposed from Easington to Salt End (a distance of around 30 km) to enable electricity generated by the Humber Gateway Offshore Wind Farm to be connected into the National Grid at a proposed new substation at Salt End.

Mixed use south of Brough (Horncastle Group)

- 3.9.12 The proposed development is of a mixed use scheme comprising the following elements:
- Residential development of around 800 dwellings;
 - Food and non-food retail units including a foodstore;
 - Business uses including offices, start up and workshop units;
 - Hotel providing around 60 beds;
 - Healthcare uses including residential care home;
 - Leisure uses;
 - Formal and informal public open space and children's play areas;
 - Completion of the Brough Relief Road; and
 - Transport interchange and additional rail station parking to the west of the site.
- 3.9.13 The proposed phasing of the development will see the construction of the relief road, foodstore and initial residential development taking place from the summer of 2012. The build programme is anticipated to see around 100 dwellings constructed per annum.

Biomass power station (GB-BIO Ltd)

- 3.9.14 GB-Bio Ltd. proposes to build and operate a biomass fired power station at Tansterne, near Aldbrough in the East Riding of Yorkshire, using locally sourced clean straw as its principal fuel. The proposed plant is a combustion facility, with a rated net thermal input of between 20 and 50 MW.

3.10 OTHER PROJECTS

Humber Gateway Wind Farm (Eon (Humber Wind Ltd))

- 3.10.1 A wind farm located north of the mouth of the River Humber, within an area of sea approximately 8 km off the Holderness Coast of East Yorkshire. Depending on the capacity of the turbines, the wind farm will consist of between 42 and 83 turbines. The proposal also includes an offshore substation, up to three meteorological masts, inter-array cables and subsea export cables.

4.1 GEOLOGY, HYDROGEOLOGY AND GROUND CONDITIONS

Screening

- 4.1.1 The only potential impacts on geology, hydrogeology and ground conditions which might arise from AMEP and the Compensation Scheme and which have the potential to act cumulatively with other projects are pollutant migration within the groundwater, saline intrusion into the chalk aquifer, and dredge disposal. All other potential impacts (e.g. encountering contaminated land, ground gas) are site-specific.
- 4.1.2 The works at AMEP are not identified as having any significant impacts on the groundwater which might act cumulatively with impacts from other projects. There is the potential for some migration of contaminants into the groundwater from the contaminated land identified at Cherry Cobb Sands; however, this will not be impacted upon or exacerbated by the works included in this application.
- 4.1.3 The ES for AMEP concluded that saline intrusion into the chalk was not a significant impact of AMEP, as the material covering the chalk does not currently prevent substantial saline intrusion; no mitigation was found to be necessary, as saline intrusion is occurring anyway. Any project acting cumulatively with AMEP is unlikely significantly to alter this impact.
- 4.1.4 The cumulative impacts of dredging and dredge disposal from AMEP and other projects has been assessed in the dredge strategy submitted as part of the application, as Annex 7.6 of the ES.
- 4.1.5 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.1 Cumulative Projects Screening

Project	
Able UK Area F	Screened out - the site is terrestrial.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened out - the site is terrestrial.
Projects in the Humber Estuary	

Project	
Donna Nook Managed Realignment Scheme	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Maintenance Dredging	Included in cumulative assessment included in Annex 7.6 of ES.
Immingham Oil Terminal Approach Channel Deepening	Included in cumulative assessment included in Annex 7.6 of ES.
Green Port Hull	Included in cumulative assessment included in Annex 7.6 of ES.
Grimsby Ro Ro	Included in cumulative assessment included in Annex 7.6 of ES.
Hull Riverside Bulk Terminal	Included in cumulative assessment included in Annex 7.6 of ES.
Humber Flood Risk Management Strategy	Screened out – plan gives rise to no cumulative effects.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out – plan gives rise to no cumulative effects.
Land East of Falkland Way, North Lincolnshire	Screened out – already constructed.
Ursa Glass Wool Factory	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Bioethanol Plant (Bioethanol Ltd.)	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
North Killingholme Power Project	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
DRAX Heron Renewable Energy Plant	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – plan gives rise to no cumulative effects.
Aeolian Wind Turbines	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Bio Power / Fuel	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Bioethanol Plant (Abengoa Bioenergy)	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Bioethanol Plant (Vireol PLC)	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Europarc	Screened out – already constructed.
Industrial Park	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out – plan gives rise to no cumulative effects.
Tidal Stream Generator	Not considered in dredge strategy, as involves no dredging.

Project	
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – plan gives rise to no cumulative effects.
Farmmarsh Farm	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Thorngumbald Windfarm	Screened out – application withdrawn.
Country Park Inn	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Bioethanol facility, Saltend Lane, Preston	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Energy from Waste facility	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Humber Gateway on-shore installation	Included in the cumulative impact assessment in Ch 31 of the ES for the application.
Mixed use south of Brough	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Biomass power station	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.
Other Projects	
Humber Gateway Wind Farm	Screened out – sufficiently remote from site that no cumulative impacts on ground conditions can occur.

Potential Impacts

- 4.1.6 As detailed in *Table 4.1*, all projects with the potential to have a cumulative impact with AMEP in terms of dredging have been considered within the dredge strategy, with the exception of the Tidal Stream Generator.

Tidal Stream Generator

- 4.1.7 This project had not been included in the cumulative and in-combination assessment of dredging and dredge disposal set out in the dredge strategy, because in itself it involves no dredging activity. The ES for the Tidal Stream Generator states that the device is not expected

to interfere with the dredging and dredged channel material disposal activities given its distance away from the main navigational channel and the main disposal areas. Accordingly, it is not anticipated to have any additional cumulative impacts with AMEP or the Compensation Scheme.

4.2 *HYDRODYNAMIC AND SEDIMENTARY REGIME*

Screening

4.2.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.2 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened out - the project is contained on land.
Able UK Area C	Screened out - the project is superseded by AMEP.
Able UK Area E	Screened out - the project is superseded by AMEP.
Able UK Northern Area	Screened out - the use of the foreshore will be minimal and temporary, and impacts on the hydrodynamic and sedimentary regime will be negligible.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - the scheme is sufficiently outside of the estuary and small enough that its contribution to in combination impacts within the estuary will be negligible.
Maintenance Dredging	Screened in
Immingham Oil Terminal Approach Channel Deepening	Screened in
Green Port Hull	Screened in
Grimsby Ro Ro	Screened in
Hull Riverside Bulk Terminal	Screened in
Humber Flood Risk Management Strategy	Screened in
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - the strategy does not define any specific development that may impact upon the hydrodynamic and sedimentary regime.
Land East of Falkland Way, North Lincolnshire	Screened out - the project is contained on land.
Ursa Glass Wool Factory	Screened out - the project is contained on land.
Bioethanol Plant (Bioethanol Ltd.)	Screened out - the project is contained on land.
North Killingholme Power Project	Screened out - the project is contained on land.

Project	
DRAX Heron Renewable Energy Plant	Screened out - the project is contained on land.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - the strategy does not define any specific development that may impact upon the hydrodynamic and sedimentary regime.
Aeolian Wind Turbines	Screened out - the project is contained on land.
Bio Power / Fuel	Screened out - the project is contained on land.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - the project is contained on land.
Bioethanol Plant (Vireol PLC)	Screened out - the project is contained on land.
Europarc	Screened out - the project is contained on land.
Industrial Park	Screened out - the project is contained on land.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - the strategy does not define any specific development that may impact upon the hydrodynamic and sedimentary regime.
Tidal Stream Generator	Screened out - the impacts of the generator on the hydrodynamic and sedimentary regime within the estuary will be extremely localised. The contribution to in combination impacts will be negligible.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - the strategy does not define any specific development that may impact upon the hydrodynamic and sedimentary regime.
Farmmarsh Farm	Screened out - the project is contained on land.
Thorngumbald Windfarm	Screened out - the project is believed to have been withdrawn from the planning system.
Country Park Inn	Screened out - the project is contained on land.
Bioethanol facility, Saltend Lane, Preston	Screened out - the project is contained on land.
Energy from Waste facility	Screened out - the project is contained on land.
Humber Gateway on-	Screened out - the project is contained on land.

Project	
shore installation	
Mixed use south of Brough	Screened out - the project is contained on land.
Biomass power station	Screened out - the project is contained on land.
Other Projects	
Humber Gateway Wind Farm	Screened out - the turbines will be sufficiently far outside of the estuary that the contribution to the in combination impacts from the farm will be negligible.

Potential Impacts

- 4.2.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Maintenance Dredging

- 4.2.3 The frequency of maintenance dredging and disposal is likely to increase from current levels due to the additional berthing pockets associated with the proposed developments. The potential impacts of such an increase will be more frequent periods of increased suspended sediment concentrations (SSCs) at the disposal site and surrounding area, combined with increased dispersal of dredged sediment settling to the bed throughout the estuary.

Immingham Oil Terminal Approach Channel Deepening, Green Port Hull, Grimsby Ro Ro, Hull Riverside Bulk Terminal, Humber Flood Risk Management Strategy

- 4.2.4 These projects represent bathymetric and topographic changes within the Humber Estuary that will impact upon the hydrodynamic and sedimentary regime (the Humber Flood Risk Management Strategy specifies the construction of numerous managed realignment sites). Sensitive receptors and potential impacts are described below.

Inter-tidal areas and habitats

- 4.2.5 Impacts on water levels and flow regimes due to bathymetric and topographic changes may lead to increased/decreased inter-tidal area and changes to accretion/erosion patterns. Changing bed levels at the disposal site may affect the wave climate, leading to changes in wave energy reaching the inter-tidal areas, subsequently affecting local morphology.

Sub-tidal areas, maintained dredged areas (SDC, ports), Gas pipelines near Halton Middle

- 4.2.6 Impacts on flow regimes due to bathymetric and topographic changes may lead to changes in estuary sedimentation patterns and morphology that could affect maintenance dredging requirements, or further expose subsurface pipelines.

Mitigation and Residual Impacts

Maintenance Dredging

- 4.2.7 Routine disposal of maintenance dredge arisings leads to temporary and minor increases in Suspended Sediment Concentrations (SSCs) in the estuary. The increased concentrations reduce to background values within a matter of days, with dredged sediment being kept in suspension until floc formations lead to it dropping out and being distributed thinly (sub-millimetric) around the estuary bed. The sediment is maintained within the estuary system.
- 4.2.8 The cumulative effect of additional maintenance dredging would be to increase the periods of temporary SSC increases and dispersal of dredged material around the estuary bed. In this sediment-rich environment the impact on temporary SSCs near to the disposal site would be minor, and negligible on estuary-wide, long-term SSCs.
- 4.2.9 The dredging and disposal process redistributes sediment back in to the estuary system, which had previously settled within berthing pockets. Therefore, there will be no impact in terms of changes to estuary sediment type or long-term background SSCs. The dispersal of this sediment throughout the estuary will give a neutral impact.
- 4.2.10 The cumulative impacts associated with these developments in combination with AMEP are listed in *Table 4.3*.

Table 4.3 Cumulative impacts due to development

Sensitive Receptors	Cumulative Impacts
Inter-tidal areas and habitats	<p>Localised minor impact (north bank inter-tidal area near disposal site) / no estuary-wide impact</p> <p>The changed bathymetry due to the in combination developments in the Outer Humber Estuary (AMEP full disposal at HU082, in combination disposal at HU081, SDC deepening) will lead to very small changes in the wave climate (due to wave refraction), which will lead to a minor localised impact on inter-tidal morphology. This is likely to take the form of localised change across affected soft sediments with channelling possible. The mudflats around</p>

Sensitive Receptors	Cumulative Impacts
	<p>Hawkins Point will be subject to potential change in the form of channel development. Any potential new morphology will likely mimic the channels of the mudflats farther to the east.</p> <p>Changes to water levels due to the proposed developments acting in combination are within model uncertainty bounds, and therefore no change is predicted.</p> <p>Potential decreases in current speeds in the Middle Estuary due to all other developments (except the AMEP quay) are offset by potential increases due to the quay. The additional cumulative impact of all in combination developments is negligible (all impacts are local to each development).</p>
Sub-tidal areas, maintained dredged areas (SDC, ports), Gas pipelines near Halton Middle	<p>No impact/minor beneficial impact for subsurface gas pipelines</p> <p>The cumulative change to current speeds in the Middle Estuary is negligible and this means that the potential impact on bed morphology here is also negligible. In general, in the sub-tidal area, the in combination cumulative impacts at the disposal sites are no greater than those due to the SDC deepening and AMEP full disposal individual impacts.</p> <p>The small reduction in current speeds due to the HRBT contribution may be of beneficial impact to the gas pipelines, potentially increasing bed stability and reducing the currently observed erosion here.</p>

4.3 WATER AND SEDIMENT QUALITY

Screening

4.3.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.4 Cumulative Projects Screening

Project	
Able UK Area F	Screened in - increased quantities of surface water run-off from paved areas and change in surface water quality due to change in land use.
Able UK Area C	Screened out - the project is superseded by AMEP.
Able UK Area E	Screened out - the project is superseded by AMEP.
Able UK Northern Area	Screened in - increased quantities of surface water run-off from paved areas and change in surface water quality due to change in land use. Potential cumulative positive impact on ecology due to habitat creation.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - scheme does not cause any significant changes to water or sediment quality in the middle or outer

Project	
	Humber Estuary that could act cumulatively with the AMEP project.
Maintenance Dredging	Screened in - elevated turbidity and disposal of dredged material.
Immingham Oil Terminal Approach Channel Deepening	Screened in - removal and disposal of large quantities of sediment within the Humber Estuary.
Green Port Hull	Screened in - surface water run-off and potential accidental release of polluting substances.
Grimsby Ro Ro	Screened in - surface water run-off and potential accidental release of polluting substances.
Hull Riverside Bulk Terminal	Screened in - surface water run-off and potential accidental release of polluting substances.
Humber Flood Risk Management Strategy	Screened out - strategy does not affect water or sediment quality. It will be discussed in terms of the policy context for the included developments, however.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - strategy does not affect water or sediment quality. It will be discussed in terms of the policy context for the included developments, however.
Land East of Falkland Way, North Lincolnshire	Screened out - drainage associated with this road widening scheme goes to sewer and the existing drainage gullies are replaced by new ones resulting in no net change to drainage reaching the Humber Estuary.
Ursa Glass Wool Factory	Screened out - an onshore facility that does not interact with the estuarine environment.
Bioethanol Plant (Bioethanol Ltd.)	Screened in - additional information is required to clarify mitigation measures implemented to prevent soil and water contamination. Sediments may enter surface runoff during construction resulting in potential cumulative effects.
North Killingholme Power Project	Screened in - cooling water intakes and discharges will be introduced to the Humber Estuary.
DRAX Heron Renewable Energy Plant	Screened in - potential risks of contamination to controlled waters were identified by the ES.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - strategy does not affect water or sediment quality. It will be discussed in terms of the policy context for the included developments however.
Aeolian Wind Turbines	Screened out - two wind turbines will be located approximately 1.5km from the coast with no significant emissions to water.
Bio Power / Fuel	Screened out - appropriate site management and the adoption of mitigation measures to prevent the release of contaminants prevent emissions to water from this site.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - appropriate site management and the adoption of mitigation measures to prevent the release of contaminants prevent emissions to water from this site.

Project	
Bioethanol Plant (Vireol PLC)	Screened out - brownfield site with soil and groundwater contamination associated with past industrial use. Appropriate site management will prevent the release of contaminants during construction. Operational mitigation measures will be implemented to further prevent the release of historical contamination and pollutants from the site.
Europarc	Screened out – already constructed.
Industrial Park	Screened in - discharge of surface runoff to watercourses with potential soil contamination associated with past land use.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - strategy does not affect water or sediment quality. It will be discussed in terms of the policy context for the included developments however.
Tidal Stream Generator	Screened out - no anticipated emissions to water or sediment
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - strategy does not affect water or sediment quality. It will be discussed in terms of the policy context for the included developments however.
Farmmarsh Farm	Screened out - three onshore wind turbines located approximately 2.5km inland from the Humber Estuary with no emissions to water or sediment.
Thorngumbald Windfarm	Screened out - proposal withdrawn.
Country Park Inn	Screened out - located on the north bank of the Humber but with no direct discharges to estuary.
Bioethanol facility, Saltend Lane, Preston	Screened out - brownfield site that exhibits soil and groundwater contamination associated with past industrial use. Appropriate site management and mitigation measures will prevent the release of contaminants during construction and operation.
Energy from Waste facility	Screened out - project is on hold indefinitely.
Humber Gateway on-	Screened in - mobilisation of pre-existing soil contaminants

Project	
shore installation	during cable route excavations at the Salt End chemical works and Easington/Skeffing landfall areas.
Mixed use south of Brough	Screened in - potential soil contamination and increased surface water drainage into the estuary
Biomass power station	Screened out - no significant emissions to water or soil.
Other Projects	
Humber Gateway Wind Farm	Screened out.

Potential Impacts

- 4.3.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Area F

- 4.3.3 The paving of agricultural land at Able UK Areas F will increase the quantity of surface water run-off originating from this site and it will also produce foul drainage and vehicle wash bay effluent during construction. There is no potential for drainage of any kind to reach the Humber Estuary from this site and there is no cumulative impact to controlled waters.

Able UK Northern Area

- 4.3.4 The drainage management plan developed for this site incorporates surface water and foul sewage drainage systems including the improvement of existing drainage ditches. A new outfall will discharge water from these systems into the Humber Estuary. The ES for this project assessed this effluent as having no beneficial or adverse impacts on the water regime and overall water and sediment quality of the receiving water. Risk of oil and fuel contamination from the site is mitigated through a comprehensive oil spill response strategy and the land use change from agriculture to industry will reduce risk of agricultural chemicals and nutrients entering the Humber Estuary from the site. The cumulative impact between the Able UK Northern Area and the Project is not significant.

Maintenance Dredging (ABP)

- 4.3.5 Maintenance dredging regularly occurs at locations including Sunk Dredged Channel, Grimsby, Immingham, Saltend Jetty, Hull docks, Goole docks, and the lower reaches of the Rivers Ouse and Trent. This results in the disturbance of sediments with associated elevated turbidity and sediment plumes and the potential release of

contaminants from buried sediments. The frequency and duration of these works vary between sites depending on the local siltation regimes. Although the Humber Estuary is a highly turbid environment, there is potential for elevated turbidity from these works to cumulatively impact water and sediment quality should they coincide with construction activities at the AMEP site. This is likely to be a minor impact of short duration.

Immingham Oil Terminal Approach Channel Deepening

- 4.3.6 The removal and disposal of large quantities of dredged sediment from the approach channel has the potential to impact water and sediment quality by changing concentrations of suspended sediment within the Humber Estuary, by releasing contaminants from buried sediments, and by altering levels of nutrients and bacteria in the water column. There is also a potential impact from accidental spillages where vessels operations have to change to accommodate the channel deepening works. In relation to background levels and natural variability, the ES for this project found impacts to water and sediment quality from elevated suspended sediments as a result of dredging operations to be negligible, and from the subsequent disposal of dredged material to be minor. The concentrations of pollutants and metals calculated to be returned to the water column via the dredger spillways were also found to be negligible in relation to background levels, with no significant impact on water or sediment quality. The Humber's extensive navigational procedures and features are adequate for minimising the risk of accidents and spills and the Humber Estuary Emergency Response Plan details the appropriate responses to any pollution events that may occur.

Green Port Hull

- 4.3.7 The ES for this project identified minor adverse impacts to water quality from contaminated runoff entering the Humber Estuary and the disturbance of contaminated sediments. A moderate adverse impact on water quality was also identified in relation to the potential for an accidental leakage or spillage of pollutants. These impacts were determined as localised, temporary, and unlikely to occur given the stringent mitigation measures in place. No residual effect on the WFD status of the Humber Estuary was identified. Similar impacts to the Holderness drain were also identified but this water course is on the north bank of the Humber so there is no potential for cumulative impacts from the AMEP project to this water body.

Grimsby Ro Ro

- 4.3.8 Potential impacts from the Grimsby Ro Ro Berth are identified in the project's ES as relating to changes to suspended sediment levels from dredging and disposal operations (assessed as minor significance), changes to contaminant, nutrient and bacterial levels from dredging and disposal operations (assessed as insignificant/minor significance for contaminants and bacteria and as insignificant for nutrients), changes to sediment quality from disposal operations (assessed as minor/insignificant), changes to vessel operations causing an increased risk of spillages from accidents (assessed as minor/insignificant assuming the use of best practice accident response management plans), and effects on water quality of maintenance dredging and the use of a sediment agitator during terminal operation (assessed as minor significance).

Hull Riverside Bulk Terminal

- 4.3.9 The potential impacts to water and sediment quality from the construction of this project are identified as resulting from contaminated runoff entering watercourse and the leakage or spillage of pollutants. The magnitude of this type of impact would depend on the scale and nature of the incident so was assessed in the ES as being of major significance with regard to a local impact but minor within the context of the Humber Estuary as a whole. No significant impact as a result of the disturbance of contaminated sediments was identified but minor impacts to the Humber Estuary were identified with regard to suspended sediments in site runoff and pollution from foul drainage and waste storage. Major local operational impacts could occur from the accidental spillage of pollutants such as dry bulks, fuels, or foul water but these were assessed as being of minor significance within the context of the wider Humber Estuary. Detailed mitigation measures and environmental management plans were referred to in the ES that would negate the possibility of impacts to water and sediment quality occurring during construction or operation, but it is recognised that there is a residual risk to the Humber Estuary as a result of accidental uncontrolled spillages or leaks.

Bioethanol plant (Bioethanol Ltd)

- 4.3.10 This site poses a risk of contamination to local surface water courses including the Humber Estuary by suspended sediments from earthworks during construction and the accidental spillage of cement and hydrocarbons. The early installation of site drainage systems to intercept surface runoff to the Humber and best practice site management to minimise the risk of accidents is expected to be

sufficient in ensuring that no significant impacts to water and sediment quality can arise during construction. A drainage lagoon will store and treat operational surface runoff so there will be no discharges of this type into the Humber. Process water releases will be minimised through the recycling of water through the plant. Design measures such as the installation of appropriate bunding (110% tank capacity) around liquid storage tanks will also prevent release of potential contaminants in the event of an accident. If the above mitigation measures are implemented then it is anticipated that no cumulative effects will arise from this site.

North Killingholme Power Project

- 4.3.11 The extraction and discharge of estuarine water used in the cooling process of this power plant will be managed by an environmental permit from the Environment Agency under the Environmental Permitting Regulation (2010). The environmental impacts of a consented discharge of this type on water quality are not significant within the context of such a large water body and given that the AMEP project will not discharge cooling water, there is no anticipated cumulative impact between the two projects.

DRAX Heron Renewable Energy Plant

- 4.3.12 No significant evidence of contaminated soils was observed within the main plant area during site investigations. Levels of selenium, zinc, sulphide, PAH and benzene have been recorded on site at levels exceeding relevant water quality standards. It is anticipated that appropriate site management and dilution of such contaminants in the Humber is sufficient to mitigate any potential risk to environmental receptors and that no active site remediation is considered necessary to mitigate potential negative environmental effects. Given that the previous land uses of the AMEP site do not pose any significant risk of land contamination, no cumulative impact to water or sediment quality is expected between the DRAX Heron Renewable Energy Plant and the AMEP project.

Bioethanol plant (Abengoa Bioenergy)

- 4.3.13 Construction earth works may lead to increased suspended sediment levels in surface water courses. There is also a risk of accidental spillage of contaminants such as cement, lime and hydrocarbons into surface waters that may ultimately enter the Humber. A construction environmental management plan will be developed and implemented to ensure that potential impacts associated with construction are minimised. During operation, storage tanks will be equipped with

appropriate bunds in accordance with the CIRIA/Environment Agency Joint Guidelines. Pollution prevention equipment will also be present on site to ensure appropriate action can be taken in the case of an accident. If the above mitigation measures are appropriately adhered to it is anticipated that no cumulative effects will arise from this site

Industrial Park (Magna Holdings)

- 4.3.14 The construction of this site will involve earth works that may result in increased suspended sediment levels in surface runoff to the Humber Estuary. The site has been subject to past industrial contamination by gypsum, which could slightly increase localised pH if released to surface water but is largely inert so is considered unlikely to have any significant impact on water quality. The operational site will include large areas of impermeable surfaces with an increased rate and quantity of surface runoff flow. This will be discharged into the Habrough Marsh Drain before flowing into the Humber Estuary. The industries likely to use this site are not yet known but any discharges to surface waters that future operators may make will be subject to consent by the Environment Agency. Assuming all discharges to surface waters from this industrial park are controlled by environmental permit then there is no cumulative impact predicted to the Humber Estuary or other surface water bodies.

Bioethanol plant (Vireol PLC)

- 4.3.15 Construction activities may mobilise soil contaminants associated with past industrial use on the site that could enter the Humber Estuary via existing on-site surface water drainage systems. Pre-construction site surveys have indicated levels of zinc, sulphide, total petroleum hydrocarbons (TPH), volatile organic compounds (VOC), and semi-volatile organic compounds (SVOC). Environmental and waste management plans will prevent the release of these substances and safeguard construction worker health and safety. The additional spillage of hydrocarbons and other construction related chemicals may also pose a risk to water and sediment quality. This risk will be minimised through best practice storage methods and the implementation of an appropriate accident management plan.
- 4.3.16 During operation, storage facilities for liquids, waste, and hazardous materials will be equipped with appropriate containments and bunds to contain any accidental releases and to prevent any contaminated surface runoff. The site will also be equipped with appropriate spill clean-up equipment should any uncontrolled release occur. If the

above mitigation measures are appropriately adhered to it is anticipated that no cumulative effects will arise from this site

Bioethanol facility, Saltend Lane, Preston (Vivergo Fuels)

- 4.3.17 The site is located on part of the existing BP Saltend chemical works and as such there is the potential for pre-existing soil contamination on the site. Contaminants identified by past surveys include various phthalate, BTEX and PAH compounds. These may be disturbed and mobilised by construction activities with potential for them to enter surface waters. The Preston New Drain that flows through the site represents a significant sediment pathway in the event of a contaminant release. Accidental leaks and spills of contaminants such as hydrocarbons and concrete materials may also occur during construction. It is anticipated that appropriate site management and best practice according to the Code of Construction Practice (CoCP) will prevent any potential construction impacts to water or sediment quality. This will include specific measures to protect the Preston New Drain. During operation, process waters will be treated and discharged within agreed limits. Drainage systems will be encouraged to drain away from the Preston New Drain. Effluent pits and firewater lagoons will be designed to segregate contaminated waters from underlying sediments. Appropriate management plans will be developed to minimise risk of accidental contaminant discharge. Assuming all discharges to surface waters are within the limits set by the Environment Agency, and contaminated soils are appropriately contained the potential cumulative impacts associated with this site are considered to be negligible

Humber Gateway on-shore installation

- 4.3.18 The installation of the onshore cable will require earth works within a section of the Salt End chemical works site with a high probability of encountering contaminated soils. Disturbance of contaminated soils may result in the mobilisation and release of pollutants into surface water runoff that may ultimately drain into the Humber. The ES for these works states that appropriate measures will be in place to contain runoff from potentially contaminated soils. Assuming that best practice mitigation and environmental management is adhered to then no significant impacts on water quality are anticipated from this site.

Mixed use south of Brough

- 4.3.19 Construction activities will involve earth works that may increase levels of suspended sediments in surface runoff. The site itself is predominantly undeveloped due to its past use as an airfield by British

Aerospace. However, desk studies conducted for the ES have revealed potential for localised soil contamination from waste disposal including possible ammunitions, the use of runway de-icers, and two redundant fuel storage tanks. Disturbance of such contamination may result in the mobilisation of pollutants into surface water runoff. It is likely that any such contamination associated with past land use is localised but additional data is required to fully assess its nature and extent. The operational site will include large areas of impermeable surfaces that will increase surface runoff rates and quantities that will enter the Humber as a pathway for contaminants associated with future site activities. Assuming all discharges by future users are consented under environmental permit from the Environment Agency, potential cumulative impacts associated with operation are anticipated to be negligible.

Mitigation and Residual Impacts

- 4.3.20 The impacts on water and sediment quality from each of the projects scoped into this assessment relate to short term localised effects associated with dredging activities, the uncontrolled release of surface water drainage and foul water, and the accidental spill or leak of pollutants such as fuels, oils, chemicals, or cargo. Cumulative impacts from dredging operations can be mitigated by scheduling the coastal works and dredging associated with the quay construction of the AMEP project that might also give rise to elevated turbidity or the release of contaminants to avoid coincidence with the dredging plans for other projects. This will ensure that any associated impacts remain within the boundaries of natural variability for this water body and that there are is no detrimental change to its WFD status.
- 4.3.21 Surface water discharges from the projects considered will be appropriately controlled in compliance with Environment Agency standards and permits such that there is no significant from, there is no significant cumulative impact expected to arise between the AMEP project and other projects on the Humber.
- 4.3.22 Where accidental leaks or spills happen simultaneously at the AMEP site and other sites, there is potential for a cumulative impact on water and sediment quality. The likelihood of simultaneous events in the same locality of the Humber is low and assuming that best practice storage of contaminants is undertaken and that emergency spill response management plans are in place at all relevant sites, there is little possibility of a significant impact to the water quality of the Humber Estuary.

4.4

AQUATIC ECOLOGY

Screening

- 4.4.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.5 Cumulative Projects Screening

Project	
Able UK Area F	Screened out - agricultural land will be converted to hard standing which will potentially increase the area for surface run off to the Estuary, however, this is not considered large enough to potentially negatively interact with aquatic ecology receptors.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened in - large area of land to be converted to hard standing with subsequent run off to intertidal area. Loss of 1.1 ha of intertidal area, increased surface runoff and possibly of contaminants to intertidal area with possible negative interactions with intertidal ecology.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened in - creation of intertidal habitat which will support aquatic ecology, although located far from AMEP site.
Maintenance Dredging	Screened out - potential interactions with aquatic ecology receptors from noise and the alteration of sedimentary regimes. However, given these are ongoing operations in several locations within the Estuary, these projects are considered part of the baseline environment for the EIA.
Immingham Oil Terminal Approach Channel Deepening	Screened in - potential interactions with aquatic ecology receptors from noise, alteration of bottom topography and sedimentary regimes or budgets.
Green Port Hull	Screened in - potential interactions with aquatic ecology receptors from noise (piling), changes to flow and water quality and changes to drainage into the Estuary.
Grimsby Ro Ro	Screened in - potential interactions with aquatic ecology receptors from noise (piling), changes to water quality and loss of habitats.
Hull Riverside Bulk Terminal	Screened in - potential interactions with aquatic ecology receptors from noise, habitat loss sedimentary regimes and water quality.
Humber Flood Risk Management Strategy	Screened in - potential interactions with aquatic ecology receptors from the creation of new intertidal habitat.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - unlikely to interact with aquatic ecology receptors.

Project	
Land East of Falkland Way, North Lincolnshire	Screened out - this development is in existence and is therefore considered within the baseline environment for the EIA.
Ursa Glass Wool Factory	Screened out - unlikely to interact with aquatic ecology receptors.
Bioethanol Plant (Bioethanol Ltd.)	Screened out - unlikely to interact with aquatic ecology receptors.
North Killingholme Power Project	Screened in - potential interaction with aquatic ecology receptors due to discharge of cooling water, process and waste effluents into the River Humber.
DRAX Heron Renewable Energy Plant	Screened out - potential interaction with aquatic ecology receptors due to discharge of cooling water, process and waste effluents into the River Humber. However negligible impacts are predicted to aquatic ecology and therefore it is not considered that the contribution should be considered further in this CIA.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - unlikely to interact with aquatic ecology receptors.
Aeolian Wind Turbines	Screened out - unlikely to interact with aquatic ecology receptors.
Bio Power / Fuel	Screened out - unlikely to interact with aquatic ecology receptors.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - unlikely to interact with aquatic ecology receptors.
Bioethanol Plant (Vireol PLC)	Screened out - unlikely to interact with aquatic ecology receptors.
Europarc	Screened out - this development is in existence and is therefore considered within the baseline environment for the EIA.
Industrial Park	Screened out - unlikely to interact with aquatic ecology receptors.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - unlikely to interact with aquatic ecology receptors.
Tidal Stream Generator	Screened in - this project is now in existence which was not the case at the time of preparation of the EIA. The project has potential interactions with aquatic ecology receptors during operation due to potential disturbance to benthic communities due to changes of tidal currents and sediment.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	

Project	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - unlikely to interact with aquatic ecology receptors.
Farmmarsh Farm	Screened out - unlikely to interact with aquatic ecology receptors.
Thorngumbald Windfarm	Screened out - proposal withdrawn.
Country Park Inn	Screened out - unlikely to interact with aquatic ecology receptors.
Bioethanol facility, Saltend Lane, Preston	Screened out - unlikely to interact with aquatic ecology receptors.
Energy from Waste facility	Screened out - unlikely to interact with aquatic ecology receptors.
Humber Gateway on-shore installation	Screened out - unlikely to interact with aquatic ecology receptors.
Mixed use south of Brough	Screened out - unlikely to interact with aquatic ecology receptors.
Biomass power station	Screened out - unlikely to interact with aquatic ecology receptors.
Other Projects	
Humber Gateway Wind Farm	Screened in - potential interactions with aquatic ecology receptors from noise, changes to water quality and sedimentary regime and loss of habitats.

Potential Impacts

- 4.4.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Northern Area

- 4.4.3 This project is located close to the development site with a small footprint within the Estuary, resulting in a small loss of intertidal area and the installation of a new outfall for the application site's drainage.
- 4.4.4 A flow of water will be discharged from the site, over the intertidal zone and into the Humber Estuary throughout the 4 years of construction (2014 to 2016) and the operation of the development. This flow, over time, is expected to alter the nature of the intertidal habitat and a channel is expected to form and be visible at low tide affecting a localised area of intertidal habitat. At high tide, the outfall will have no impact on any ecological receptors. However, at low tide the outfall

will form a stream that will cross the estuary bed and cut through the mudflats to the low tide level, changing the nature of the mudflat. The ES⁽¹⁾ for the project reports that discussions held with Natural England have confirmed that this change is not considered to be an adverse impact on the mudflats and although the habitat will change and is likely to be used differently, no adverse impacts on the integrity of the cSAC, SPA, Ramsar site, SSSI or UKBAP habitat are expected. Therefore these works are likely to have a negligible impact on cSAC, SPA, Ramsar site, SSSI and UK BAP habitat.

4.4.5 During operation treated surface run-off and drainage will be discharged from the site, containing residual contaminants such as suspended sediments and oils, and will flow directly into the Humber Estuary. With the application of mitigation measures embedded into the site drainage system, the chances of any pollution impacting to the Estuary are low enough to be considered negligible.

4.4.6 Given the negligible nature of the impacts reported, and the small localised footprint of the intertidal area that this affects, it is unlikely that this project will contribute significantly to overall cumulative impacts to AMEP aquatic ecology receptors.

Donna Nook Managed Realignment Scheme

4.4.7 This managed realignment scheme aims to provide a better standard of flood protection than the existing tidal defences and to create intertidal habitats (111 ha) to compensate for habitat losses in the outer part of the Humber Estuary. The site is located on the south bank of the Humber Estuary to the south east of the AMEP site, outwith the 10 km study area.

4.4.8 The site is likely over time to develop into saltmarsh habitat which will provide additional suitable habitat for juvenile fish. The proposals also include the provision of a fish scarer to reduce the existing risk of fish entrapment and mortality in pumping machinery.

4.4.9 This increase in intertidal habitat may contribute in a beneficial way towards the cumulative impacts associated with intertidal habitat loss within the Humber Estuary in a regional context but is unlikely to contribute to any cumulative impacts that may be experienced by AMEP aquatic ecology receptors given the significant distance from the site.

¹ Alab Environmental Services Ltd (2009), Able Humber Ports Facility Northern Area Environmental Statement

Immingham Oil Terminal Approach Channel Deepening

- 4.4.10 This project is located just outside the 10 km study area, in the mouth of the Humber Estuary to the south east of the project site. The deepening of the Immingham Oil Terminal approach will involve a continuing of current dredging operations to a greater extent. The operations will involve the removal and relocation of 427 ha ⁽¹⁾.
- 4.4.11 Given the localised nature of the impacts that are reported for the project, it is unlikely that the project will contribute significantly to cumulative impacts experienced by AMEP aquatic ecology receptors. However, in a regional context the project will contribute to the cumulative loss and disturbance of subtidal habitats within the Humber Estuary.

Green Port Hull

- 4.4.12 The Green Port Hull Project is to be located just outside the 10 km study area to the north west of the AMEP site on the north bank of the Humber Estuary. The project will generate a 4.5 ha loss of intertidal habitat which is considered to result in a minor significant impact in isolation and a 3 ha loss of subtidal habitat due to the reclamation.
- 4.4.13 Other effects of the proposed development will include minor significant noise impacts to fish from piling, moderate – minor significant localised impacts from changes to flow, moderate impacts to water quality and moderate beneficial impacts to the drainage of the site.

Grimsby Ro Ro

- 4.4.14 The Grimsby Ro Ro Project is located just outside the 10 km study area to the south east of the AMEP site, on the south bank of the Humber Estuary. The project will generate a small amount of habitat loss including 60 m² of intertidal habitat and 30 m² of subtidal habitats from piling activities. The project will have an overall minor significant impact to benthic species in the local area, and an insignificant impact to species elsewhere in the Estuary. Minor to insignificant impacts are also predicted to fish species from the piling activities, and to water quality from changes to the sedimentary regime.

¹ Associated British Ports and Total Lindsey Oil Refinery (2009) Immingham Oil Terminal Approach Channel Dredging Environmental Statement.

- 4.4.15 Given the localised nature of the impacts and the small scale of the project, the project is unlikely to contribute to any cumulative impacts experienced by AMEP aquatic ecology receptors. The project will make a small contribution to the cumulative loss of intertidal and subtidal habitats within the Humber Estuary.

Hull Riverside Bulk Terminal

- 4.4.16 The Hull Bulk Terminal Project is located within the 10 km study area and is situated on the north bank of the Humber Estuary to the north west of the AMEP site. It will generate the relocation of 7.8 ha of surface sediments and 280 ha of subtidal habitat due to capital dredging, the loss of 9 m² of intertidal habitat and 120 m² of subtidal habitat due to piling. These habitat losses are assessed as insignificant and the direct impacts to subtidal habitats and benthic species are predicted to be of minor significance during the capital dredging. The project will make a small contribution to the cumulative loss and disturbance of intertidal and subtidal habitats within the Humber Estuary.

Humber Flood Risk Management Strategy

- 4.4.17 Similar to the Donna Nook Managed Realignment Scheme outlined above, the Humber Flood Risk Management Strategy proposes the creation of natural areas through similar schemes. These projects will similarly provide additional suitable habitat for juvenile fish. The project will generate an increase in intertidal habitat and subsequently may contribute in a beneficial way towards the cumulative impacts associated with intertidal habitat loss within the Humber Estuary in a regional context but is unlikely to contribute to any cumulative impacts that maybe experienced by AMEP aquatic ecology receptors.

Tidal Stream Generator

- 4.4.18 The Neptune Proteus Tidal Stream Generator is currently in operation in the Humber Estuary.
- 4.4.19 The project includes a small amount of habitat loss due to the installation of piles and 1 km of cabling during construction. However, this is considered negligible in the assessment provided. During operation the project is anticipated to disturb benthos and epifauna over an area of 2 km². This is assessed as having a localised and minor significant impact to the communities.

- 4.4.20 Given the localised nature of the impacts and the small scale of the project, the project is unlikely to contribute to any cumulative impacts

experienced by AMEP aquatic ecology receptors. The project will make a small contribution to the cumulative loss and disturbance of intertidal and subtidal habitats within the Humber Estuary.

Humber Gateway Wind Farm

4.4.21 The Humber Gateway Offshore Wind Farm will be located approximately 8-9 km to the north east of the mouth of the Humber Estuary. The ES for the development reports that there will be no significant impacts to intertidal ecology, minor significant impacts that will be localised in nature to subtidal ecology, minor – moderate significant impacts to marine mammals from piling during the construction period and no significant impacts to sensitive fish species such as shad and salmon. Local modelling exercises have also demonstrated that the influence of the wind farm will not extend into the Estuary and will generally be restricted to beyond the coastal zone, ruling out any potential contribution to cumulative impacts of the hydrodynamic regime in the Estuary which could indirectly affect AMEP aquatic ecology receptors.

4.4.22 Given the distance between the developments and the localised nature of the reported impacts, the project is unlikely to contribute to any cumulative impacts experienced by AMEP aquatic ecology receptors.

Mitigation and Residual Impacts

4.4.23 The following sections follow a receptor lead approach, summarising key cumulative impacts to the various aquatic ecology receptors that are identified within the AMEP EIA.

Loss of Habitat and Benthic Communities

4.4.24 The AMEP project will generate a loss of 13.5 ha of subtidal habitat and a loss of 31.5 of intertidal habitat as a result of the quay footprint. The Humber Estuary covers an area of 36,657 ha, of which 26,180 ha is the intertidal and subtidal area of the lower and middle estuary. Therefore the losses that are predicted from the AMEP site along the southern bank and middle section of the Estuary are approximately 0.17% of the total area of estuarine habitat available in the lower and middle estuary. In isolation the AMEP project is assessed as generating a significant impact to the ecosystem structure and functioning.

Table 4.6 below sets out the habitat losses and gains within the Humber Estuary of the projects included within this cumulative assessment.

Table 4.6 *Habitat Loss from Proposed Developments in the Humber Estuary*

Project	Humber Estuary Habitat loss (ha)	Assessment Conclusions from relevant Application Document
AMEP (not including the Compensation Site)	-13.5 subtidal -31.5 intertidal	Significant
Able UK North	-0.1362 – 0.2026 ¹	Negligible
Donna Nook Managed Realignment Scheme	+111	Beneficial
Immingham Oil Terminal Approach Channel Deepening	No loss (relocation)	-
Green Port Hull (not including compensation)	-3.0 subtidal -4.5 intertidal	Minor significant
Grimsby Ro Ro	-0.003 subtidal -0.006 intertidal	Minor significant (locally) Insignificant (Estuary wide)
Hull Bulk Terminal	-0.012 subtidal -0.0009 intertidal	Insignificant
Humber Flood Risk Management Strategy which includes Donna Nook Managed Realignment Scheme	+513 (of which Donna Nook equates to +111)	Beneficial
Tidal Stream Generator	-0.0312	Negligible
Humber Gateway Offshore Wind Farm	None	-

4.4.25 Overall the projects listed above cumulatively account for an approximate loss of 53 ha of estuarine habitat within the Humber Estuary. This is equates to a loss of approximately 0.2% of the total area of estuarine habitat available in the lower and middle estuary, to which the AMEP site contributes significantly. This is offset by the the Humber Flood Risk Management Strategy that will create approximately 513 ha of intertidal habitat. However, this will be generated over a number of years according to the long-term plan outlined in the Humber Flood Risk Management 50 year Strategy.

(1) Alab Environmental Services Ltd (2009) Able Humber Ports Facility Northern Area Environmental Statement

4.4.26 The overall cumulative impact with regard to habitat loss in the Humber Estuary in the shorter term is considered to be significant, however this will be minor in nature. It should be noted that the species impacted by this loss are generally reported to be opportunistic and tolerant to change and recover rapidly from disturbance.

Habitat Change / Disturbance

4.4.27 Habitat disturbance to aquatic ecology is caused mainly by activities such as dredging (the impacts of which are mainly localised) and the deposition of sediment (the impacts of which can be more widespread). The following key projects are identified as causing potential habitat disturbance:

- *Able UK Northern Area*: this project will discharge over the intertidal zone causing a change in habitat over time. Impacts are assessed as localised and negligible;
- *Immingham Oil Terminal Approach Channel Deepening*: minor significant impacts are predicted from dredging activities;
- *Hull Riverside Bulk Terminal*: minor significant impacts are predicted from capital dredging; and
- *Tidal Stream Generator*: during operation minor significant impacts are predicted to an area of approximately 200 ha.

4.4.28 The AMEP project assessment reports no significant impacts with regard to habitat change/disturbance to aquatic ecology. The Compensation Site to be developed on the north bank will increase the quantity of mudflat, compensating for the area lost due to AMEP.

4.4.29 However, it is possible that the projects listed above could impact in a cumulative sense upon AMEP receptors from an increase in suspended sediment. The nature of these impacts is dependent on the distance from the disposal location and the direction of flow.

4.4.30 The Hull Riverside Bulk Terminal will have, if consented, a deposit location for sediment to the north of the AMEP site (Holme Deposit Ground). The temporary plume from this site is assessed to be localised and no significant impacts are predicted.

4.4.31 The Immingham Oil Terminal Approach Channel Project assessment has disposal grounds of up to 576 ha, of which Holme Deep Channel is located closest to the AMEP site. During peak flows there is a plume of

suspended sediment that extends up and downstream of the deposit at this location with mean suspended sediment levels predicted to be up to 50 mg/l above background levels. Peak background levels within the Middle Estuary can exceed 1,000 mg/l on spring tides and are nearly always above 200 mg/l¹.

- 4.4.32 The general enhancement of the suspended sediment concentrations over the period of capital deposits is assessed by ABPmer as negligible when the Estuary background concentration and their natural variability is considered. The dredge and disposal strategy has been designed to minimise impacts by ensuring that the dredged materials are deposited in an appropriate location in terms of the existing habitats and the functioning of the estuary. The effects of the dredge and disposal work on subtidal habitats overall are considered to be of minor significance for this project.
- 4.4.33 The Tidal Stream Generator EIA reports that there will be a reduction in the suspended sediment concentration in the wake region and downstream and upstream of c.25%. This material will be deposited on the bed (and in to the scour pit described earlier) but is likely to be re-eroded during the following tidal cycle. It is concluded that overall the effect on suspended load will be temporary and localised to slack water within the wake region².
- 4.4.34 In conclusion, it seems unlikely that AMEP aquatic receptors will receive additional habitat disturbance impacts from Able UK Northern Area, or the Tidal Stream Generator Projects given the localised nature and small extent of the impacts predicted in the application documents. It is possible given the distance of the Holme Deep Channel deposit ground of the Immingham Oil Terminal Approach Channel Project in particular (that reports minor significant impacts to subtidal habitats) that AMEP aquatic receptors may experience a slight increase in suspended sediment on the fringes of the development area. Even should this occur concurrently with AMEP project activities, then no significant cumulative impacts would be experienced by subtidal habitat receptors.

¹ ABPmer (2009) Immingham Oil Terminal Approach Channel Dredging Environmental Statement

² Institute of Estuarine and Coastal Studies, University of Hull (2007) The River Humber (Upper Burcom Tidal Stream Generator) Order, Environmental Statement

4.4.35 The following projects have been identified as predicting impacts to fish from noise during piling operations:

- Immingham Oil Terminal Channel Deepening (minor impacts to lamprey only);
- Green Hull Port;
- Grimsby Ro-Ro; and
- AMEP.

4.4.36 If simultaneous piling takes place then it is possible that cumulative impacts will be experienced by AMEP fish receptors from Green Hull Port given this is the closest development to the site. However, this is unlikely to increase the level of impacts on receptors significantly.

4.5 *ECOLOGY AND NATURE CONSERVATION*

Screening

4.5.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.7 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened out - no impact anticipated due to low quality of arable land, existing presence of power lines, made ground area and location next to busy road. Limited usage by fauna species
Able UK Area C	Screened out - superseded by AMEP.
Able UK Area E	Screened out - superseded by AMEP
Able UK Northern Area	Screened in - effects on qualifying SPA species are negligible after mitigation is applied although some residual disturbance arising from train movements through North Killingholme Haven Pits (NKHP) will remain. For none European Site features alone and cumulatively moderately negative impacts on skylark and yellowhammer at the local level are reported.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - cumulative impacts likely to be positive for wintering birds through habitat creation.
Maintenance Dredging	Screened out - increase in traffic minor and distant from mudflats supporting important bird numbers. Evidence of habituation to water traffic.
Immingham Oil Terminal Approach	Screened out - effects on waterbirds negligible due to habituation to disturbance and distance from receptors.

Project	
Channel Deepening	
Green Port Hull	Screened in - loss of 4.5 ha of intertidal mudflat and 3 ha of subtidal. Construction and operational disturbance and displacement of birds.
Grimsby Ro Ro	Screened out - ES states impacts on birds could be minor to moderate at local effort however these would be negligible if piling carried out during summer months only. All other effects predicted as negligible.
Hull Riverside Bulk Terminal	Screened in - Loss of 1.4 ha sub-tidal and intertidal habitat utilised by significant numbers of waterbird species throughout the tidal cycle. Cumulative impacts to farmland birds through loss of 31.04 ha of terrestrial habitat.
Humber Flood Risk Management Strategy	Screened out - short term impacts only from disturbance and displacement where flood prevention works implemented. Flood storage sites, realignments and reduction in coastal squeeze will provide long term estuarine habitat creation for waterbirds and other species.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - although promotes development in areas supporting species and habitats which could be considered for cumulative or in-combination effects these can only be properly assessed once component projects & plans have been subject to the regulatory process.
Land East of Falkland Way, North Lincolnshire	Screened out - minor road development at Barton-upon-Humber. Negligible impacts to species. Impacts not listed directly but given location they are likely to be negligible.
Ursa Glass Wool Factory	Screened in - loss of 25 ha site inland from the estuary supporting significant numbers of bird species (including curlew) associated with Humber SPA/Ramsar site and recorded in any numbers at AMEP. Birds of conservation concern including skylark and yellowhammer also breed in the site and will be permanently displaced.
Bioethanol Plant (Bioethanol Ltd.)	Screened out - site considered to be of low ecological value with limited records for breeding birds and low interest. Site also adjacent to existing power station and powerlines.
North Killingholme Power Project	Screened out - EIA work ongoing and currently insufficient information about the likely effects of the proposal. Hence it is not possible to assess cumulative impacts at this stage.
DRAX Heron Renewable Energy Plant	Screened in - site consists of land within AMEP Ecological Mitigation Area and will cause further loss of habitat and disturbance to breeding bird species, wintering wader species and species utilising Rosper Road Pond. Water vole and other ecological interests may also be affected cumulatively.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - although it promotes development in areas supporting species and habitats which could be considered

Project	
	for cumulative or in-combination effects these can only be properly assessed once component projects & plans have been subject to the regulatory process.
Aeolian Wind Turbines	Screened out - no significant effects listed for Humber SPA/Ramsar site qualifying interests and mitigation in place to reduce impacts on other receptors including breeding birds to negligible levels.
Helios Bio Power / Fuel	Screened in - significant impacts on Humber SPA/Ramsar site interests so mitigation area included in design. However, evidence from recent studies show that site used widely as high tide roost and foraging site by significant numbers of waterbirds including black-tailed godwit, curlew and lapwing.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - ES states impacts on species and habitats are minimal and no impacts will occur to SPA birds. Water voles are present but habitat will be retained for this species.
Bioethanol Plant (Vireol PLC)	Screened out - after implementation of mitigation residual impacts not thought to be significant for breeding birds, wintering birds, water voles or other interests. Records indicate site is of lower usage for wintering birds compared to others.
Europarc	Screened out - site now largely constructed and impacts cannot be considered cumulatively or in-combination with AMEP. Wintering bird species also still utilising habitat in wider area and not affected by site.
Industrial Park	Screened out - negligible impacts on most terrestrial habitats and species although loss of some habitat for breeding birds including skylark and reed bunting.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - although promotes development in areas supporting species and habitats which could be considered for cumulative or in-combination effects these can only be properly assessed once component projects & plans have been subject to the regulatory process.
Tidal Stream Generator	Screened out - no impacts on supporting habitats or birds predicted due to location and limited infrastructure required.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East	

Project	
Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - although promotes development in areas supporting species and habitats which could be considered for cumulative or in-combination effects these can only be properly assessed once component projects & plans have been subject to the regulatory process.
Far Marsh Farm	Screened out - site at its peak supports golden plover numbers above national threshold and but only single birds recorded and AMEP compensation site only used on one occasion in small numbers. Significant cumulative impacts are not predicted.
Thorngumbald Windfarm	Screened out - proposal withdrawn.
Country Park Inn	Screened out - site has negligible nature conservation interest and supports no species or habitats associated with AMEP upon which cumulative or in-combination impacts could occur.
Bioethanol facility, Saltend Lane, Preston	Screened out - site located within BP Saltend industrial site and only noise disturbance likely to be an issue with bird species and area already subject to heavy industry so species likely to display habituation. Other local roost sites available for species and works only likely to be 18 months once started.
Energy from Waste facility	Screened out - site located within existing BP Saltend site and being held 'indefinitely'. Impacts will be similar to those outlined for Vivergo.
Humber Gateway on-shore installation	Screened out - impacts to receptors will not be significant after post construction mitigation is implemented.
Mixed use south of Brough	Screened out-Distant from AMEP and close to existing settlement. Inland location at upper part of estuary therefore unlikely interacts with bird populations affected by AMEP.
Biomass power station	Screened out - site located some distance from project area and air quality on interests associated with AMEP will not be significant.
Other Projects	
Humber Gateway Wind Farm	Screened out - interests affected by project are different to those associated with AMEP including those of the Humber SPA/Ramsar site.

Potential Impacts

- 4.5.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Northern Area

- 4.5.3 Impacts on waterbirds that could arise cumulatively or in-combination from this project interacting with AMEP are loss of terrestrial habitat

and disturbance during construction and operation. Able UK Northern Area also involves the loss of terrestrial habitat and residual negative impacts on skylark and yellowhammer are reported at the local level.

Green Port Hull

- 4.5.4 GPH represents an additional loss of 4.5 ha of intertidal mudflat and 3 ha of subtidal habitat that increases the total amount of estuarine habitat lost when combined with AMEP to 36 ha of intertidal and 16.5 ha of subtidal. Full compensation for the AMEP estuarine losses will be provided by Able at Cherry Cobb Sands. Construction disturbance including piling may overlap with AMEP and this worst case scenario has been assumed for the purpose of assessment. Operational impacts of the GPH scheme include erection and testing of turbines, provision of a permanent wind turbine, and a helicopter landing site for helicopter operations, together with disturbance arising from dredging and vessel movements.

DRAX Heron Renewable Energy Plant

- 4.5.5 Although the ES predicts no impacts the boundary overlaps with AMEP's proposed mitigation site. Cumulative effects with AMEP on qualifying bird interests (particularly curlew) may arise as a result.

Helius Bio Power/ Fuel

- 4.5.6 The ES indicates the permanent loss of 13.4 ha of the total 34.7 ha of the site. This has the potential to displace 2-3.3% of lapwing, 1.9-2.3% of curlew, and disturbance to up to 4.6% of passage ringed plover.

Vireol Bioethanol Plant

- 4.5.7 Impacts could arise from small terrestrial land take and construction and operational disturbance to surrounding fields, including Helius bird mitigation (see below). Distance from shore indicates direct impacts on populations unlikely.

Hull Riverside Bulk Terminal

- 4.5.8 According to the cumulative impact assessment undertaken for GPH this project is currently on hold awaiting a specific user and planning consent. However a worst case scenario is used for this assessment and it is assumed construction would overlap with AMEP. Key impacts would be construction disturbance, particularly piling, and permanent loss of estuarine (1.4 ha) and terrestrial (31.03 ha) habitat. Operational impacts would arise from dredging and ship movements.

- 4.5.9 Although the site is located directly adjacent to Saltend mudflats, which support significant numbers of SPA qualifying bird species (including curlew, redshank, dunlin, mallard and others) at low tide for feeding and areas of adjacent rock armour at high tide to roost, no significant effects were predicted from construction or operation taking account of mitigation.

URSA Glass Wool Factory

- 4.5.10 Disturbance, displacement and habitat loss for waterbird species using arable grassland adjacent to and within the URSA Glass Wool site may arise. Species potentially affected include curlew and lapwing as well as farmland bird species of conservation concern such as skylark, grey partridge, yellowhammer and yellow wagtail.

Mitigation and Residual Impacts

Able UK Northern Area

- 4.5.11 For the Able UK Northern Area impacts arising from habitat loss and operational disturbance are mitigated for by the provision of 59 ha of habitat incorporating fields favoured by the key bird species (including lapwing and curlew). These fields will be managed as a mosaic of open pools, wet meadow and dry grassland. The re-establishment of the railway line through NKHP will introduce a short term disturbance event (two trains with a return journey (*ie* four disturbances a day)).
- 4.5.12 Disturbance effects arising from construction will be managed by timing of work in the summer months to avoid migratory and wintering bird concentrations.
- 4.5.13 The AA undertaken by the local authority concluded no negative effect on site integrity would arise with the application of mitigation.
- 4.5.14 Both AMEP and Able UK Northern Area will result in a loss of habitat supporting breeding birds. Whilst the mitigation site and elements of the landscape masterplan (particularly hedgerows, small woodland pockets and vegetated strips along ditches) will compensate for many of the species likely to be displaced residual impacts for farmland species such as tree sparrow, willow tit, linnet, yellowhammer and skylark, significant at the local level only, are reported for AMEP. The additive numbers from Able UK Northern Area are small and it is unlikely all territories will be lost, and therefore effects remain local within the context of a UK population that despite significant declines

due largely to wider countryside issues still stands at 1,785,000 territories for Skylark¹ and 792,000 territories for Yellowhammer².

Green Port Hull

- 4.5.15 The loss of 7.5 ha of estuarine habitat within the Humber Estuary SPA/SAC/Ramsar site and disturbance arising from both construction and operation provide a cumulative loss of habitat and potential functional loss of roosting and feeding opportunities. Key species likely to be affected by GPH are dunlin (1% of Humber total supported at GPH), redshank (1.2%), turnstone (39%), herring gull (5.4%), cormorant (3.9%) and common gull (3.1%). Mitigation, including provision of an artificial roost site, and soft start procedures for piling is included, but a residual moderate adverse impact on waterbirds is reported, largely arising from loss of intertidal habitat.
- 4.5.16 The cumulative effects with AMEP relate to an increase in the total loss of estuarine habitat, and an increase in the potential impacts on turnstone (0.9% of Humber population may be displaced by AMEP- below the significance level alone but GPH effects potentially make this more significant) through construction and operational disturbance. Cumulative impacts on redshank (up 1.5% of wintering and 9.9% passage population displaced by AMEP) may also arise through construction and operational disturbance.
- 4.5.17 GPH are mitigating for turnstone through the provision of artificial roost sites and rock armour habitat, and therefore no cumulative effects should arise for this species. Although it is not clear if it will be acceptable, the Chowder Ness compensation site is referenced in the GPH ES and is being viewed as providing 6 ha of 'banked' compensation. This has provided additional estuarine habitat for redshank and other waders. If the HRA process requires additional compensation this would need to be provided by GPH and be sufficient to offset impacts. The 100 ha AMEP compensation at Cherry Cobb is providing mitigation in excess of the 86.5 ha of estuarine habitat required in the short to medium term. Assuming either the acceptance of Chowder Ness, or the provision of additional compensation measures by GPH through the HRA process, no in-combination effects with AMEP are predicted.

¹ <http://blx1.bto.org/birdtrends/species.jsp?s=snipe>

² <http://blx1.bto.org/birdtrends/species.jsp?year=2011&s=yelha>

DRAX Heron Renewable Energy Plant

- 4.5.18 The project overlaps with the proposed Mitigation Site A for AMEP, which is designed to mitigate for the loss of terrestrial feeding and roosting requirements of curlew in particular. Should the DRAX project proceed on its current basis it may affect the viability of mitigation area A of AMEP.
- 4.5.19 However, Able is in discussion with DRAX about an approach which will avoid cumulative / in-combination effects. The DRAX project utilises approximately 12 ha of land, which also lies within AMEP's mitigation area A, for use as a laydown area and by construction plant, before it is converted to the mitigation area by AMEP. The AMEP mitigation proposals have been drawn up in agreement with Natural England and are designed to mitigate for the loss of terrestrial habitat within the AMEP site for wintering waders, although it will also provide habitat for a range of breeding birds. If the laydown area is essential for DRAX, it could be mitigated by appropriate phasing of the AMEP development.

Helius Bio Power/ Fuel

The ES offers a 23 ha mitigation site of which 20 ha is managed for inland roosting and feeding bird species including lapwing, and curlew, and 1.3 ha for water voles (but also benefiting farmland birds such as skylark and grey partridge). Construction and operational effects, mostly noise, will be mitigated for by a noise attenuation plan (based on L_{Aeq} rather than L_{max}), habituation to noise by birds, and the use of screens and embankments to reduce acoustic and visual disturbance on the mitigation site. Assuming this is approved then no cumulative impacts would be expected to arise.

Hull Riverside Bulk Terminal

- 4.5.20 Construction impacts from the HRBT are more likely to directly interact with GPH, particularly in terms of cumulative disturbance arising from piling, given the close proximity of those two developments and the much greater distances of AMEP from them. The HRBT ES concluded that there were no significant impacts on SPA bird populations from that scheme, although species present at the HRBT site in significant numbers (above the 1% threshold for their Humber populations) includes dunlin, redshank and lapwing which are all also present in significant numbers on the AMEP site. A compensation site for these species has been developed for AMEP adjacent to CCS.

- 4.5.21 The loss of terrestrial habitat will have cumulative impacts on the total number of red listed species lost with HRBT adding 11 linnet and 8 skylark to the territories lost at AMEP (14 linnet and 13 skylark assuming no positive effects from mitigation within AMEP boundaries). In combination effects would still only be of local significance given the national population levels.

URSA Glass Wool Factory

- 4.5.22 The location of the URSA Glass Wool Factory is directly adjacent to a number of other development areas, including the Able UK Northern Area and the North Killingholme Power Project. Species which utilise habitat in these areas include significant numbers of waterbird species, including curlew and lapwing as well as farmland birds.
- 4.5.23 The URSA site itself is a small proportion of the wider development area and records indicate that the site historically supported fewer wintering waterbird species than other development areas. Records for breeding birds indicate species of conservation concern are present and territories of skylark (6 territories), grey partridge (1 territory) yellowhammer (3 territories) and yellow wagtail (2 territories) may be lost.
- 4.5.24 The URSA project will create a wetland reserve habitat that is additional to the 59 ha mitigation area provided by Able UK Northern Area. It is therefore unlikely that cumulative effects will arise as both sites provide sufficient mitigation.

Sum of Impacts

- 4.5.25 *Table 4.8* presents the individual project impacts after mitigation as assessed by the published information provided. A row for each of the key impacts identified allows the cumulative and in-combination effects to be assessed and this is summarised in the final column.

Table 4.8 Cumulative and In-combination Impacts Summary Matrix

Impact	AMEP	Able Northern Area	GPH	HRBT	URSA Glass Wool	DRAX Heron	Helius Power	Impact Assessment
Loss of Estuarine habitat	Major-compensation provided	None	Minor-Moderate. Assumes compensation/mitigation implemented	Minor-Moderate. loss of mudflat although as yet un-quantified	No	No	No	Minor -Losses compensated for at AMEP and assumes will be also at GPH. Possible minor loss at HRBT.
Loss of terrestrial habitat supporting SPA qualifying interest bird species	Moderate-compensation provided	Moderate-mitigation & compensation provided	No	Moderate-high tide roost mitigation to be provided	Minor-loss of habitat	Moderate-mitigation to be provided	Moderate-mitigation area retained	Minor -. Based on existing ES data sufficient quality of mitigation will be provided by the combined projects (albeit within a smaller quantity of land then that lost to the combined developments) to ensure residual impacts remain minor.

Impact	AMEP	Able Northern Area	GPH	HRBT	URSA Glass Wool	DRAX Heron	Helius Power	Impact Assessment
Construction Impacts on SPA qualifying interest bird species (disturbance & displacement)	Major-compensation provided	Minor	Minor-Moderate. Possible compensation/mitigation	Moderate temporary impact	Minor	Minor - assuming mitigation in place does not clash with AMEP mitigation.	Minor- Site regularly supports significant numbers of qualifying species. Mitigation area as well as noise attenuation will reduce impacts.	Minor - Impacts compensated for at AMEP and anticipated they will be at GPH. Mitigation measures in place relating to timing of works at most sites. Providing construction mitigation and alternative habitat is provided residual impacts should remain minor.
Operational impacts on SPA qualifying interest bird species (disturbance & displacement)	Moderate-mitigation & compensation provided	Minor	Moderate-mitigation proposed	Minor	Minor	Minor	Minor	Minor - Losses compensated for at AMEP and at GPH. Assumes AMEP mitigation area A fully available. Other projects unlikely to have impact above minor level.

Impact	AMEP	Able Northern Area	GPH	HRBT	URSA Glass Wool	DRAX Heron	Helius Power	Impact Assessment
Loss of farmland birds	Minor	Minor- although local residual impacts identified	Negligible	Minor	Minor	Minor although potential impacts on AMEP mitigation site	Minor	Minor - Remains minor but open field species such as skylark do experience cumulative losses arising from almost all projects. Exact totals are difficult to establish but are in the order of 50-60 territories of skylark (after mitigation).

4.5.26 *Table 4.8* concludes that, providing that the project ESs have correctly assessed impacts and employ the mitigation they describe, only minor cumulative impacts will occur. This assessment is based on the published ES and HRA material for other projects that in turn reflects the information available to them at the time they were prepared.

Residual Impacts

4.5.27 Overall, if mitigation measures outlined above are implemented it is likely that cumulative / in-combination impacts across the developments will be reduced to minor levels. These assessments may be subject to change as new projects or information are brought forward.

4.6 COMMERCIAL FISHERIES

Screening

4.6.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.9 Cumulative Projects Screening

Project	
Able UK Area F	Screened out - unlikely to interact with fisheries resource or fishing operations.
Able UK Area C	Screened out - superseded by AMEP.
Able UK Area E	Screened out - superseded by AMEP.
Able UK Northern Area	Screened in - general to the area, loss of small intertidal area (seawall refurbishment and direct construction of pumping facilities use of rock armour), runoff to intertidal area with effects on the ecology of fishery resources and reductions or displacement of area accessible to fishing gear.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened in - creation of natural areas possibly including nursery habitat for fishery species.
Maintenance Dredging	Screened in - noise (energy introduction) and alteration of sedimentary regimes or budgets (hydrodynamics and sediment transport / deposition).
Immingham Oil Terminal Approach Channel Deepening	Screened in - noise (energy introduction), alteration of bottom topography, sedimentary regimes or budgets affecting the ecology of fishery species and reductions or displacement of area accessible to fishing gear.
Green Port Hull	Screened in - noise (energy introduction), alteration of bottom topography, sedimentary regimes or budgets affecting the ecology of fishery species and reductions or

Project	
	displacement of area accessible to fishing gear.
Grimsby Ro Ro	Screened in - noise (energy introduction), alteration of bottom topography, sedimentary regimes or budgets affecting the ecology of fishery species.
Hull Riverside Bulk Terminal	Screened in - noise (energy introduction), alteration of bottom topography, sedimentary regimes or budgets affecting the ecology of fishery species.
Humber Flood Risk Management Strategy	Screened in - creation of natural areas possibly including nursery habitat for fishery species and coastal squeeze associated to flood defence improvements.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - unlikely to interact with fisheries resource or fishing operations.
Land East of Falkland Way, North Lincolnshire	Screened out - unlikely to interact with fisheries resource or fishing operations.
Ursa Glass Wool Factory	Screened out - unlikely to interact with fisheries resource or fishing operations.
Bioethanol Plant (Bioethanol Ltd.)	Screened out - unlikely to interact with fisheries resource or fishing operations.
North Killingholme Power Project	Screened out - unlikely to interact with fisheries resource or fishing operations.
DRAX Heron Renewable Energy Plant	Screened out - unlikely to interact with fisheries resource or fishing operations.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - unlikely to interact with fisheries resource or fishing operations.
Aeolian Wind Turbines	Screened out - unlikely to interact with fisheries resource or fishing operations.
Bio Power / Fuel	Screened out - unlikely to interact with fisheries resource or fishing operations.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - unlikely to interact with fisheries resource or fishing operations.
Bioethanol Plant (Vireol PLC)	Screened out - unlikely to interact with fisheries resource or fishing operations.
Europarc	Screened out - unlikely to interact with fisheries resource or fishing operations.
Industrial Park	Screened out - unlikely to interact with fisheries resource or fishing operations.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - unlikely to interact with fisheries resource or fishing operations.
Tidal Stream Generator	Screened out - demonstrator too small to be of any effect outside its immediate location.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with	

Project	
the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - unlikely to interact with fisheries resource or fishing operations.
Farmmarsh Farm	Screened out - unlikely to interact with fisheries resource or fishing operations.
Thorngumbald Windfarm	Screened out - proposal withdrawn.
Country Park Inn	Screened out - unlikely to interact with fisheries resource or fishing operations.
Bioethanol facility, Saltend Lane, Preston	Screened out - unlikely to interact with fisheries resource or fishing operations.
Energy from Waste facility	Screened out - unlikely to interact with fisheries resource or fishing operations.
Humber Gateway on-shore installation	Screened out - unlikely to interact with fisheries resource or fishing operations.
Mixed use south of Brough	Screened out - unlikely to interact with fisheries resource or fishing operations.
Biomass power station	Screened out - unlikely to interact with fisheries resource or fishing operations.
Other Projects	
Humber Gateway Wind Farm	Screened in - noise, EMF (energy introduction) and alteration of sedimentary regimes or budgets (hydrodynamics and sediment transport / deposition), creation of hard bottom structures and fish concentrating device and reductions or displacement of area accessible to fishing gear.

Potential Impacts

- 4.6.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Northern Area

- 4.6.3 This project is very close to the development but has a very small footprint on the Estuary. It will result in a small loss of intertidal area and the potential to contribute to coastal squeeze resulting from the planned refurbishment of the seawall and use of rock armour. These activities were considered in the project ES to locally affect the intertidal

area with potential effects on the ecology of fishery resources. The footprint of the development on the intertidal area is very small and does not represent any significant loss of area accessible to fishing gear. Therefore it is unlikely it will result in any significant cumulative effects with the Able Marine Energy Park.

Donna Nook Managed Realignment Scheme

- 4.6.4 The impacts of this future managed realignment site are considered to be linked to the ecology of fishery species and supporting food webs. The scheme will create new intertidal area in the outer Humber Estuary, a location that is far from the development. In this regard, and after a period of initial development of ecological function in the site, the area would probably develop into a salt marsh environment and operate as a shallow nursery environment providing enhanced feeding opportunities and shelter from predators for juvenile fish. Species targeted by commercial operations or recreational anglers may benefit resulting in an indirect positive effect of fisheries elsewhere in the estuary and adjacent coastal area. No fishing activities are currently using the area. It is unlikely that this project will have significant cumulative effects with the Able Marine Energy Park.

Maintenance Dredging

- 4.6.5 Ongoing maintenance dredging activities in the Humber Estuary result in the introduction of noise, subtidal habitat damage leading to possible ecological effects and the alteration of sedimentary regimes or budgets. Effects of dredging are localised and short term leading to effects on the physical, biological and chemical regime in the vicinity of the areas affected by the removal and deposition of sediments. Due to the dynamic nature of the Humber the combination of all dredging operations results in an overall pressure level that is probably similar to the natural stress caused by natural processes. This interpretation is confirmed by the very need to conduct regular maintenance dredging due to the rapid siltation of navigation channels. Nevertheless, an effect on fisheries may arise from reduced access to fishing grounds or damage to subtidal habitats at both dredging and disposal zones. Due to the low fishing effort, significant in-combination effects are considered to be negligible.

Immingham Oil Terminal Approach Channel Deepening

- 4.6.6 The closest proposed dredging area is located at the Sunk Dredged Channel, the project plans to excavate to a depth of 11.6m to enable safe

navigation of deeper draughted vessels to existing river berths at Immingham. This channel is routinely dredged and it is likely that common effects associated with dredging will occur during the deepening but to a greater extent. It is expected that the deepening of the channel will magnify the typical effects of dredging but these are still considered to be localised and of a temporary nature. In any case the effects of dredging on the flow and sediment regime is not expected to extend to the area of the development. It is therefore considered that due to the low and localised impacts of dredging on fisheries in general that there will be no significant in-combination effects.

Green Port Hull

- 4.6.7 The development of this port facility will result in similar pressures as the Able Marine Energy Park project and is likely to include noise, alteration of bottom topography, sedimentary regimes or budgets through dredging and possible effects on the ecology of fishery species. The project lies beyond the 10km boundary radius from the Able Marine Energy Park and effects are not expected to extend to the area of the development. Similarly fishing activities in this area are absent and it will not affect the overall area accessible to fishing gear in the Humber Estuary, resulting in non-significant cumulative effects with the Able Marine Energy Park.

Grimsby Ro Ro Berth

- 4.6.8 The main routes for cumulative impacts identified for this development are hydrodynamic alterations and direct effects on subtidal habitats. With respect to fisheries the probable stressors derived from these two are indirect effects mediated by ecological mechanisms affecting fisheries species. Reductions or displacement of area accessible to fishing gear is, similarly to the Able Marine Energy Park, unlikely due to the small footprint of the development and the practically non-existent fishing effort in the immediate vicinity (1 to 5 km) of the developments. Therefore cumulative effects on fisheries are considered negligible.

Hull Riverside Bulk Terminal

- 4.6.9 This development was judged to have no significant adverse effect on commercial fishery activities within, close to or in the wider Estuary. The assessment identified a small scale adverse effect on shellfish fisheries (*Crangon crangon*) linked to the disposal of dredged material. Such effects, however, were considered not significant given the

expected small scale of the changes and the currently small fishing intensity targeting the species in the Humber Estuary. Indirect effects linked to the ecology of the early stages of fishery species (i.e. nursery area) are also considered minor due to the small footprint of the development and the transient nature of acute effects during the construction phase. The expected cumulative effects on fisheries with the Able Marine Energy Park are judged to be negligible.

Humber Flood Risk Management Strategy

- 4.6.10 The overall management strategy includes the creation of natural areas through the implementation of managed realignment schemes. These areas, as outlined for the Donna Nook project, will likely develop characteristics of nursery habitat for fishery species, will promote the maintenance of biological diversity and provide reserve storage to prevent flooding of protected land. In addition, the management strategy will probably result in *de facto* creation of natural realignments in areas where the sea defences will not be maintained. Others areas harbouring population or industrial centres will follow a 'hold the line' or occasionally 'advance the line' interventions which will maintain the current protection afforded by these areas. The combined effect will likely result in marginal areas reverting to brackish marshes, reducing historical loss of intertidal area, and alleviating future coastal squeeze resulting from sea level rise and flood defence improvements. Indirect beneficial effects on fisheries in these areas may result in enhancing recruitment to commercial stocks. In general, fishing activities are in general very low, but may increase locally if shore-based recreational anglers gain easier access to the estuary, although the effect would be a redistribution of effort rather than an increase in fishing pressure. It is unlikely that the strategy will have significant negative cumulative effects on fisheries but has the potential to improve the ecology of fishery-targeted species.

Humber Gateway Wind Farm

- 4.6.11 This is a large development sited in the immediate coastal area at approximately 8-9 km from the mouth of the Humber Estuary and covers an area of 35 km². Local modelling exercises suggest that the influence of the wind farm will not extend into the estuary and will be restricted to the coastal zone and therefore direct cumulative effects on the hydrodynamic regime will not be of any significance. Assuming that the same fleet target both areas, the main route of effect on cumulative effects on fisheries for this development may be linked to the reduction of fishing grounds available for trawling (the Humber

Gateway Wind Farm lies just beyond the boundary of the 6 nautical miles where trawling is prohibited by local bylaws (North Eastern Inshore Fisheries and Conservation Authority)). By comparison, the size of fishing area affected by the Able Marine Energy Park is very small and in-combination effects are exceedingly improbable. An additional route of common effects may arise from the creation of hard bottom structures and fish/ shellfish aggregating role of these affecting the ecology of fishery species or their food webs. These effects, if present, will produce beneficial or detrimental pressures on the fishery resource (depending on the ecology of individual species) but most likely leading to only local changes. Due to the distance between the two developments, it is unlikely that any cumulative effects will be significant.

Mitigation and Residual Impacts

- 4.6.12 Under the criteria of the expected area of influence of this development and other projects considered here to have similar direct or indirect impacts on fisheries, it is reasonable to conclude that activities potentially affecting the fishery resource or access to fishing grounds will not significantly overlap at any one of the proposed developments.
- 4.6.13 In general no implications or implications of only minor significance to fisheries were identified during the EIA process carried out for all the projects considered. When potential pressures (i.e. underwater noise, loss of habitat, loss/ displacement of fishing grounds, etc) were identified as likely to occur, the severity of impacts were scored as non-significant mainly due to the current low level of fishing activity in the Humber.
- 4.6.14 However, even when pressures are localized, and the likelihood of additive effects at any given development are negligible, there is still the potential for similar port developments or other types of activities to impact on the same quality attributes that support the ecology of fishery species or on the access to fishing grounds at the scale of the whole system. This may lead to an overall effect and finally undesirable impacts.
- 4.6.15 The cumulative assessment undertaken here is based on three main judgment variables: 1-magnitude of expected impacts, 2- construction time overlaps and 3- operational life overlaps. As the potential impacts have been considered localized and generally negligible with only minor residual effects at the level of the individual development, the

foremost criteria to assess cumulative effects used in this assessment has been temporal co-occurrence.

- 4.6.16 Overlap in construction activity has the potential to introduce relatively intense disturbances, in particular through piling noise, accidental emission of polluting substances and vessel exclusion zones. These potential pressures are by their own nature transient and, as mentioned earlier, it is anticipated that likely impacts from these developments would be restricted to their immediate vicinities. It is also apparent that not all developments will occur at the same time and therefore the likelihood of significant cumulative or in-combination effects is very low or negligible at the scale of the entire Humber Estuary.
- 4.6.17 There is comparatively a much greater chance for overlapping activities during the operational lives of current and future projects. Potential cumulative or in-combination impacts would primarily result in reduced access to fishing grounds, and to a smaller extent localised changes to hydrodynamics and habitat alteration and/or loss (i.e. nursery habitat loss) resulting in ecological effects on target species. These latter impacts would be extremely localised and it would be unlikely to have any significant measurable in-combination effects due to the relatively low extent of the areas affected, both with respect to intertidal and subtidal habitats. Furthermore, the extremely dynamic nature of the area and ongoing habitat compensation programmes (including the compensation scheme linked to this development) would suggest that on average no measurable deleterious ecological interactions are expected.
- 4.6.18 Loss of fishing grounds could affect a comparatively larger area resulting in the redistribution of fishing effort which could lead to significant cumulative impacts on fishing activities; however, due to the current extremely low fishing effort in the Humber Estuary, this eventuality is very unlikely. AMEP will have a very small to negligible impact on fisheries on its own and the combined effect of other developments is considered not to be significant. As such, no substantially greater impact than previously concluded is expected due to cumulative or in-combination effects and it is considered here that there is no need to undertake further mitigation actions.

4.7 DRAINAGE AND FLOOD RISK

Screening

- 4.7.1 Table 4.7 identifies the reasons for screening projects in or out of the assessment of cumulative effects.
- 4.7.2 Projects that are remote from the AMEP site, particularly those outside of the surface water catchment area for AMEP have no potential in-combination drainage or flood risk impacts.
- 4.7.3 Able UK Areas F, C and E are to be incorporated into the AMEP site. The original development schemes for these areas will therefore be superseded by the AMEP project. Such projects have also therefore been screened out.
- 4.7.4 Six adjacent projects are located within the district of the North East Lindsey Drainage Board. There may be potential cumulative surface water drainage impacts with these projects. These projects have therefore been marked for further assessment in the following table.

Table 4.10 Cumulative Projects Screening

Project	
Able UK Area F	Screened out – to be incorporated into the AMEP site.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened in – potential cumulative surface water drainage impact.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – no potential cumulative drainage or flood risk impact.
Maintenance Dredging	Screened out – no potential cumulative drainage or flood risk impact.
Immingham Oil Terminal Approach Channel Deepening	Screened out – no potential cumulative drainage or flood risk impact.
Green Port Hull	Screened out – no potential cumulative drainage or flood risk impact.
Grimsby Ro Ro	Screened out – no potential cumulative drainage or flood risk impact.
Hull Riverside Bulk Terminal	Screened out – no potential cumulative drainage or flood risk impact.
Humber Flood Risk Management Strategy	Screened in – maintenance of flood defence could give rise to impacts not assessed within the FRMS.
Projects in North Lincolnshire Council	

Project	
Area	
North Lincolnshire Core Strategy	Screened out – no potential cumulative drainage or flood risk impact.
Land East of Falkland Way, North Lincolnshire	Screened out – no potential cumulative drainage or flood risk impact.
Ursa Glass Wool Factory	Screened in – potential cumulative surface water drainage impact.
Bioethanol Plant (Bioethanol Ltd.)	Screened in – potential cumulative surface water drainage impact.
North Killingholme Power Project	Screened in – potential cumulative surface water drainage impact.
DRAX Heron Renewable Energy Plant	Screened in – potential cumulative surface water drainage impact.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – no potential cumulative drainage or flood risk impact.
Aeolian Wind Turbines	Screened out – no potential cumulative drainage or flood risk impact.
Bio Power / Fuel	Screened out – no potential cumulative drainage or flood risk impact.
Bioethanol Plant (Abengoa Bioenergy)	Screened out – no potential cumulative drainage or flood risk impact.
Bioethanol Plant (Vireol PLC)	Screened out – no potential cumulative drainage or flood risk impact.
Europarc	Screened out – no potential cumulative drainage or flood risk impact.
Industrial Park	Screened out – no potential cumulative drainage or flood risk impact.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out – no potential cumulative drainage or flood risk impact.
Tidal Stream Generator	Screened out – no potential cumulative drainage or flood risk impact.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	

Project	
ERYC Core Strategy	Screened out – no potential cumulative drainage or flood risk impact.
Farmmarsh Farm	Screened out – no potential cumulative drainage or flood risk impact.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – no potential cumulative drainage or flood risk impact.
Bioethanol facility, Saltend Lane, Preston	Screened out – no potential cumulative drainage or flood risk impact.
Energy from Waste facility	Screened out – no potential cumulative drainage or flood risk impact.
Humber Gateway on-shore installation	Screened out – no potential cumulative drainage or flood risk impact.
Mixed use south of Brough	Screened out – no potential cumulative drainage or flood risk impact.
Biomass power station	Screened out – no potential cumulative drainage or flood risk impact.
Other Projects	
Humber Gateway Wind Farm	Screened out – no potential cumulative drainage or flood risk impact.

Potential Impacts

- 4.7.5 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Northern Area

- 4.7.6 All surface water run-off from the Able UK Northern Area will be routed to a new pumping station to be located on Halton Marshes with a direct discharge to the Humber estuary. Therefore there will be no cumulative impact with the Project.

Ursa Glass Wool Factory

- 4.7.7 Surface water attenuation is proposed to limit run-off from the Ursa Glass Wool Factory to greenfield rates. In addition, the Ursa Glass Wool Factory is located within the catchment of the North Killingholme Drain, whereas the AMEP project is located within the Killingholme Marshes catchment. Therefore the surface water drainage arrangements for the Ursa Glass Wool Factory will be entirely independent of the surface water drainage arrangements for the Project. Therefore there will be no cumulative impact with the Project.

- 4.7.8 Surface water attenuation is proposed to limit run-off from the Bioethanol Plant to greenfield rates. Furthermore, the Bioethanol Plant is located within the catchment of the North Killingholme Drain, whereas the AMEP project is located within the Killingholme Marshes catchment. Therefore the surface water drainage arrangements for the Bioethanol Plant will be entirely independent of the surface water drainage arrangements for the Project. Therefore there will be no cumulative impact with the Project.

North Killingholme Power Project

- 4.7.9 An NSIP (nationally significant infrastructure project) application is in preparation for the North Killingholme Power Project. Consequently it is not currently possible to assess the impacts of the North Killingholme Power Project in detail, because that project is at an early stage. However, the North Killingholme Power Project is located within the catchment of the North Killingholme Drain, whereas the AMEP project is located within the Killingholme Marshes catchment. Therefore the surface water drainage arrangements for the North Killingholme Power Project are likely to be entirely independent of the surface water drainage arrangements for the Project. Therefore there should be no cumulative impact with the Project.

DRAX Heron Renewable Energy Plant

- 4.7.10 Surface water attenuation is proposed to limit run-off from the DRAX Heron Renewable Energy Plant to greenfield rates. The DRAX Heron Renewable Energy Plant and the AMEP project are both located within the Killingholme Marshes catchment. The AMEP project includes the relocation of the existing tidal outfall and the construction of a new pumping station at the new outfall point (to be adopted by the North East Lindsey Drainage Board). The new pumping station will be designed to accommodate all existing and future consented discharges, including discharges from the DRAX Heron Renewable Energy Plant. Therefore there will be no cumulative impact with the Project.
- 4.7.11 The only off-site flood risk impact of the AMEP project is the raising of flood levels in surrounding areas in a breach scenario, due to the raised AMEP site levels obstructing the route of floodwaters. This impact was reported in Section 3.5 of the AMEP FRA. The general conclusion was a predicted increase in flood depths of 350 mm adjacent to a breach, bearing in mind that flood depths in the affected areas would be over

2.0 m without the development. The Drax site is within the area of influence of the AMEP project, thus the AMEP project may have an impact on flood levels at the Drax site in a breach scenario. It is understood that the Drax scheme does not involve any widespread raising of site levels and it will therefore not have a significant impact on flood levels in a breach scenario. Consequently there will be no cumulative impact with the Project.

Humber Flood Risk Management Strategy (FRMS)

- 4.7.12 The Humber Flood Risk Management Strategy states that, ‘(a)ll of the defences to this unit (apart from those protecting agricultural land near East Halton Skitter..) will continue to be maintained and improved as necessary to provide a high standard of protection throughout the 100-year life of the strategy’ (p47). Accordingly AMEP is consistent with the Humber FRMS and there will be no cumulative impact from the Project.

Mitigation and Residual Impacts

- 4.7.13 None of the projects identified above have any cumulative impacts in combination with the Project. Thus there is no need for any mitigation and there are no residual impacts.

4.8 NAVIGATION

Screening

- 4.8.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.11 Cumulative Projects Screening

Project	
Able UK Area F	Screened out – project is exclusively terrestrial.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened out – project is exclusively terrestrial.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – no vessel movements associated with project.
Maintenance Dredging	Included in cumulative assessment in Ch 14 of the ES for the application.
Immingham Oil Terminal Approach Channel Deepening	Included in cumulative assessment in Ch 14 of the ES for the application

Project	
Green Port Hull	Potential cumulative impact over and above that of Quay 2005 (which it supersedes).
Grimsby Ro Ro	Included in cumulative assessment in Ch 14 of the ES for the application
Hull Riverside Bulk Terminal	Included in cumulative assessment in Ch 14 of the ES for the application
Humber Flood Risk Management Strategy	Screened out – plan is terrestrial in nature; navigational impacts are assessed as projects are brought forward.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out – plan is terrestrial in nature; navigational impacts are assessed as projects are brought forward.
Land East of Falkland Way, North Lincolnshire	Screened out – project is exclusively terrestrial.
Ursa Glass Wool Factory	Screened out – project is exclusively terrestrial.
Bioethanol Plant (Bioethanol Ltd.)	Screened out – project is exclusively terrestrial.
North Killingholme Power Project	Screened out – project is still at PEIR stage.
DRAX Heron Renewable Energy Plant	Screened out – project is exclusively terrestrial.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – plan is terrestrial in nature; navigational impacts are assessed as projects are brought forward.
Aeolian Wind Turbines	Screened out – project is exclusively terrestrial.
Bio Power / Fuel	Screened out – project is exclusively terrestrial.
Bioethanol Plant (Abengoa Bioenergy)	Screened out – project is exclusively terrestrial.
Bioethanol Plant (Vireol PLC)	Screened out – project is exclusively terrestrial.
Europarc	Screened out – project is exclusively terrestrial.
Industrial Park	Screened out – project is exclusively terrestrial.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out – plan is terrestrial in nature; navigational impacts are assessed as projects are brought forward.
Tidal Stream Generator	Potential for cumulative navigational impacts beyond what is assessed in Ch 14 of the ES.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially	

Project	
acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – plan is terrestrial in nature; navigational impacts are assessed as projects are brought forward.
Farmarsh Farm	Screened out – project is exclusively terrestrial.
Thorngumbald Windfarm	Screened out – project has been withdrawn.
Country Park Inn	Screened out – project is exclusively terrestrial.
Bioethanol facility, Saltend Lane, Preston	Screened out – project is exclusively terrestrial.
Energy from Waste facility	Screened out – project is exclusively terrestrial.
Humber Gateway on-shore installation	Screened out – project is exclusively terrestrial.
Mixed use south of Brough	Screened out – project is exclusively terrestrial.
Biomass power station	Screened out – project is exclusively terrestrial.
Other Projects	
Humber Gateway Wind Farm	Screened out – outside of estuary.

Potential Impacts

- 4.8.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Green Port Hull

- 4.8.3 It is assessed in the Green Port Hull ES that the project will have no interaction or cumulative impacts on navigation with AMEP or the Compensation Scheme, and that therefore cumulative impacts are identified as neutral. Accordingly, it is not anticipated that any additional cumulative impact over and above that assessed in the AMEP ES for Quay 2005 (which Green Pot Hull supersedes) will arise.

Tidal Stream Generator

- 4.8.4 This is a small-scale project to be constructed and operated within the estuary, 75m landward of the Upper Burcom light vessel no. 10. The developer has stated in the ES for the project that it has agreed with ABP that there will be no disruption to vessel traffic at any time during installation, operation or decommissioning, and that throughout the

installation and operation of the device, measures recommended by ABP and Trinity House will be taken to highlight it as a potential obstruction to marine traffic. No cumulative impacts with other projects are identified by the promoters. Accordingly, no additional cumulative impact over and above what is assessed in the ES for AMEP is likely to arise.

4.9 TRAFFIC AND TRANSPORT

Screening

- 4.9.1 As stated in the ES, there are potential cumulative impacts that may occur as a result of traffic generated by AMEP and other developments which are to be constructed in the local area. Table 4.12 below lists the committed development (or those that are within the planning process and yet to be given approval) which are taken account of in the baseline assessment flows on the local and strategic highway network. Accordingly, the cumulative impact of AMEP with these developments has already been taken into account in the traffic impact assessment.

The table also sets out other projects as identified during further consultation, identifying whether any possible cumulative impact beyond that already built into the model can occur.

Table 4.12 *Cumulative Projects Screening*

Project	
Able UK Area F	Not already included in the model. Possible cumulative impact.
Able UK Area C	Already inherent in model.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Already inherent in model.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – traffic flows in AMEP model did not include travel across the Humber Bridge, so projects on north bank of the estuary can be excluded as having no potential cumulative impact. Transport impacts of Compensation Site are unlikely to act cumulatively with this project.
Maintenance Dredging	Screened out – the project is marine.
Immingham Oil Terminal Approach Channel Deepening	Screened out – the project is marine.
Green Port Hull	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are

Project	
	unlikely to act cumulatively with this project as the site is remote from Hull.
Grimsby Ro Ro	Not already included in model. Possible cumulative impact.
Hull Riverside Bulk Terminal	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from Hull.
Humber Flood Risk Management Strategy	Screened out – the plan is marine.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out – plan has no potential cumulative impact. Assessment carried out in the context of this plan.
Land East of Falkland Way, North Lincolnshire	Screened out – already constructed.
Ursa Glass Wool Factory	Already inherent in model.
Bioethanol Plant (Bioethanol Ltd.)	Already inherent in model.
North Killingholme Power Project	Screened out – no application has yet been made, project is still at PEIR stage.
DRAX Heron Renewable Energy Plant	Already inherent in model.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – plan has no potential cumulative impact. Assessment carried out in the context of this plan.
Aeolian Wind Turbines	Not already included in model – possible cumulative impact.
Bio Power / Fuel	Already inherent in model.
Bioethanol Plant (Abengoa Bioenergy)	Already inherent in model.
Bioethanol Plant (Vireol PLC)	Already inherent in model.
Europarc	Screened out – already constructed.
Industrial Park	Already inherent in model.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out – plan has no potential cumulative effects.
Tidal Stream Generator	Screened out – project is marine.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	

Project	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – plan has no potential cumulative effects.
Farmmarsh Farm	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project.
Thorngumbald Windfarm	Screened out – application withdrawn.
Country Park Inn	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from this project.
Bioethanol facility, Saltend Lane, Preston	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from this project.
Energy from Waste facility	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from this project.
Humber Gateway on-shore installation	Already considered within ES.
Mixed use south of Brough	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from this project.
Biomass power station	Screened out – projects on the north bank are not considered to have potential cumulative effects with AMEP. Transport impacts of Compensation Site are unlikely to act cumulatively with this project as the site is remote from this project.
Other Projects	
Humber Gateway Wind Farm	Screened out – project is marine.

Potential Impacts

- 4.9.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Area F

- 4.9.3 This project was not considered within the modelling for the AMEP site. However, the modelling did include the Able UK Area C application. This project is larger in scale than Area F, and the traffic and transport impacts identified within its ES are greater than those arising from the Area F application. The Area C application will be superseded by the AMEP project, so the assessment already includes a greater additional traffic flow than will be contributed by Area F. No additional cumulative impact is therefore likely to arise.

Grimsby Ro-Ro

- 4.9.4 Although this project was not included inherently in the additional modelling for AMEP, the traffic and transport impacts identified in the ES are stated to be insignificant in terms of road traffic. No additional cumulative impact is therefore likely to arise.

Aeolian Wind Turbines

- 4.9.5 Although this project was not included inherently in the additional modelling for AMEP, the traffic and transport impacts identified in the ES are stated to be insignificant in terms of operational road traffic. No additional cumulative impact is therefore likely to arise during the operational phase.

- 4.9.6 Construction traffic is stated as giving rise to 4108 vehicle movements over a 12-month period. The implementation of the mitigation measures stated in the Aeolian Turbines ES causes the residual impacts to be assessed as being of local scale and negligible significance. No additional cumulative impact is therefore likely to arise during the construction phase.

4.10 NOISE AND VIBRATION

Screening

- 4.10.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.13 Cumulative Projects Screening

Project	
Able UK Area F	Screened out - non-significant noise sources as project is a port storage area.
Able UK Area C	Screened out - superseded by AMEP.
Able UK Area E	Screened out - superseded by AMEP.
Able UK Northern Area	Screened out - non-significant noise sources as project is a port storage area.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - distance.
Maintenance Dredging	Screened out - distance.
Immingham Oil Terminal Approach Channel Deepening	Screened out - distance.
Green Port Hull	Screened out - distance.
Grimsby Ro Ro	Screened out - distance.
Hull Riverside Bulk Terminal	Screened out - distance.
Humber Flood Risk Management Strategy	Screened out - distance.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - not relevant.
Land East of Falkland Way, North Lincolnshire	Screened out - not relevant.
Ursa Glass Wool Factory	Screened in - has potential to influence existing acoustic environment.
Bioethanol Plant (Bioethanol Ltd.)	Screened in - has potential to influence existing acoustic environment.
North Killingholme Power Project	Screened out - planning development.
DRAX Heron Renewable Energy Plant	Screened in - has the potential to influence existing acoustic environment.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Not applicable
Aeolian Wind Turbines	Screened out - distance.
Bio Power / Fuel	Screened out - distance.
Bioethanol Plant (Abengoa Bioenergy)	Screened out - distance.
Bioethanol Plant (Vireol PLC)	Screened out - distance.
Europarc	Screened out - distance.

Project	
Industrial Park	Screened in - has potential to influence existing acoustic environment.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - distance.
Tidal Stream Generator	Screened out - distance.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – distance.
Farmarsh Farm	Screened out – distance.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – distance.
Bioethanol facility, Saltend Lane, Preston	Screened out – distance.
Energy from Waste facility	Screened out – distance.
Humber Gateway on-shore installation	Screened out – distance.
Mixed use south of Brough	Screened out – distance.
Biomass power station	Screened out – distance.
Other Projects	
Humber Gateway Wind Farm	Screened out – distance.

Potential Impacts

4.10.2 Where available, the calculated noise level from each screened-in project (ie the contributed noise level) has been determined from the respective assessments. The results of the cumulative noise assessment for the daytime and night time periods at each Noise Sensitive Area (East Halton, North and South Killingholme) are shown in *Table 4.14* and *Table 4.15*, which present:

- a comparison of existing noise levels;
- the contributed noise level from AMEP;;
- the contributed noise level from all other developments;
- the cumulative noise level from all developments;
- the increase attributable to only to AMEP; and
- the overall increase attributable to all developments (including AMEP).

Table 4.14 Cumulative Noise Assessment - Daytime

Scenario	Noise Level, dB LAeq,1hr		
	East Halton	North Killingholme	South Killingholme
Existing Noise Level	46	64	54
Other Developments Contributed Noise Level	40	40	39
Cumulative Noise Level - All Developments (not incl AMEP) + Existing	47	64	54
AMEP Contributed Noise Level	34	33	31
Cumulative Noise Level - All Developments (incl AMEP) + Existing	47	64	54
Increase in Noise Level attributable to AMEP	0	0	0
Increase in noise level attributable to all developments (including AMEP)	1	0	0

Table 4.15 Cumulative Noise Assessment - Night time

Noise Level, dB LAeq,1hr	East Halton	North Killingholme	South Killingholme
Existing Noise Level	39	46	53
Other Developments Contributed Noise Level	40	40	40
Cumulative Noise Level - All Developments (not incl AMEP) + Existing	43	47	53
AMEP Contributed Noise Level	34	33	31

Cumulative Noise Level - All Developments (incl AMEP) + Existing	43	47	53
Increase in Noise Level attributable to AMEP	0	0	0
Increase in noise level attributable to all developments (including AMEP)	4	1	0

Residual Impacts

- 4.10.3 The cumulative noise impact from all developments (including AMEP) during the daytime is considered to be *Negligible* as the resultant cumulative noise level is expected to increase by up to 1 dB. Whereas the cumulative noise impact from all developments (including AMEP) during the night time is expected to increase noise levels by up to 4 dB, and is considered to be of *Minor* significance.
- 4.10.4 The cumulative noise impact of other projects with the AMEP project during the daytime and night time periods is considered to be *Negligible* as the contribution from AMEP is not causing an increase in noise levels.

4.11 AIR QUALITY

Screening

- 4.11.1 When considering the potential for cumulative impacts to arise, consideration is made of the existing conditions, the nature of the emissions arising from AMEP and the potential emissions arising from the other committed developments. The impact assessment undertaken for AMEP concluded that there were no significant impacts associated with the operation of AMEP at any receptors, human or ecological. In terms of the potential for significant cumulative impacts, in this case it is pertinent to only consider those where there the air quality standards, critical loads or critical levels are approached or exceeded as a result of existing emission sources. The basis for this is that where air quality standards, critical loads or critical levels are not approached or exceeded, the potential increase due to cumulative impacts is highly unlikely to be sufficient to result in air quality standards, critical loads or critical levels being exceeded. This approach is borne out later in this section, where it is identified that the key cumulative sources, in combination with AMEP are identified as being highly unlikely to

result in exceedances when taken into consideration with the baseline conditions and results set out in the AMEP air quality impact assessment. In addition, due to the nature of emissions sources associated with AMEP, impacts arise close to the site and access shipping lanes, and in close proximity to roads used to access the site.

4.11.2 On this basis, the key impacts from the perspective of cumulative impacts are those arising at sensitive ecological receptors in the vicinity of AMEP. Furthermore, it is appropriate to identify where impacts associated with AMEP will be sufficiently small that consideration of impacts associated with AMEP is effectively meaningless (ie the impacts are so small as to be, effectively, undetectable in practice, in this case taken to be less than 0.1% of a critical load or critical level). Considering these factors, the key considerations for the cumulative assessment are:

- The potential for significant cumulative impacts of NO_x at the Humber Estuary and North Killingholme Pits;
- The potential for significant cumulative impacts of nutrient nitrogen at the Humber Estuary.

4.11.3 In all other cases, either baseline conditions or impacts from AMEP are such that the risk of significant cumulative impacts are negligible.

4.11.4 The key consideration is prevailing wind direction which dictates the direction of dispersion of emissions, however, distance from AMEP is also important as increased distance will tend to reduce impacts beyond 1-2 km from source.

4.11.5 *Table 4.16* identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.16 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened out – negligible activities contributing to air pollution.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened out – negligible activities contributing to air pollution.
Projects in the Humber Estuary	
Donna Nook Managed	Screened out – negligible activities contributing to air

Project	
Realignment Scheme	pollution.
Maintenance Dredging	Screened out – negligible activities contributing to air pollution.
Immingham Oil Terminal Approach Channel Deepening	Screened out – negligible activities contributing to air pollution.
Green Port Hull	Screened out – negligible activities contributing to air pollution.
Grimsby Ro Ro	Screened out – negligible activities contributing to air pollution.
Hull Riverside Bulk Terminal	Screened out – activities will make negligible contribution to air pollution cumulatively with AMEP.
Humber Flood Risk Management Strategy	Screened out – negligible activities contributing to air pollution.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Not applicable
Land East of Falkland Way, North Lincolnshire	Screened out – any contributions already exist in baseline.
Ursa Glass Wool Factory	Screened in - possible cumulative impacts.
Bioethanol Plant (Bioethanol Ltd.)	Screened in - possible cumulative impacts.
North Killingholme Power Project	Screened in - possible cumulative impacts.
DRAX Heron Renewable Energy Plant	Screened in - possible cumulative impacts.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Not applicable
Aeolian Wind Turbines	Screened out – negligible activities contributing to air pollution.
Bio Power / Fuel	Screened in - possible cumulative impacts.
Bioethanol Plant (Abengoa Bioenergy)	Screened in - possible cumulative impacts.
Bioethanol Plant (Vireol PLC)	Screened in - possible cumulative impacts.
Europarc	Screened out – any contributions already exist in baseline.
Industrial Park	Screened out – negligible activities contributing to air pollution.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Not applicable
Tidal Stream Generator	Screened out – negligible activities contributing to air pollution.
Projects in East Lindsey	

Project	
District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Not applicable
Farmmarsh Farm	Screened out – negligible activities contributing to air pollution.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – negligible activities contributing to air pollution.
Bioethanol facility, Saltend Lane, Preston	Screened in - possible cumulative impacts
Energy from Waste facility	Screened in - possible cumulative impacts.
Humber Gateway on-shore installation	Screened out – negligible activities contributing to air pollution.
Mixed use south of Brough	Screened out – negligible activities contributing to air pollution.
Biomass power station	Screened in - possible cumulative impacts.
Other Projects	
Humber Gateway Wind Farm	Screened out – negligible activities contributing to air pollution.

Potential Impacts

- 4.11.6 A number of the projects listed in *Table 4.16* have been identified as having the potential to contribute to a cumulative impact to air quality. The projects which have a potential to have cumulative impacts, their proximity to AMEP and the likelihood of cumulative impacts due to the prevailing meteorological conditions are summarised in *Table 4.17*.

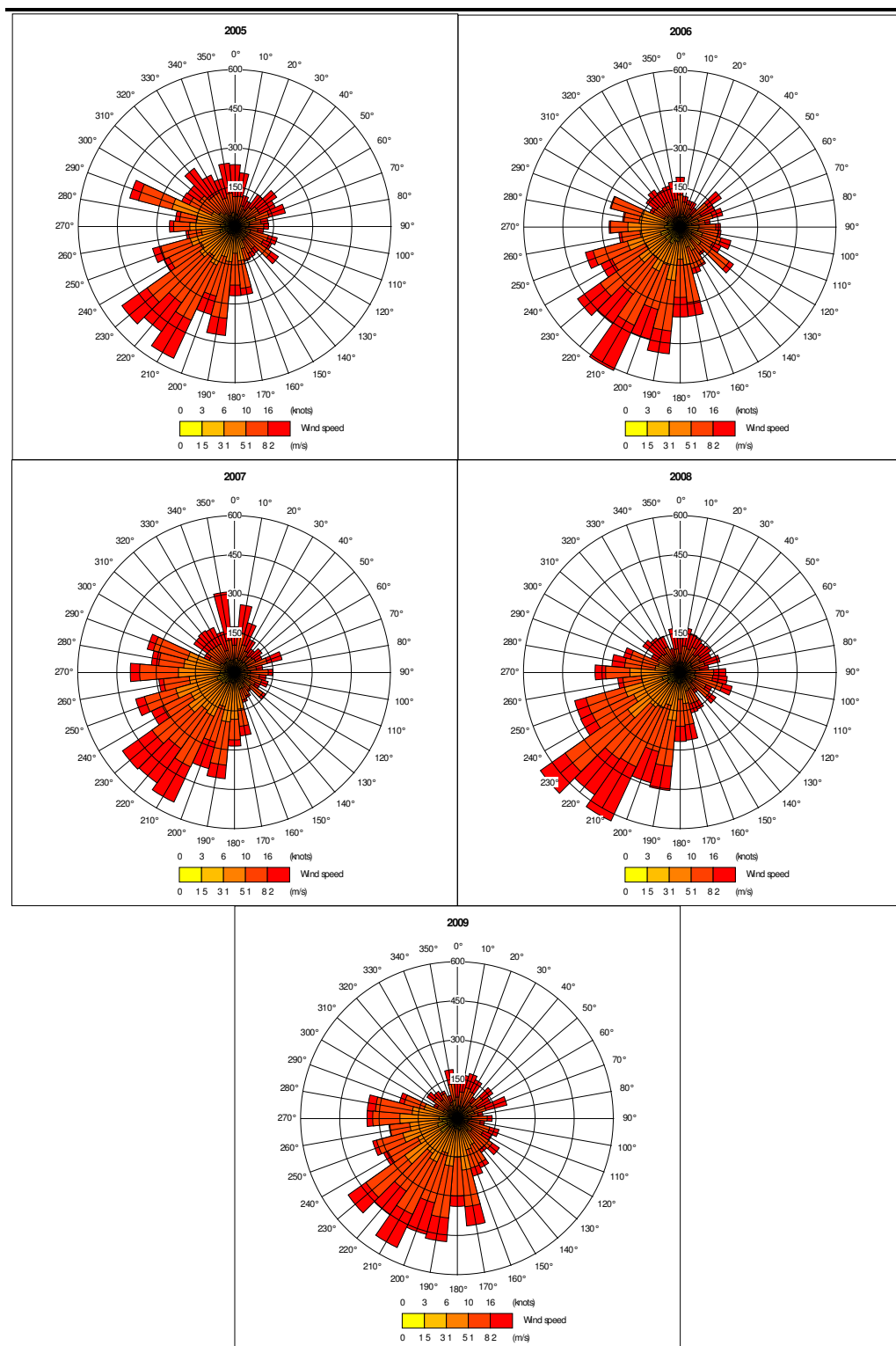
Table 4.17 *Projects with the Potential for Cumulative Impacts to Air Quality*

Project	Direction	Approximate Distance (km)	Possibility of cumulative impacts due to Meteorological conditions	Impact Assessment Conclusion for Impact to Air Quality
Ursa Glass Wool Factory	NW	1	Likely	No significant impacts identified as part of detailed assessment by URS in 2008
Bioethanol Plant (Bioethanol Ltd)	NW	1	Likely	No significant impacts identified as part of detailed assessment by Jacobs in 2006
North Killingholme Power Project	N	1	Likely	PIER report prepared by Parsons Brinckerhoff (2012) shows a stack height of 80m or more is required to adequately mitigate impacts to NO ₂ and human health. No detailed modelling or assessment on ecological receptors available at present .
DRAX Heron Renewable Energy Plant	SE	1	Likely	No significant impacts identified as part of detailed assessment by SKM in 2009.
Bio Power / Fuel	SE	7	Unlikely	No significant impacts identified to Human Health, but possible impacts to the Humber Estuary from Acidification and Nutrient Nitrogen deposition have been identified in a detailed assessment completed by CERC.
Bioethanol Plant (Abengoa Bioethanol)	SE	7	Unlikely	No significant impacts identified by detailed assessment.

Project	Direction	Approximate Distance (km)	Possibility of cumulative impacts due to Meteorological conditions	Impact Assessment Conclusion for Impact to Air Quality
Bioethanol Plant (Vireol PLC)	SE	8	Unlikely	No significant impacts identified by detailed assessment. A possible improvement to a local AQMA was identified due to redirection of traffic associated with the project.
Bioethanol facility, Saltend Lane, Preston	N	9	Unlikely	No significant impacts identified by detailed assessment.
Energy from Waste facility	N	9	Unlikely	No full assessment available.
Biomass power station	N	20	Unlikely	No significant impacts identified by detailed assessment.

4.11.7 Pollutants emitted to the atmosphere will disperse according to the prevailing meteorological conditions; and in particular according to the wind field. The windrose for Donna Nook Meteorological monitoring station, which is representative for all the projects listed, are presented in *Figure 4.1*.

Figure 4.1 Windrose 2005-2009 for Donna Nook Meteorological monitoring station



Note: Coordinates 542982, 399724, proximity to coastline 150m

4.11.8

The dominant wind direction shown in the Donna Nook windrose is of south westerlies. Due to the proximity of the coastline, a small number

of events related to a sea breeze effect are seen in the easterly direction, these will be more pronounced in the windrose than experienced for any of these projects as this effect will diminish quickly overland. Events with low wind speeds are more likely to create high concentrations for any emissions to the atmosphere, and it is shown that these occur with greatest frequency in the south westerly and westerly directions.

- 4.11.9 The cumulative air quality impacts to the environment must be considered in the context of the meteorological conditions discussed above. On this basis it is possible to conclude that project to the north of AMEP and to the south east are unlikely to contribute to any cumulative impacts.
- 4.11.10 The projects to the north, namely a Bioethanol Plant, an Energy from Waste facility and a Biomass Plant, are only likely to contribute to significant cumulative impacts under southerly winds. However, due to the distance (9 km or more) from AMEP, pollutant concentrations arising at North Killingholme Pits or the Humber Estuary close to AMEP will be negligible. Northerly winds are less common, but again, due to the distance, emissions from the three projects north of the Humber will be dispersed to such a degree that the potential for cumulative impacts is considered negligible.
- 4.11.11 The projects to the south east, namely two Bioethanol Plants and a Biomass Power Station, will have their largest impacts to the north east (ie the Humber Estuary). However, the largest impacts at the Humber Estuary will arise elsewhere from the largest impacts associated with AMEP. Detailed assessments which have been reviewed have all shown these impacts to be insignificant in isolation. Cumulative impacts are most likely to occur under north westerly wind conditions. There are a relatively low number of events and the reduced proportion of low wind speeds in this direction. In addition, due to the distance of these projects from AMEP (7 km or more), emissions are considered likely to be dispersed to such a degree that the potential for cumulative impacts is considered negligible.

Glass Wool Factory, North Lincolnshire, Ursa

- 4.11.12 The application for a Glass Wool Factory details three stacks associated with the project, measuring 65 m, 50 m and 23 m in height for the emission of associated pollution to the atmosphere. In a study completed in 2008 by URS, using detailed dispersion modelling it was concluded that the factory in isolation would not cause any significant

impacts to air quality. The Glass Wool Factory will be located approximately 2 km to the north west of AMEP, and therefore, when considering the implications of the wind file presented in *Figure 4.1*, it can be concluded that any cumulative impacts to air quality would occur under low wind conditions from the north west, thus causing the addition of the emissions from both projects. These wind conditions are infrequent, and impacts of this plant on the Humber Estuary are more likely to arise elsewhere in the estuary. However, given the proximity of the plant to AMEP the potential for cumulative impacts at North Killingholme Pits and the Humber Estuary close to AMEP exists.

Bioethanol Plant, North Lincolnshire, Bioethanol Ltd

- 4.11.13 A full impact assessment has been completed by Jacobs in 2006 for the Bioethanol Plant proposed in the North Lincolnshire. A review of this study indicates that activities with the potential to have a cumulative impact to air quality are a 37 MW CHP plant, dryers and emissions associated with the manufacturing process and storage tanks. The study used detailed dispersion modelling to draw the conclusion that emissions from this plant would not have significant impacts. The proximity of this Bioethanol Plant to AMEP means that cumulative impacts to air quality are most likely to occur under low westerly wind speed conditions.

North Killingholme Power Plant, North Lincolnshire, C. Gen

- 4.11.14 The PEIR report as prepared by Parsons Brinckerhoff for the North Killingholme Power Plant has been reviewed. This does not include detailed dispersion modelling, and instead looks at screening calculations for contributions during construction, operation and decommissioning for air quality. It is not possible to conclude from this work that the operations will not have significant impacts to human or ecological receptors. Part of this work screens out some of the associated activities, and looks at screening calculations for possible stack height in relation to impacts to NO₂ concentrations. The baseline of nitrogen dioxide (NO₂) and oxides of nitrogen (NO_x) are elevated in certain locations around the Humber Estuary, and therefore it can be concluded that further detailed dispersion modelling assessments will identify the requirements for a tall stack, and a high standard of mitigation. Due to the location of the proposed plant, to the northwest of AMEP, cumulative impacts would occur when winds were from the northwest or southeast, both uncommon wind directions. In addition, as the plant is adjacent to the northern end of AMEP it is foreseeable that the maximum impact associated with the plant would not be co-

incidental of that of AMEP as the tall stack would mean that the point of maximum impact would be further afield.

Heron Renewable Energy Plant, North Lincolnshire, Drax

- 4.11.15 A detailed dispersion modelling assessment has been completed by Sinclair Knight Merz (SKM) for the Heron Renewable Energy Plant. Impacts were concluded to be not significant in terms of air quality to human or ecological receptors. The assessment was reported in 2009, however, this assessment does not make reference to significance criteria which would now be used, and impacts to the Humber Estuary would now be identified as a possible significant impact. The guidance states that a Process Contribution (PC) of above 1% of the Environmental Assessment Level (EAL) is not defined as insignificant, and that a Predicted Environmental Concentration (PEC) of above 70% of the EAL is considered significant. For the Humber Estuary a number of impacts would now be considered as significant. However, due to the location of the proposed plant, to the southeast of AMEP, cumulative impacts would occur when winds were from the northwest or southeast, both uncommon wind directions. In addition, as the plant is adjacent to the southern end of AMEP it is foreseeable that the maximum impact associated with the plant would not be co-incidental of that of AMEP as the tall stack would mean that the point of maximum impact would be further afield.

Mitigation and Residual Impacts

- 4.11.16 Of the projects within the surrounding area of AMEP, there are 10 which have been identified as potentially adding cumulatively to air quality impacts. Of these, three are located to the north at a distance of 9 km or more, and a further three are located to the south east at a distance of 7 km or more. Due to the distance of the aforementioned proposed projects, and the prevailing meteorological conditions, it is concluded that any cumulative impacts to air quality due to AMEP and these projects are likely to be negligible.
- 4.11.17 There are four remaining projects which are considered to potentially contribute to significant cumulative impacts. These projects are all located within 1 to 2 km of AMEP. Detailed assessments have been completed for the glass wool plant, bioethanol plant and biomass plant. For the Glass wool plant and the bioethanol plant, these concluded that no significant impacts would occur due to these projects, in isolation. For the biomass plant, potentially significant impacts can be interpolated from the data provided at Humber Estuary. And in the

case of the power station, no firm conclusions can be drawn. There is some uncertainty as to the potential for significant cumulative impacts to arise. As previously discussed, in all cases, the wind conditions are such that, even for the two plants adjacent to the AMEP site, the point of maximum impact is unlikely to be co-incidental with that from AMEP. This is due both to the consideration of wind direction, and consideration of the difference in emission sources at AMEP and the tall stacks at these two plants. However, conservatively there remains the potential for significant cumulative impacts to arise at North Killingholme Pits and a small area of the Humber Estuary. This is primarily from the particularly stringent criterion that is applied where the baseline conditions are already in excess of an assessment criteria (an increase of >1% of the critical level or critical load is considered significant).

4.11.18 When considering these cumulative impacts, it is important to note that the impacts associated with the AMEP proposal are, in isolation, considered not significant at North Killingholme Pits and the Humber Estuary. Therefore, even when AMEP is considered in combination with these four other projects, the total cumulative impact would be, at the very worst, a small percentage of the assessment criteria, and a small percentage of the existing impacts due to existing sources of emissions; in terms of the Humber Estuary impacts would also occur at a small area of the Estuary, at worst.

4.11.19 One point that must be noted is that in terms of impacts at sensitive ecological receptors in particular, the assessment methods and impact assessment criteria have substantially changed since the studies for the four other developments of interest were undertaken (2006, 2008 and 2009). On the whole these changes have tended towards more stringent assessment criteria, and more demanding assessment of impacts. Therefore, it is foreseeable that where no significant impact has previously been concluded for the four plants of interest this may now not be the case. Without detailed reassessment of all four projects, it is impossible to conclude the influence of these changes in methods on the conclusions of the assessments. However, it is appropriate to consider that as AMEP is the most recent assessment, this will most closely reflect current best practice, and is therefore likely to be a more stringent assessment than was undertaken for the other plants.

Screening

4.12.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.18 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
Able UK Area C	Screened out – superseded by AMEP
Able UK Area E	Screened out – superseded by AMEP
Able UK Northern Area	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - Residual effects predicted after mitigation are not significant and are localised; no cumulative effects considered likely
Maintenance Dredging	Screened out - Effects are not considered significant and are localised; no cumulative effects considered likely
Immingham Oil Terminal Approach Channel Deepening	Screened out - Effects are not considered significant and are localised; no cumulative effects considered likely
Green Port Hull	Screened out - Significant adverse effects have been identified, but too localised to have a cumulative effect
Grimsby Ro Ro	Screened out - Effects are not considered significant and are localised; no cumulative effects considered likely
Hull Riverside Bulk Terminal	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
Humber Flood Risk Management Strategy	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - No cumulative effects considered likely
Land East of Falkland Way, North Lincolnshire	Screened out - No effects identified and would be too localised; no cumulative effects considered likely
Ursa Glass Wool Factory	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely

Project	
Bioethanol Plant	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
North Killingholma Power Project	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
DRAX Heron Renewable Energy Plant	Screened out - Residual effects are considered negligible and are localised; no cumulative effects considered likely
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - No cumulative effects considered likely
Aeolian Wind Turbines	Screened out - Residual effects have been identified but are localised; no cumulative effects considered likely
Bio Power / Fuel	Screened out - No residual effects predicted after mitigation; no cumulative effects considered likely
Bioethanol Plant	R Screened out - residual effects are considered negligible and are localised; no cumulative effects considered likely
Bioethanol Plant	No effects identified and would be too localised; no cumulative effects considered likely
Europarc	Screened out - No effects identified and would be too localised; no cumulative effects considered likely
Industrial Park	Screened out - No effects identified and would be too localised; no cumulative effects considered likely
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - No cumulative effects considered likely
Tidal Stream Generator	Screened out - No cumulative effects considered likely
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - No cumulative effects considered likely

Project	
Farmmarsh Farm	Screened out - Residual effects are considered slight to moderate and are localised; no cumulative effects considered likely
Thorngumbald Windfarm	Screened out - proposal has been withdrawn
Country Park Inn	Screened out - No cumulative effects considered likely
Bioethanol facility, Saltend Lane, Preston	Screened out - No cumulative effects considered likely
Energy from Waste facility	Screened out - No cumulative effects considered likely
Humber Gateway on-shore installation	Screened out - No effects identified and would be too localised; no cumulative effects considered likely
Mixed use south of Brough	Screened out - No cumulative effects considered likely
Biomass power station	Screened out - No cumulative effects considered likely
Other Projects	
Humber Gateway Wind Farm	Screened out - No cumulative effects considered likely

Potential Impacts

- 4.12.2 No projects have been identified where there are residual effects on the historic environment which can act in combination with the AMEP proposals. Most effects that have been identified elsewhere are too localised or of such low significance that there is no cumulative change identifiable.

Mitigation and Residual Impacts

- 4.12.3 There are no mitigation measures proposed, nor cumulative residual impacts identified. There is some potential for the cumulative loss of evidential value from buried archaeological sites affected by development sites around the Humber Estuary. Modern development control policies and guidance provide adequate mitigation and safeguards for the preservation of significant remains in situ, where practicable, and for the recording, analysis and dissemination of information about sites where preservation is not achievable. It is assumed that each of the projects considered to have potential cumulative effects will be assessed in accordance with current best practice.

Screening

4.13.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.19 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened out – lighting is not a component of this scheme.
Able UK Area C	Screened out – will be superseded by AMEP.
Able UK Area E	Screened out – will be superseded by AMEP.
Able UK Northern Area	Screened in – this project is close to AMEP and is likely to include lighting proposals.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – lighting is not a component of this scheme.
Maintenance Dredging	Screened out – navigational lighting and operational lighting is very focused on dredging area and is unlikely to act cumulatively with AMEP.
Immingham Oil Terminal Approach Channel Deepening	Screened out – navigational lighting and operational lighting is very focused on dredging area and is unlikely to act cumulatively with AMEP.
Green Port Hull	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Grimsby Ro Ro	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Hull Riverside Bulk Terminal	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Humber Flood Risk Management Strategy	Screened out – lighting is not a component of this strategy.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Not applicable.
Land East of Falkland Way, North Lincolnshire	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Ursa Glass Wool Factory	Screened in – the project is close to AMEP and is likely to include lighting proposals.
Bioethanol Plant (Bioethanol Ltd.)	Screened in – the project is close to AMEP and is likely to include lighting proposals.
North Killingholme Power Project	Screened in – the project is close to AMEP and is likely to include lighting proposals.
DRAX Heron Renewable Energy Plant	Screened in – the project is close to AMEP and is likely to include lighting proposals.
Projects in North East Lincolnshire Council Area	

Project	
North East Lincolnshire Core Strategy	Not applicable.
Aeolian Wind Turbines	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Bio Power / Fuel	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Bioethanol Plant (Abengoa Bioenergy)	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Bioethanol Plant (Vireol PLC)	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Europarc	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Industrial Park	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Not applicable.
Tidal Stream Generator	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Not applicable.
Farmmarsh Farm	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Bioethanol facility, Saltend Lane, Preston	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Energy from Waste facility	Not applicable.
Humber Gateway on-shore installation	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Mixed use south of Brough	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.

Project	
Biomass power station	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.
Other Projects	
Humber Gateway Wind Farm	Screened out – project is too distant from AMEP to produce significant cumulative lighting impacts.

Potential Impacts

- 4.13.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Able UK Northern Area (Able UK Ltd)

- 4.13.3 This project includes 30 m high lighting towers providing 25 lux across port related storage areas. 10 m high lighting columns are proposed for the lorry and car parks. Cumulative lighting impacts could arise on nearby sensitive visual receptors such as residents at East Halton.

Project Ursa Glass Wool Factory

- 4.13.4 This project will require operational lighting for health and safety and for vehicular access and parking. Cumulative lighting impacts could arise on nearby sensitive ecological receptors such as the Feeding Areas for Birds in adjacent fields and Bird Areas in adjacent Mitigation Fields.

Project Bioethanol Plant, Bioethanol Ltd

- 4.13.5 This project will require operational lighting for health and safety and for vehicular access and parking. Cumulative lighting impacts could arise on nearby sensitive visual receptors such as those at Immingham. In combination lighting impacts could also arise on nearby sensitive ecological receptors such as the Mudflats Special Protection Area.

North Killingholme Power Project

- 4.13.6 This project will require operational lighting for health and safety and for vehicular access and parking. Cumulative lighting impacts could arise on nearby sensitive visual receptors such as residents at East Halton.

DRAX Heron Renewable Energy Plant

- 4.13.7 This project will require operational lighting for health and safety and for vehicular access and parking. Cumulative lighting impacts could

arise on nearby sensitive visual receptors such as residents at East Halton.

Mitigation and Residual Impacts

- 4.13.8 There is the potential for four of the projects included above and the AMEP project to produce cumulative lighting impacts on residential receptors at East Halton. This is due to the types of projects which include levels of lighting required for commercial and industrial type activity.
- 4.13.9 Light impact mitigation measures included in the AMEP ES will assist in reducing the cumulative impacts on nearby sensitive receptors. These include:
- 4.13.10 Construction Phase
- Mobile lighting will be directed away from sensitive receptors.
 - Lighting during marine works will be kept to a minimum with light controlled by the use of appropriate lighting units. These will be directed away from sensitive residential and ecological receptors.
- 4.13.11 Operational Phase
- Lighting towers will be fitted with directional luminaires to limit light spill.
 - Downlights will be fitted to the outside of buildings to provide localised lighting for safe access.
 - Landscape planting will assist in mitigating the effects of lighting by intercepting illumination.
- 4.13.12 Similar mitigation measures should be included for the other projects likely to impact on sensitive receptors.
- 4.13.13 Measures are also included within the AMEP ES to mitigate any potential lighting impacts on the intertidal mudflats.
- 4.13.14 Measures are also included within the AMEP ES to mitigate any potential lighting impacts on the adjacent feedings areas which might arise from the AMEP project and the Ursa Glass Wool Factory acting cumulatively.

- 4.13.15 The proposed AMEP is located in a baseline which already contains a large number of existing water and quay side developments. These developments contain lighting which is visible from many of the sensitive locations included in the light impact assessment section.
- 4.13.16 The overall lighting proposed for the AMEP site is not inconsiderable and it will form a new night time feature in the area. This will be read in the context of the existing surroundings which themselves are a night time feature of the area.
- 4.13.17 Looking at the existing development in the area, the Lindsey Oil Refinery which is adjacent to the site is a major lit night time feature of the area. The E.ON power station is also lit but not quite to the same scale. The nearby Humber Sea Terminal and the Oil Terminal at Immingham both have levels of night time illumination.
- 4.13.18 When viewed at night from the wider area for example across the estuary, the coastline for the most part is illuminated for much of its length either side of the site. There are more densely lit areas and some darker lengths but on the whole the appearance is of a developed coast. One particular “hotspot” is the area around the proposed AMEP. Much of that illumination can be accorded to the Lindsey Oil Refinery. The fact that the AMEP site is positioned in proximity to this existing and brightly illuminated facility reduces its potential cumulative impact.
- 4.13.19 Similarly, the AMEP site when viewed from the Lincs Wolds AONB at night will be seen behind the refinery and in association with a number of nearby illuminated facilities.
- 4.13.20 It is not considered that these cumulative impacts are worse than those reported in the original ES. This is due in part to the level of existing illumination in the night time baseline resulting from the Oil Refinery facility and also due to the distances involved which result in a rapid reduction in Lux levels.

4.14 LANDSCAPE AND VISUAL IMPACT

Screening

- 4.14.1 Cumulative landscape and visual impacts arise from the additional effects arising from the presence of AMEP in the landscape alongside existing and other planned projects in the surrounding area. A two

stage approach has been adopted for the screening exercise. The first screening stage considered all projects, and exclusions from the cumulative assessment were made based on broad criteria such as project type and distance from AMEP. The second screening step considered the remaining projects in terms of the physical elements proposed and their immediate landscape setting. Some of these projects were then considered, at the outset, not to contribute to significant cumulative landscape and visual effects and were excluded from further cumulative study, leaving a total of six proposed projects for detailed cumulative landscape and visual impact assessment.

4.14.2 The broad criteria for screening projects, in the first stage, for inclusion in the cumulative assessment are set out below:

1. The cumulative landscape and visual impact assessment addresses projects of a similar development type and scale to the AMEP proposal. Examples of such projects include power plants, industrial warehouses, port and port related storage facilities.
2. The cumulative assessment addresses the elements of the proposed AMEP that will be present continuously and permanently on the site at Killingholme Marshes. In this regard, the wind turbines, which will be present temporarily on the quayside until shipped to an offshore scheme location, are considered only in terms of their temporary presence as freight on the quayside. As these wind turbines are not operational, a cumulative assessment between the AMEP freight wind turbines and other operational wind farms is not conducted in this assessment. This approach recognises that the AMEP wind turbines will be shipped to an offshore wind farm and will therefore be considered for their contribution to cumulative impact with other wind farms when operational in the destination offshore wind farm.
3. The AMEP site is located within a landscape which features a considerable amount of existing heavy industries and port or ferry related activities. In addition, a number of the planned projects tabulated below lie adjacent to or close to the AMEP site. In this regard, significant cumulative landscape and visual effects are believed to be limited to a 10 km radius from the centre of the proposal. The scope of the cumulative assessment is therefore limited to projects located within a 10 km radius of the AMEP site. An exception to this is the Green Port Hull proposal. Although this lies just outside the study area, it represents the only project in the

vicinity which matches the AMEP project in terms of physical structures proposed and which comprises structures of a size and scale that are similar to AMEP.

- 4.14.3 On the basis of the above criteria adopted for the landscape and visual cumulative assessment, the following table identifies the projects which will be taken forward for further study in this assessment of cumulative landscape and visual effects.

Table 4.20 *Cumulative Projects Screening*

Project	
Able UK Area F	Screened in – it comprises a port related storage facility and shares similarities with AMEP as a development type.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened in – it comprises a port related storage facility and shares similarities with AMEP as a development type.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - outside the 10 km study area.
Maintenance Dredging	Screened out – project comprises works which do not share similarities with AMEP.
Immingham Oil Terminal Approach Channel Deepening	Screened out – outside the 10 km study area.
Green Port Hull	Screened in – although this project lies just outside the 10 km study area, it comprises a facility for the manufacture and shipment of wind turbine components, and features proposals of a very similar type and scale as AMEP.
Grimsby Ro Ro	Screened out - outside the 10 km study area.
Hull Riverside Bulk Terminal	Screened in - this comprises a new bulk products and storage facility together with jetty at the Port of Hull. It comprises permanent visible port and freight related facilities and therefore shares some similarities with AMEP.
Humber Flood Risk Management Strategy	Screened out - this project comprises works which do not share similarities with the permanent elements associated with AMEP.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out – no cumulative effects AMEP.
Land East of Falkland Way, North Lincolnshire	Screened out – outside the 10 km study area.
Ursa Glass Wool Factory	Screened in – this project lies north east and very close to the AMEP site and comprises factory buildings of a similar scale to some associated with AMEP.
Bioethanol Plant	Screened in – this project lies adjacent and north of the

Project	
(Bioethanol Ltd.)	AMEP site. It comprises structures of a similar scale to those proposed in AMEP.
North Killingholme Power Project	Screened in – this project lies north east of the site for AMEP and comprises structures of a similar scale to those proposed in AMEP.
DRAX Heron Renewable Energy Plant	Screened in – this project lies north east of the site for AMEP and comprises structures of a similar scale to those proposed in AMEP.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – no cumulative effects with AMEP.
Aeolian Wind Turbines	Screened out – an operational wind farm and is not a development of a similar type and scale as AMEP.
Bio Power / Fuel	Screened in – this project comprises structures of a similar scale to those proposed in AMEP.
Bioethanol Plant (Abengoa Bioenergy)	Screened in – this project comprises structures of a similar scale to those proposed in AMEP.
Bioethanol Plant (Vireol PLC)	Screened in – this project comprises structures of a similar scale to those proposed in AMEP.
Europarc	Screened in – this project comprises structures of a similar scale to those proposed in AMEP.
Industrial Park	Screened in – this project comprises structures of a similar scale to those proposed in AMEP.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out – no cumulative effects with AMEP.
Tidal Stream Generator	Screened out – outside the 10 km study area.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – no cumulative effects with AMEP.
Farmmarsh Farm	Screened out – an operational wind farm and is not a development of a similar type and scale as AMEP.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – outside the 10 km study area.

Project	
Bioethanol facility, Saltend Lane, Preston	Screened in – this project comprises structures of a similar scale to those proposed in AMEP
Energy from Waste facility	Screened in – this project comprises structures of a similar scale to those proposed in AMEP
Humber Gateway on-shore installation	Screened out – no cumulative effects with AMEP.
Mixed use south of Brough	Screened out - outside the 10 km study area.
Biomass power station	Screened out - outside the 10 km study area.
Other Projects	
Humber Gateway Wind Farm	Screened out - outside the 10 km study area.

4.14.4 The above projects which matched the broad criteria were considered further in terms of their potential to contribute to significant cumulative landscape and visual effects. *Table 4.21* below presents an analysis of the landscape setting and visual context of each of the projects and a second stage screening exercise is undertaken to exclude the projects which are unlikely to contribute to significant cumulative landscape and visual impacts.

4.14.5 The review of projects presented below has been undertaken with limited data for all of the projects in terms of Zones of Theoretical Visibility and landscape and visual assessment reports including photomontages. Cumulative Zones of Theoretical Visibility were not available for AMEP and each of these other projects to inform this assessment.

4.14.6 In addition, given the difficulties in determining when projects will actually be constructed it is impossible to detail the cumulative effects attributable to construction phase. However, it is determined that the cumulative effects attributable to the construction phase will be of no greater significance than those detailed under operation.

Table 4.21 *Cumulative Project Screening - Stage Two*

Project	Potential for Cumulative Landscape and Visual Impacts.
Able UK Area F	<p>The Able UK Area F proposal will, be located approximately 0.5 km north west of AMEP within the Humber Estuary Local landscape Character Area in North Lincolnshire County. Both AMEP and Able Area F will be located within a part of the Humber Estuary which features heavy industrial developments.</p> <p>The Able UK Area F proposal comprises a 5 ha storage</p>

Project	Potential for Cumulative Landscape and Visual Impacts.
	<p>facility whose site location is bounded to the west by Chase Hill Wood. A power station lies further west of this. Other industrial developments lie to the north and the south of this site. If Able UK Area F is built, there will be very limited opportunities to view this development along with AMEP from the surrounding area. This is due to the visual screening provided by existing industrial developments. The 30 m high security lighting masts may be visible albeit, perhaps not distinguishable from the lighting generally present in this industrialised landscape. If AMEP is built, this will visually screen the Area F proposal from the Humber Estuary and landscapes further north.</p> <p>Able UK Area F will occupy a small footprint and will be visually screened by existing and proposed developments (North Killingholme Power Project). For this reason, Able UK Area F is not considered to contribute towards significant cumulative landscape and visual impacts.</p>
Able UK Northern Area	<p>The Able UK Northern Area proposal will be located approximately 1.0 km north west of AMEP and will directly overlook the Humber Estuary from the South Bank. Direct cumulative impacts will arise to the Humber Estuary Local landscape Character Area in North Lincolnshire County as a result of the physical presence of this project and AMEP in the landscape of the South Humber Bank</p> <p>The Able UK Northern Area comprises 379.9 ha of port related storage and service facilities and will be present as a large scale element which will be visible as a new element in the landscape along with AMEP. Areas affected include small areas of farmed landscapes in the Humber Estuary and Lincolnshire Drift Local Landscape Character Areas in North Lincolnshire and a small part of the Sunk Island Local Landscape Character Area in North Yorkshire.</p> <p>The projects concerned will be sited in an immediate landscape setting which is heavily industrialised. AMEP, however, will feature elements of a larger scale than the freight facilities associated with the Able UK Northern Area. Apart from the temporary presence of wind turbine as freight, a range of tall cranes will be visible as part of AMEP operations. AMEP is therefore believed to contribute additional tall structures to the skyline.</p> <p>The Able UK Northern Area is of particular relevance to the cumulative assessment largely because of its large footprint which is comparable to the footprint of AMEP and its location, almost adjacent to AMEP on the South Humber Bank.</p>

Project	Potential for Cumulative Landscape and Visual Impacts.
Projects in the Humber Estuary	
Green Port Hull (GPH)	<p>Green Port Hull will be located approximately 11 km north of AMEP and will directly overlook the Humber Estuary from the north bank.</p> <p>GPH will be visible against the urban backdrop of the city of Kingston Upon Hull and AMEP against the industrialised landscape of the Killingholme Marshes Area.</p> <p>Both proposals will feature tall elements such as cranes and wind turbines (positioned on the shoreline prior to dispatch) together with large quayside manufacturing facilities. As a result each of these projects will visually stand out and be clearly seen as development types which have many shared characteristics visually and are distinguishable from all other existing and proposed industrial developments in the area. Both AMEP and GPH will potentially be the tallest industrial developments lining the banks of the Humber Estuary. The GPH is of particular relevance to the cumulative assessment because of its shared characteristics with AMEP and the location, overlooking the visually open waterway.</p>
Hull Riverside Bulk Terminal (HRBT)	<p>HRBT will be located approximately 9 km north of AMEP and will comprise a new riverside bulk terminal which will directly overlook the Humber Estuary from the north bank. A new jetty is proposed as part of the works. The HRBT will be seen from the surrounding landscape usually against the backdrop of the existing built up port of Hull and the industrial backdrop of Saltend. This proposal will be sited within an existing extensive dockland area. As a result of this, HRBT is not expected to bring about notable and significant change to the receiving landscape and visual amenity in its own right. Some small change may be derived from the proposed jetty.</p> <p>The HRBT is therefore not considered to contribute towards significant cumulative landscape and visual impacts.</p>
Projects in North Lincolnshire Council Area	
Ursa Glass Wool Factory	<p>This factory will be located approximately 0.5 – 1 km north west of AMEP. The URSA glass wool factory is a small scale development with a small footprint compared with AMEP. The factory is estimated to be visible along with AMEP from open farmland in the vicinity of East Halton and further north.</p>

Project	Potential for Cumulative Landscape and Visual Impacts.
	<p>The URSA Glass wool factory will in its own right have limited impacts on the wider landscape and visual amenity due to the visual screening provided by intervening industrial developments.</p> <p>The URSA glass wool factory is of limited relevance to the cumulative assessment and effects are expected to be limited to open farmed landscapes to the north and west of this factory site.</p>
Bioethanol Plant, Bioethanol Ltd	This power plant will be located approximately 0.5-1 km north west of AMEP. This power plant will have effects on landscape and visual amenity south of the Humber Estuary. It is of some considerable relevance to the cumulative assessment because of its proximity to AMEP and the scale of the structures proposed as seen from the immediate landscape around it.
North Killingholme Power Project	<p>This power plant will be located approximately 0.5-1 km north of AMEP. The proposed power plant will occupy an area measuring 27.5 ha adjacent to the Humber Sea Terminal. Whilst the project will feature large scale and some tall structures (flare stack) associated with power generation, the overall scale of the project will be considerable smaller than AMEP.</p> <p>The project is of considerable relevance to the cumulative assessment because of its proximity to AMEP, the scale of the development and its location, overlooking the visually open Humber Estuary from the South Bank.</p>
DRAX Heron Renewable Energy Plant	This power plant will be located adjacent to the south east boundary of AMEP. It will be of relevance to the cumulative assessment because of its proximity to AMEP and because of the scale of the proposal together with its location, overlooking the Humber Estuary from the south bank.
Projects in North East Lincolnshire Council Area	
Bio Power / Fuel Helius	This power plant will be located approximately 6.5 km south east of AMEP and will be sited within the industrialised skyline of the western edge of Grimsby. The project will be located in between the site of an existing power station and another industrial facility. As the site for this proposal is set within an existing industrialised skyline, it is not considered to contribute to significant cumulative landscape and visual impacts.
Bioethanol Plant Vireol	This power plant will be located approximately 8.5 km

Project	Potential for Cumulative Landscape and Visual Impacts.
PLC	south east of AMEP. This proposal will occupy a small footprint area relative to AMEP and will be sited inland within the industrialised edge of Grimsby. This proposal will be located within an industrialised setting and will, in its own right, have limited landscape and visual effects owing to the visual screening provided by adjacent industrial developments. It is therefore not considered to contribute to significant cumulative landscape and visual effects.
Bioethanol Plant Abengoa LTD	This power plant will be located approximately 6 km south east of AMEP within the industrialised skyline of the western edge of Grimsby. For this reason it is not considered to contribute to significant cumulative landscape and visual impacts.
Europarc Wykeland Group	This facility will be located approximately 10 km south east of AMEP. It will be located inland within the industrialised edge of Grimsby. For this reason it is not considered to contribute to significant cumulative landscape and visual impacts.
Magna Holdings Industrial Park	This facility will be located approximately 4 km south east of AMEP. The change to landscape and visual amenity brought about by this project will be relatively small in its own right due to the site location, adjacent to the urban and industrial landscape of Immingham including proximity to the large scale Immingham Docks. This proposal is not considered to contribute to significant cumulative landscape and visual impacts.
Projects in the East Riding of Yorkshire Area	
Bioethanol facility, Vivergo Fuels Saltend Lane, Preston	This power plant will be located approximately 9 km north of AMEP. It will be sited within the industrialised landscape of Saltend which is currently visually identifiable by industrial structures, pylons and large scale cooling towers. The Bioethanol facility is therefore not considered to contribute to significant cumulative landscape and visual impacts.
Energy from Waste facility	This power plant will be located approximately 9.5 km north of AMEP in the industrialised landscape of Saltend. This facility is therefore not considered to contribute to significant cumulative landscape and visual impacts.

4.14.7 As a result of the two stage screening approach, the following projects are included within the cumulative impact assessment baseline:

- Able UK Northern Area;
- Green Port Hull (GPH);
- URSA Glass Wool Factory;
- Bioethanol Plant, Bioethanol Ltd;
- North Killingholme Power Project; and
- DRAX Heron Renewable Energy Plant.

4.14.8 Cumulative impacts on Landscape Character and Visual Amenity are considered in further detail below taking into account the projects listed above together with AMEP.

Methodology

4.14.9 Cumulative landscape and visual impacts may result from additional changes to the baseline landscape or visual amenity caused by the proposal in combination with other industrial developments present in the receiving landscape.

4.14.10 The assessment identifies the additional contribution of AMEP to the magnitude of change experienced as a result of the existing and proposed industrial developments referred to above. The magnitude of cumulative change arising from the proposal is assessed as large, medium, small or imperceptible, based on an interpretation of the following (largely quantifiable) parameters, to take account of cumulative change:

- number of existing and proposed industrial developments visible;
- distance to existing and proposed industrial developments;
- direction and distribution of existing and proposed industrial developments;
- landscape setting, context and degree of visual coalescence of existing and proposed industrial developments; and
- proportion of developed/undeveloped skyline occupied by existing and proposed industrial developments.

- 4.14.11 The principle of magnitude of cumulative change makes it possible for the proposed AMEP to have a major visual effect on a close receptor while having only a minor cumulative effect from the same viewpoint. For example, a major visual impact may be experienced at a viewpoint located close to AMEP where the development is seen as a large elements in the view. However, when another industrial development is visible from this same viewpoint and is seen to be larger than AMEP, then AMEP may be seen to contribute a small amount to an already developed skyline. Thus a small magnitude of cumulative change would be assessed to arise on a viewpoint of high sensitivity thereby resulting in a minor to moderate cumulative effect.
- 4.14.12 The significance of any identified cumulative landscape or visual effect has been assessed as major, moderate, minor or not significant in relation to the sensitivity of the receptor and the predicted magnitude of cumulative change as outlined above.
- Major - substantial additional change in conjunction with other developments affecting the character or views of the landscape or the elements within.
 - Moderate - additional change in conjunction with other developments affecting the character or views of the landscape or the elements within.
 - Minor - slight change in conjunction with other developments affecting the character or views of the landscape or the specific elements within.
 - Not significant – no or minimal perceptible additional change in conjunction with other developments affecting the character or views of the landscape or the specific elements within.
- 4.14.13 The residual cumulative impact of AMEP is outlined below. This is presented in the context of the local landscape character areas with reference to some of the key viewpoints within each of these areas.

Potential Impacts

- 4.14.14 The site for AMEP is located within an immediate landscape setting which features a range of existing large scale industrial and port related developments. Many of these are located close to the site for the proposal.

- 4.14.15 The existing Immingham Port occupies a large site immediately south of the site for the proposal. The Immingham bulk coal import facility is located adjacent to this port. The existing Lindsey Oil Refinery occupies a large site immediately west of the site for the proposed AMEP. The refinery is a large scale industrial development featuring tall structures, stacks and flares which are brightly lit at night. The existing Killingholme Power Station is located north west of the site and the Humber Sea Terminal is located adjacent to and north of the site.
- 4.14.16 Further east, towards the settlements of Immingham and Grimsby, extensive areas of the South Bank of the Humber Estuary features many industrial developments as well as the port and industrial facilities.
- 4.14.17 The presence of these existing industrial developments, especially those located near to AMEP, will mean that the potential for cumulative effects arising from AMEP will be diminished due to the partial screening of AMEP proposals by these existing facilities and the fact that AMEP, where visible, will usually be seen against an industrialised skyline.
- 4.14.18 Potential cumulative landscape and visual impacts are presented below and take into account the landscape and visual mitigation measures proposed for AMEP.

Residual Cumulative Impacts on Landscape Character during Operation

- 4.14.19 The long term cumulative impacts will arise to landscape character as a result of the physical presence and visibility of AMEP along with other projects which are considered to be relevant in terms of significant cumulative effects. These include the following previously identified projects:
- Able UK Northern Area;
 - Green Port Hull (GPH);
 - URSA Glass Wool Factory;
 - Bioethanol Plant, Bioethanol Ltd;
 - North Killingholme Power Project; and
 - DRAX Heron Renewable Energy Plant.
- 4.14.20 Apart from GPH, the projects located closest to AMEP are generally considered to be of greatest relevance to the cumulative assessment. These projects will be present in the landscape along with AMEP and will be seen with AMEP from a range of viewpoint locations.

North Lincolnshire – Humber Estuary Landscape Character Area

- 4.14.21 Direct cumulative impacts on the Humber Estuary Local Landscape Character Area (LLCA) in North Lincolnshire will arise due to the presence of Able UK Northern Area and the North Killingholme Power Project which will be physically present in this landscape along with AMEP. These projects together with AMEP will be located within an existing industrialised part of the Humber Estuary LLCA.
- 4.14.22 Indirect cumulative impacts on the character of the *Humber Estuary* LLCA will arise as a result of the visibility of other projects along with AMEP. In this regard, the open estuarine landscapes to the north of AMEP in the vicinity of Halton Marshes will be affected potentially by the visibility of the Able UK Northern Area, GPH and the North Killingholme Power Plant, in particular, along with AMEP. GPH will, however, be visible only from locations along or very near the shoreline as a relatively small development compared with AMEP. This is because it is located some distance away on the North Bank of the Humber Estuary. These projects, where visible, will be seen alongside the existing industrial developments in the vicinity of the site for AMEP. The proposed projects, namely Able UK Northern Area and the power plant, where visible, will be seen in the foreground with AMEP, partly visible in the background. The taller elements such as the wind turbines as freight and the cranes are expected to be visible. From some locations on the banks of the estuary, the proposed GPH will be visible in the distance albeit against an industrial urban backdrop of Kingston Upon Hull.
- 4.14.23 AMEP is therefore considered to contribute a *small - medium* magnitude of cumulative change to this landscape of *medium* sensitivity thereby resulting in a *minor to moderate* cumulative impact on landscape character.

North Lincolnshire – Lincolnshire drift Landscape Character Area

- 4.14.24 In the case of the *Lincolnshire Drift* Local Landscape Character Area (LLCA) in North Lincolnshire, indirect cumulative impacts will arise as a result of the visibility of the taller elements of AMEP along with the Able UK Northern area, the URSA Glass wool factory, the Bioethanol Plant and upper portions of the North Killingholme Power Project. These cumulative effects will affect open farmed landscapes in the vicinity of East Halton. These cumulative changes will be seen within a landscape setting which features existing heavy industry. AMEP is

therefore considered to contribute a *small* magnitude of cumulative change to this landscape of *medium* sensitivity thereby resulting in a *minor* cumulative impact on landscape character.

North East Lincolnshire – Humber Estuary Landscape Character Area A

- 4.14.25 In the case of the *Humber Estuary* Local Landscape Character Area (LLCA) in North East Lincolnshire, indirect cumulative impacts will arise mainly as a result of the visibility of the taller elements of AMEP in the background and the proposed Drax Heron Renewable Energy Plant in the foreground. This will potentially affect a limited part of this landscape north of Immingham. Further afield, the potential cumulative effects arising from AMEP and the other proposed projects will affect limited areas of this landscape as much of it features built up areas and other industrial developments.

- 4.14.26 AMEP is therefore considered to contribute a *small* magnitude of cumulative change to this landscape of *low* sensitivity thereby resulting in a *not significant* cumulative impact on landscape character.

North East Lincolnshire – Lincolnshire Coast and Marshes Landscape Character Area B

- 4.14.27 In the case of the *Lincolnshire Coast and Marshes* (LLCA) in North East Lincolnshire, the taller elements associated with the proposed AMEP may be visible from some locations along with some of the proposed developments referred to above. The existing urban area of Immingham and the existing industrial developments such as the Lindsey Oil Refinery and Immingham Port will be the dominating elements affecting the character of this landscape and indeed views from this landscape towards the site for AMEP. AMEP is therefore considered to contribute a *small* magnitude of cumulative change to this landscape of *low* sensitivity thereby resulting in a *not significant* cumulative impact on landscape character.

West Lindsey – Wolds Estates Landscape Character Area

- 4.14.28 The *Wolds Estates* (LLCA) in West Lindsey features extensive areas of woodland cover. Cumulative impacts on landscape character will be very limited.

Yorkshire – Sunk Island Landscape Character Area

4.14.29 The character of the *Sunk Island* (LLCA) in Yorkshire will be affected by AMEP, in particular the tallest elements of the scheme albeit with the existing Lindsey Oil Refinery in the background. The proposal will be seen from the Sunk Island landscape against a skyline featuring other heavy industries along the south bank of the Humber Estuary extending from East Halton to Grimsby. Other proposed schemes will be visible and will be seen to associate with AMEP as these are sited close to AMEP and will overlook the Estuary from the south bank. These schemes include the Able UK Northern Area, The North Killingholme Power Project and the Drax Heron Renewable energy plant. GPH may be visible in the distance from parts of this landscape against the port of Hull and the wider urban backdrop located some distance away.

4.14.30 AMEP will be present as one of the larger of the proposed developments as seen from Sunk Island. In this regard, a small - medium magnitude of cumulative change is predicted to arise in this landscape of medium sensitivity to the proposed change thereby resulting in a minor – moderate cumulative impact.

Yorkshire – South Patrington, Ottringham and Keyingham Farmland Landscape Character Area

4.14.31 AMEP will be partly visible from this landscape, mainly the upper portions of taller elements associated with the proposal. The upper portions of the taller elements associated with the existing Lindsey Oil Refinery will be barely visible. Other existing industrial developments on the south bank of the Humber Estuary will be scarcely visible from this landscape. Proposed developments such as the North Killingholme Power Project and the Drax Heron Renewable energy plant may be visible in part (taller structures associated with these). The western end of this landscape commands views towards the industrialised edge of Hull and opportunities to view the proposed GPH may be gained from some locations. The industrial mass associated with the edge of Kingston Upon Hull will be much more noticeable to the viewer than the proposed AMEP because the proposed AMEP will be partly visible as a small element in the distance. The proposal will therefore be seen to contribute little by way of additional industrial development when viewed from the western end of this landscape.

4.14.32 A small magnitude of cumulative change is predicted to arise in this landscape of medium sensitivity to the proposed change thereby resulting in a minor cumulative impact.

Yorkshire – Burstwick to Withernsea Farmland Landscape Character Area

- 4.14.33 This landscape offers similar viewing opportunities of the proposal and surrounding existing and proposed industrial development as the South Patrington, Ottringham and Keyingham Farmland Landscape Character Area.
- 4.14.34 A small magnitude of cumulative change is predicted to arise in this landscape of medium sensitivity to the proposed change thereby resulting in a minor cumulative impact.

Yorkshire – Paull Farmland Landscape Character Area

- 4.14.35 The proposed AMEP will be partly visible (upper portions of taller structures) from most of this landscape. It will be seen in association with the existing Oil Refinery in the background. The existing industrial and urban skyline of Kingston Upon Hull will be more visually prominent to the viewer from the western edge of this landscape. In the case of proposed developments, the GPH is likely to be the most visually prominent element in the docklands of Hull. AMEP will also be seen as a relatively small element in the distance on the south bank of the estuary. A small magnitude of cumulative change is predicted to arise in this landscape of medium sensitivity to the proposed change thereby resulting in a minor cumulative impact.

Kingston Upon Hull

- 4.14.36 The proposed AMEP will only be visible from the part of this city that directly overlooks the Humber Estuary. The affected area comprises mainly docklands. The GPH will be present as one of the largest industrial developments on the docklands. AMEP will be visible as a small element in the distance and other proposed developments included in this assessment are expected to be scarcely visible.
- 4.14.37 A small magnitude of cumulative change is predicted to arise in this landscape of low sensitivity to the proposed change thereby resulting in a not significant cumulative impact.

Residual Cumulative Impacts on Viewers at fixed viewpoint locations.

- 4.14.38 The cumulative visual impact of AMEP from fixed viewpoint locations within the 10 km study area has been considered, taking into account the proposed developments as follows which are assumed to be present in the landscape.

- Able UK Northern Area;
- Green Port Hull (GPH);
- URSA Glass Wool Factory;
- Bioethanol Plant, Bioethanol Ltd;
- North Killingholme Power Project; and
- DRAX Heron Renewable Energy Plant.

Viewpoint 1 Public Footpath, South Humber Bank.

- 4.14.39 The proposed buildings and warehouses associated with the Able UK Northern Area will be visible at short range. A part of the proposed North Killingholme Power Project will be visible where this extends out into the estuary. AMEP will be visible in part behind the North Killingholme Power project, namely tall structures such as stakes and flare. The view from this location will be very much dominated by these two proposed projects whilst AMEP will be only partly visible in the distance. A *small* magnitude of cumulative change will arise to the viewer of *medium* sensitivity resulting in a *minor* cumulative visual impact.

Viewpoint 2 North Killingholme Haven Pits

- 4.14.40 The proposed AMEP will be visible from this location along with part of the proposed North Killingholme Power Project. Both developments would be visible at short range albeit with some partial screening afforded by vegetation near to the viewer. AMEP will be seen to be a larger and more visually dominant element in the view. A *large* magnitude of cumulative change will arise to the viewer of *high* sensitivity resulting in a *major* cumulative visual impact.

Viewpoint 3 Coastal Footpath, North Humber Bank

- 4.14.41 The viewer's attention will usually be focused on the south bank of the Humber Estuary and the proposed AMEP will be visible as the largest of the proposed developments albeit against an industrial skyline. The Able UK Northern area will be visible as a relatively small element comprising container storage of limited height. The North Killingholme Power Project will be visible as will the Drax Heron Renewable energy plant. As AMEP is of a size and scale that is larger than these other developments, it is expected to give rise to a *medium* magnitude of cumulative change to viewers of *medium* sensitivity thereby resulting in a *moderate* cumulative visual impact.

Viewpoint 4 Viewing point and parking area at Paull

- 4.14.42 AMEP will be clearly visible along with smaller scale proposals such as the North Killingholme Power Project and the Drax Heron Renewable energy plant. The viewer at this location is likely to see the GPH development against the industrial and urban backdrop of Kingston Upon Hull. The GPH proposal is located nearer to the viewer than AMEP and is potentially more visually prominent. A *small* magnitude of cumulative change will arise to the viewer of *medium* sensitivity resulting in a *minor* cumulative visual impact.

Viewpoint 8 Resident at Marsh Lane

The viewer at this location will see the industrial warehouses associated with AMEP at short range together with the DRAX Heron renewable energy plant.

- 4.14.43 Cumulative visual impacts will be derived from the presence of AMEP and the Drax proposal which will become the dominating features in the view. A *medium* magnitude of cumulative change will arise to the viewer of *high* sensitivity resulting in a *moderate to major* cumulative visual impact.

Viewpoint 9 Homestead Lake Public Park and Play Area

- 4.14.44 Viewers at this viewpoint will be affected by both AMEP and parts of the proposed Drax Heron renewable energy plant. Both proposals will be partly visible and partly screened from view by the intervening Lyndsey Oil refinery and some mature vegetation. AMEP will be the more visually dominant element in the view however taking into account the existing industrial elements in the foreground, a *small* magnitude of cumulative change will arise to the viewer of *medium* sensitivity resulting in a *minor* cumulative visual impact.

Viewpoint 11 Residents of South Killingholme

- 4.14.45 The dominant element in the existing view is the Lyndsey Oil refinery including stacks, flares and industrial buildings and structures. The upper portions of the cranes and wind turbines as these await despatch will be partly visible. Other proposed projects in the cumulative assessment are not expected to be visible. Therefore, no cumulative visual impacts will arise.

Viewpoint 12 Residents of North Killingholme

- 4.14.46 As with viewpoint 11, the dominant element in the view at viewpoint 12 is the oil refinery. Other proposed projects in the cumulative assessment are not expected to be visible. Therefore, no cumulative visual impacts will arise.

Viewpoint 13 Residents of East Halton

- 4.14.47 Viewers at this location will see the Able UK Northern Area together with the storage containers at very short range. AMEP will be partly visible in the distance above the line of an existing hedgerow. As AMEP is located further from the viewer and is only partly visible, it is expected to give rise to a *small* magnitude of cumulative change to this viewpoint of *medium* sensitivity thereby giving rise to a minor cumulative visual impact.

Viewpoints 14 South End , 15 Brocklesby and 16 Sunk Island, East of Church

- 4.14.48 These viewpoints are located at least 5 km from the development proposals listed above that are considered to be of greatest relevance to the cumulative impact assessment together with AMEP. At these distances, cumulative visual impacts are expected to be not significant.

4.15 AVIATION

Screening

- 4.15.1 The following table identifies those projects which are located within 10 nautical miles (nm) (18.52 km) of Humberside Airport as depicted in *Figure 4.2* below. During consultation undertaken for the EIA it was confirmed with Humberside Airport that the relevant safeguarding zone around the airport is the outer horizontal surface (OHS) and that this applies between a radius of 6.5 km – 15 km measured from the aerodrome reference points (533428.09N, 0002102.66W). For the purpose of screening, the radius of 10 nautical miles will be applied as criteria.

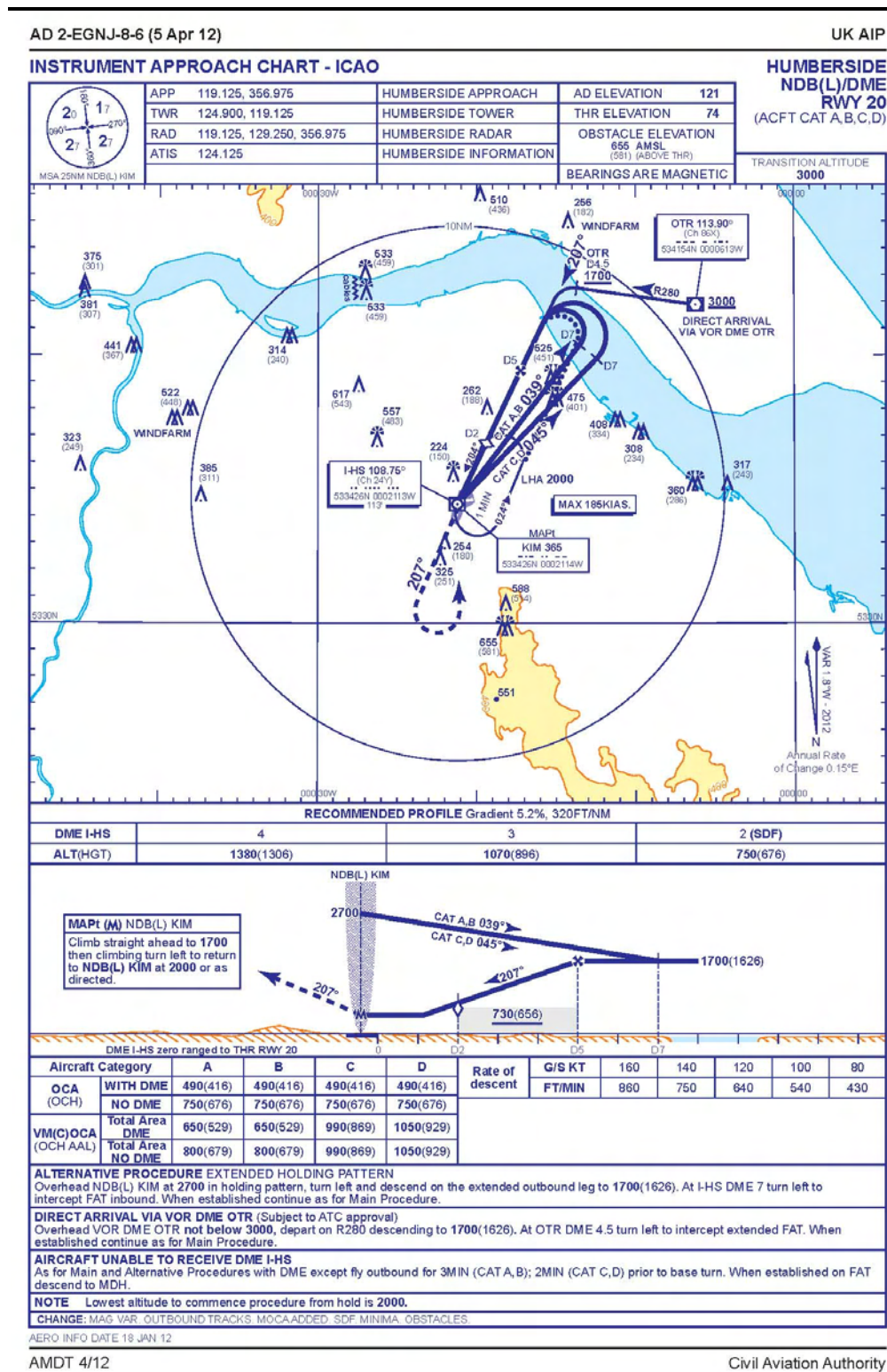
Table 4.22 Cumulative Projects Screening

Project	
Able UK Area F	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.

Project	
Able UK Northern Area	Screened out – consists of warehousing, with lighting columns of 30 m in height above ground level.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – no potential impact on aviation.
Maintenance Dredging	Screened out – no potential impact on aviation.
Immingham Oil Terminal Approach Channel Deepening	Screened out – no potential impact on aviation.
Green Port Hull	Screened in – will consist of a turbine with a tip height of 125 m above ground level and a helipad to the east of Alexandra Dock.
Grimsby Ro Ro	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Hull Riverside Bulk Terminal	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Humber Flood Risk Management Strategy	Not applicable.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Not applicable.
Land East of Falkland Way, North Lincolnshire	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Ursa Glass Wool Factory	Screened in – will include a furnace building of 31.4 m above ground level and chimneys of 65 m, 50 m and 23 m in height above ground level.
Bioethanol Plant (Bioethanol Ltd.)	Screened out – stack heights of 15.2 m above ground level pose no potential impact on aviation.
North Killingholme Power Project	Screened in – within 10 nm of Humberside Airport.
DRAX Heron Renewable Energy Plant	Screened in – within 10 nm of Humberside Airport.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Not applicable.
Aeolian Wind Turbines	Screened in – within 10 nm of Humberside Airport
Bio Power / Fuel	Screened in – within 10 nm of Humberside Airport
Bioethanol Plant (Abengoa Bioenergy)	Screened in – within 10 nm of Humberside Airport.
Bioethanol Plant (Vireol PLC)	Screened in – within 10 nm of Humberside Airport.
Europarc	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Industrial Park	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.

Project	
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Not applicable
Tidal Stream Generator	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Not applicable
Farmarsh Farm	Screened in – within 10 nm of Humberside Airport.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Bioethanol facility, Saltend Lane, Preston	Screened in – within 10 nm of Humberside Airport.
Energy from Waste facility	Screened in – within 10 nm of Humberside Airport.
Humber Gateway on-shore installation	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Mixed use south of Brough	Screened out – although within the 10 nm radius, it will have no potential impact on aviation.
Biomass power station	Screened out – located outside the 10 nm radius of Humberside Airport.
Other Projects	
Humber Gateway Wind Farm	Screened out – located outside the 10 nm radius of Humberside Airport.

Figure 4.2 Humberside Airport Instrument Approach Chart



Potential Impacts

4.15.2

The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Green Port Hull

- 4.15.3 The Green Port Hull ES indicates that there will be no adverse impacts attributable to the operation of a permanent wind turbine. The increase in helicopter movements will be minimal compared with existing operations. Given the distance of this project from AMEP it will result in no significant cumulative effect.

Ursa Glass Wool Factory

- 4.15.4 The chimney stacks are to be lit with medium intensity red lights. Given its proximity to AMEP and its relatively shorter structures this project results in no significant cumulative effect with AMEP.

North Killingholme Power Project

- 4.15.5 According to the PEIR, the maximum building height will be approximately 35 m above ground level and although the stack height is to be confirmed, it will be no more than 85 m above ground level. Given its proximity to AMEP, its relatively shorter structures and assuming that the stack will be lit with medium intensity red lights this project results in no significant cumulative effect with AMEP.

DRAX Heron Renewable Energy Plant

- 4.15.6 This project will consist of a chimney stack of 100 m above ground, with the next tallest structures being the boiler house at 68 m above ground and the steam turbine building at 56 m above ground. Given its proximity to AMEP, its relatively shorter structures and assuming that structures in excess of 45 m in height above ground will be lit with medium intensity red lights, this project results in no significant cumulative effect with AMEP.

Aeolian Wind Turbines

- 4.15.7 This project consists of two turbines of 150 m to tip, above ground levels. Given the distance of this project from AMEP it will result in no significant cumulative effect.

Bio Power/Fuel Heliuss

- 4.15.8 The tallest structure of this project to be constructed is the stack assembly (2 flues combined) approximately 80 m in height above ground level. Given the location relative to AMEP and assuming that

the stack assembly will be lit with medium intensity red lights, this project results in no significant cumulative effect with AMEP.

Bioethanol Plant (Abengoa Bioenergy)

- 4.15.9 The grain silos will be approximately 27m high above the surrounding ground level. The eight fermentation towers stand approximately 22 m above ground level. Given the distance of this project from AMEP and its relatively short structures this project will result in no significant cumulative effect with AMEP.

Bioethanol Plant (Vireol PLC)

- 4.15.10 This project will include one stack of 40 m in height above ground level. Given the distance of this project from AMEP and its relatively short structures this project will result in no significant cumulative effect with AMEP.

Farmarsh Farm

- 4.15.11 This project will consist of three turbines of tip height 102 m above ground level. Given the distance of this project from AMEP it will result in no significant cumulative effect.

Bioethanol facility, Saltend Lane, Preston

- 4.15.12 This project will include wheat storage silos, approximately 34 m high above ground level, DDGS loading silos, approximately 36 m above ground level, and distillation columns, approximately 34 m above ground level. Given the distance of this project from AMEP and its relatively short structures this project will result in no significant cumulative effect with AMEP.

Energy from Waste Facility

- 4.15.13 This project will include the erection of an EfW building of 47m in height above ground level, with a stack of 95m in height above ground level. Given the distance of this project from AMEP and its relatively short structures this project will result in no significant cumulative effect with AMEP.

Mitigation and Residual Impacts

- 4.15.14 With the provision of the aviation warning light mitigation measures, the hazard to aviation presented by tall structures will be mitigated to a

level in line with those presented at other airports and aerodromes in the UK. Therefore, the residual impact is judged to be low. There are several tall structures present and to be constructed in the vicinity of the AMEP site, but none of them of the scale that will be employed at the AMEP site. The turbines erected on the quay will only be in place temporarily and their blades will not be rotating. They, therefore, will have no significant cumulative impact on radar. Given that the Compensation Site to be developed to cater for birds displaced from the AMEP site is located further away from Humberside Airport, it is judged that the cumulative bird strike hazard will not be increased. Therefore, the cumulative impact of the tall structures on the AMEP site is judged relatively low.

4.16

WASTE

Screening

4.16.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects.

Table 4.23 Cumulative Projects Screening

Project	
Able UK Area F	Screened out - site won materials used in site construction; minimal waste arising during operation.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened out - or site won materials used in site construction; minimal waste arising during operation.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out - minimal waste arisings.
Maintenance Dredging	Screened out - dredging impacts considered separately.
Immingham Oil Terminal Approach Channel Deepening	Screened out - dredging impacts considered separately.
Green Port Hull	Screened out - proposed facility will generate a range of wastes similar to AMEP. The ES prepared for the development identifies that the majority of these wastes will be capable of being recycled or reused, and that residual impacts associated with the construction and operation of the proposed development are minor to neutral. Any such impacts will occur to the north of the Humber, and therefore will not impact cumulatively with AMEP.
Grimsby Ro Ro	Screened out - dredging impacts considered separately.

Project	
Hull Riverside Bulk Terminal	Screened out - proposed facility will generate a range of wastes similar to AMEP. The ES prepared for the development identifies that the majority of these wastes will be capable of being recycled or reused, and that residual impacts associated with the construction and operation of the proposed development are of minor or no significance. . Any such impacts will occur to the north of the Humber, and therefore will not impact cumulatively with AMEP. Dredgings are out of scope as they are considered separately.
Humber Flood Risk Management Strategy	Screened out - wastes from maintenance and improvement works will largely be inert and capable of on-site use or third party recovery of recycle, for which there is local and regional demand.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out - future waste management requirements as a result of developments under the Strategy will be considered within Local Development Frameworks, which may provide additional opportunities for the reuse and recycling of AMEP wastes.
Land East of Falkland Way, North Lincolnshire	Screened out - considered within the baseline assessment.
Ursa Glass Wool Factory	Screened in - proposed facility will generate a range of wastes similar to AMEP.
Bioethanol Plant (Bioethanol Ltd.)	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may impact cumulatively with AMEP.
North Killingholme Power Project	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may impact cumulatively with AMEP.
DRAX Heron Renewable Energy Plant	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may impact cumulatively with AMEP.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out - future waste management requirements as a result of developments under the Strategy will be considered within Local Development Frameworks, which may provide additional opportunities for the reuse and recycling of AMEP wastes.
Aeolian Wind Turbines	Screened out - erection of turbines will generate minimal waste requiring off-site disposal.
Bio Power / Fuel	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may

Project	
	impact cumulatively with AMEP.
Bioethanol Plant (Abengoa Bioenergy)	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may impact cumulatively with AMEP.
Bioethanol Plant (Vireol PLC)	Screened in - the facility will generate minimal operational wastes, but construction will generate a range of site clearance, preparation and erection wastes which may impact cumulatively with AMEP.
Europarc	Screened in further development and operation of the Europarc will generate a range of wastes similar to AMEP.
Industrial Park	Screened in - further development and operation of the Park will generate a range of wastes similar to AMEP.
Projects in City of Kingston Upon Hull	
Hull City Council Core Strategy	Screened out - future waste management requirements as a result of developments under the Strategy will be considered within Local Development Frameworks but, being on the northern shore of the Humber, are unlikely to provide significant additional opportunities for the reuse and recycling of AMEP wastes.
Tidal Stream Generator	Screened out - any wastes requiring off-site management during the construction and operation of the facility would draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out - future waste management requirements as a result of developments under the Strategy will be considered within Local Development Frameworks but, being on the northern shore of the Humber, are unlikely to provide significant additional opportunities for the reuse and recycling of AMEP wastes.
Farmmarsh Farm	Screened out - erection of turbines will generate minimal waste requiring off-site management.
Thorngumbald Windfarm	Screened out - proposal withdrawn.
Country Park Inn	Screened out - waste generated during the extension and

Project	
	running of the Inn will be minimal and will be managed locally without impacting cumulatively with AMEP.
Bioethanol facility, Saltend Lane, Preston	Screened out - the bioethanol plant will generate minimal operational wastes. Construction of the facility may generate a range of wastes similar to AMEP which will be required to be managed under the facility's Site Waste Management Plan to minimise impacts. Any wastes requiring off-site management would draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP.
Energy from Waste facility	Screened out - plans to develop the facility have been withdrawn.
Humber Gateway on-shore installation	Screened out - the facility will generate minimal operational wastes. Construction of the installation may generate site clearance, preparation and erection wastes which will be required to be managed under the facility's Site Waste Management Plan to minimise impacts. Any wastes requiring off-site would draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP.
Mixed use south of Brough	Screened out - construction of dwellings and associated infrastructure will generate site clearance, preparation and erection wastes which will be required to be managed under own Site Waste Management Plan to minimise impacts. Then development will generate a range of domestic and commercial wastes which will draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP operational wastes.
Biomass power station	Screened out - the facility will generate minimal operational wastes. Construction of the installation may generate site clearance, preparation and erection wastes similar to AMEP which will require to be managed under own Site Waste Management Plan to minimise impacts. Any wastes requiring off-site would draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP.
Other Projects	
Humber Gateway Wind Farm	Screened out - the facility will generate minimal operational wastes. Construction of the wind farm may generate some site clearance, preparation and erection wastes which will be required to be managed under the site's Site Waste Management Plan to minimise impacts. Any wastes requiring off-site would draw on facilities to the north of the Humber and therefore not impact cumulatively with AMEP.

Potential Impacts

- 4.16.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Projects with potential construction phase cumulative impacts

- Bioethanol plant (Bioethanol Ltd)
- North Killinghome Power Project
- Drax Heron Renewable Energy Plant
- Bio Power / Fuel (Helius)
- Bioethanol plant (Vireol)
- Bioethanol plant (Abengoa)

- 4.16.3 These facilities will produce minimal operational wastes, but their construction will generate a range of site clearance, preparation and other construction wastes. The potential arisings have not been assessed in the respective applications, but may impact cumulatively with AMEP where the developments occur concurrently.

Ursa Glass Wool Factory

- 4.16.4 The development would include site clearance and construction of buildings B1 (Light Industrial/Research), B2 (General Industrial) and B8 (Warehousing), construction access road, parking facilities and associated landscaping. Data on waste arisings from the operation of the facility have not been assessed, but are likely to be of similar quantity and composition as from AMEP.

Europarc

- 4.16.5 Europarc is a partially developed 47 acre site offering mixed commercial and industrial business units. Further development of the site would involve construction of additional units and landscaping. Further expansion would generate a range of office, catering and business-specific wastes which have not been assessed.

Magna Holdings Industrial Park

- 4.16.6 The project is to develop an industrial park comprising buildings B1 (Light Industrial/Research), B2 (General Industrial) and B8 (Warehousing), and is expected to create 1200 jobs. The site is adjacent to Immingham Docks, a landfill site and Immingham's municipal waste recycling centre and extends to around 30 hectares comprising a former gypsum lagoon and low lying marshy grass. The development would

be over a number of years and generate a range of office, catering and business-specific wastes which have not been assessed.

ABP Business Park, North Moss Lane, Stallingborough

- 4.16.7 This project is in addition to those listed in Table 4.1, being a replacement for an extant planning permission granted to H&M Estates (discussed in the ES) for the greenfield development of around 20 hectares for an Employment Business Park to include buildings classes B1, B2 and B8. The business park would generate a range of office, catering and business-specific wastes which have not been assessed.

Mitigation and Residual Impacts

- 4.16.8 The above developments will create wastes during their construction phases and some during their operation. Cumulative impacts will occur where construction of the developments proceed concurrently with AMEP and result in competition for capacity in off-site treatment or disposal. However, each development would be subject to a Site Waste Management Plan requiring waste arisings to be minimised in line with the waste hierarchy. Local infrastructure exists for the management of residual construction wastes from these developments, and could readily expand to meet further requirements and opportunities if required by concurrent demands.
- 4.16.9 Operational wastes from the business parks typically are a valued source of recycled materials and, as such, typically have high demand. Again, the local recycling infrastructure is adequate to meet these needs and could readily expand to meet further requirements and opportunities.
- 4.16.10 The cumulative impact is therefore assessed as low and no further mitigation for AMEP is required.

4.17 HEALTH

Screening

- 4.17.1 The following table identifies the justifications for screening projects in or out of the assessment of cumulative effects. In general, the cumulative effects are limited to those that are in relative proximity to AMEP.

Table 4.24 Cumulative Projects Screening

Project	
Able UK Area F	Screened out – no potential impact on community health.
Able UK Area C	Screened out – superseded by AMEP.
Able UK Area E	Screened out – superseded by AMEP.
Able UK Northern Area	Screened out – no potential impact on community health.
Projects in the Humber Estuary	
Donna Nook Managed Realignment Scheme	Screened out – no potential impact on community health.
Maintenance Dredging	Screened out – no potential impact on community health.
Immingham Oil Terminal Approach Channel Deepening	Screened out – no potential impact on community health.
Green Port Hull	Screened out – no potential impact on community health.
Grimsby Ro Ro	Screened out – no potential impact on community health.
Hull Riverside Bulk Terminal	Screened out – no potential impact on community health.
Humber Flood Risk Management Strategy	Screened out – no potential impact on community health.
Projects in North Lincolnshire Council Area	
North Lincolnshire Core Strategy	Screened out – no potential impact on community health.
Land East of Falkland Way, North Lincolnshire	Screened out – no potential impact on community health.
Ursa Glass Wool Factory	Screened in – possible cumulative impacts on air quality.
Bioethanol Plant (Bioethanol Ltd.)	Screened in – possible cumulative impacts on air quality.
North Killingholme Power Project	Screened in – possible cumulative impacts on air quality.
DRAX Heron Renewable Energy Plant	Screened in – possible cumulative impacts on air quality.
Projects in North East Lincolnshire Council Area	
North East Lincolnshire Core Strategy	Screened out – no potential impact on community health.
Aeolian Wind Turbines	Screened out – no potential impact on community health.
Bio Power / Fuel	Screened out – no potential impact on community health.
Bioethanol Plant (Abengoa Bioenergy)	Screened out – no potential impact on community health.
Bioethanol Plant (Vireol PLC)	Screened out – no potential impact on community health.
Europarc	Screened out – no potential impact on community health.
Industrial Park	Screened out – no potential impact on community health.
Projects in City of Kingston Upon Hull	
Hull City Council Core	Screened out – no potential impact on community health.

Project	
Strategy	
Tidal Stream Generator	Screened out – no potential impact on community health.
Projects in East Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	Screened out – no potential impact on community health.
Projects in West Lindsey District Council Area	
No projects potentially acting cumulatively with the Project (AMEP and Compensation Site)	Screened out – no potential impact on community health.
Projects in the East Riding of Yorkshire Area	
ERYC Core Strategy	Screened out – no potential impact on community health.
Farmarsh Farm	Screened out – no potential impact on community health.
Thorngumbald Windfarm	Screened out – proposal withdrawn.
Country Park Inn	Screened out – no potential impact on community health.
Bioethanol facility, Saltend Lane, Preston	Screened out – no potential impact on community health.
Energy from Waste facility	Screened out – no potential impact on community health.
Humber Gateway on-shore installation	Screened out – no potential impact on community health.
Mixed use south of Brough	Screened out – no potential impact on community health.
Biomass power station	Screened out – no potential impact on community health.
Other Projects	
Humber Gateway Wind Farm	Screened out – no potential impact on community health.

Potential Impacts

- 4.17.2 The following are those projects that are identified in the table above as potentially having a cumulative impact with the Project.

Glass Wool Factory

- 4.17.3 Under low wind conditions from the west, this project could lead to an addition of the emissions from this project to those from AMEP.

- 4.17.4 The proximity of this Bioethanol Plant to AMEP means that under low westerly wind speed conditions cumulative impacts to air quality could occur.

North Killingholme Power Plant

- 4.17.5 It is not possible to identify, from the limited information in the North Killingholme Power Plant PEIR, the significant impacts of the project on health.

Heron Renewable Energy Plant

- 4.17.6 Although impacts were concluded in the air dispersion modelling to be not significant in terms of air quality to human or ecological receptors, this assessment does not make reference to significance criteria which would now be used, and impacts to the Humber Estuary would now be identified as a possible significant impact. This could result in cumulative impacts in terms of air quality with an associated impact on human health.

Mitigation and Residual Impacts

- 4.17.7 Due to the number of other proposed developments in the area there are likely to be cumulative health impacts. Additional construction and operation traffic associated with other proposals in the area may well cause further increased journey times for local residents (depending which transport routes are used by other proposals), which may add to stress, annoyance and overall decreased well being. Furthermore, additional traffic will also increase the risk of road traffic accidents which could potentially result in injury or death.
- 4.17.8 The cumulative impact of additional industrialisation of the area may in itself have an increased negative impact on health through a decreased sense of wellbeing, changes to sense of place, enjoyment of the area and therefore mental health.
- 4.17.9 The cumulative impact of AMEP along with other future proposals in the area is likely to have a positive impact on employment levels and therefore the health of those who gain employment. However, as the other proposals are located in different areas in the Humber the potential positive health impacts are likely to be distributed across the region, rather than concentrated in the local area.

- 4.17.10 The additive effect of this project (even though playing a small part) with other future proposals may result in a degradation of air quality in the area which has the potential to negatively impact on people's health in particular in relation to respiratory and cardiovascular diseases.
- 4.17.11 The cumulative impact on health due to noise is negligible as the cumulative noise impact attributable to the AMEP project during the daytime and night time periods is considered to be negligible as the contribution from AMEP is not causing an increase in noise levels.

5.1 INTRODUCTION

- 5.1.1 The purpose of this chapter is to illustrate the impacts (positive or negative) on individual receptors, resulting from the combination of more than one impact. It is based on the individual topic assessments and professional judgement as to whether the identified receptors suffer from in-combination impacts, and whether these impacts are considered not significant or significant.

5.2 ASSESSMENT METHODOLOGY

- 5.2.1 In-combination impacts have been considered throughout the EIA process and in the preparation of the individual impact chapters so that it can take into account the broader picture of how the Project (both AMEP and the Compensation Site) may affect the various environmental media.
- 5.2.2 All environmental topics are interlinked to a degree such that interrelationships exist on numerous levels. A summary matrix has been developed to identify key interactions that exist with respect to the Project. A “✓” symbol has been used to indicate that an interaction exists.

Table 5.1 *Impacts Interaction and Interrelationship Matrix*

	Geology, Hydrogeology and Ground Conditions
	Hydrodynamic and Sedimentary Regime
	Water and Sediment Quality
	Aquatic Ecology
	Terrestrial Ecology and Birds / Ecology and Nature Conservation
	Commercial Fisheries
	Drainage and Flood Risk
	Commercial and Recreational Navigation
	Traffic and Transport
	Noise and Vibration
	Air Quality
	Marine and Terrestrial Archaeology / Historic Environment
	Light
	Landscape and Visual
	Socio-Economics
	Aviation
	Waste
	Health

	Geology, Hydrogeology and Ground Conditions	Hydrodynamic and Sedimentary Regime	Water and Sediment Quality	Aquatic Ecology	Terrestrial Ecology and Birds / Ecology and Nature Conservation	Commercial Fisheries	Drainage and Flood Risk	Commercial and Recreational Navigation	Traffic and Transport	Noise and Vibration	Air Quality	Marine and Terrestrial Archaeology / Historic Environment	Light	Landscape and Visual	Socio-Economics	Aviation	Waste	Health
Geology, Hydrogeology and Ground Conditions		✓	✓	✓	✓	✓	✓					✓						✓
Hydrodynamic and Sedimentary Regime	✓		✓	✓	✓	✓	✓	✓				✓						
Water and Sediment Quality	✓	✓		✓	✓	✓	✓	✓							✓		✓	✓
Aquatic Ecology	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			
Terrestrial Ecology and Birds / Ecology and Nature Conservation	✓	✓	✓	✓		✓	✓		✓	✓	✓		✓		✓	✓		
Commercial Fisheries	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓			
Drainage and Flood Risk	✓	✓	✓	✓	✓	✓		✓				✓						
Commercial and Recreational Navigation		✓	✓	✓		✓	✓		✓	✓	✓				✓			✓
Traffic and Transport				✓	✓	✓		✓		✓	✓		✓		✓			✓
Noise and Vibration				✓	✓	✓		✓	✓						✓			✓
Air Quality				✓	✓	✓		✓	✓						✓			✓
Marine and Terrestrial Archaeology / Historic Environment	✓	✓		✓		✓	✓								✓			
Light				✓	✓	✓			✓					✓	✓	✓		✓
Landscape and Visual													✓		✓			✓
Socio-Economics			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓
Aviation					✓								✓					✓
Waste			✓												✓			✓
Health	✓		✓					✓	✓	✓	✓		✓	✓	✓	✓	✓	

5.3

IMPACTS

5.3.1

The consideration of in-combination impacts has been addressed during the preparation of the EIA in each of the individual topic chapters. A very diverse range of interactions has been considered as

part of this EIA. The key in-combination impacts are discussed further in *Table 5.2*.

Table 5.2 **Key In-combination Impacts**

Key Interaction	Description
Hydrodynamic and Sedimentary Regime, Water and Sediment Quality, Aquatic Ecology and Commercial Fisheries	Impacts resulting from changes to the hydrodynamic and sedimentary regime associated with the construction and operational phases have been considered in terms of its impact on water and sediment quality, aquatic ecology and commercial fisheries.
Noise and Vibration, Aquatic Ecology, Terrestrial Ecology and Birds, and Health	The potential for impacts resulting from noise or vibration during the construction and operational phases was considered, particularly when carrying out the assessment of potential impacts on ecological and human receptors and defining the relevant mitigation measures.
Air Quality, Terrestrial Ecology and Birds, Aquatic Ecology, and Health	Impacts on human and ecological receptors may occur as a result of emissions of dust, changes in traffic levels and exhaust emissions. The potential for impacts was considered when carrying out the assessment of potential impacts and defining the relevant mitigation measures.
Noise and Vibration and Marine and Terrestrial Archaeology	The potential for vibration impacts on features of architectural, archaeological or cultural importance has been considered and appropriate measures have been defined where necessary.
Traffic and Transport, Commercial and Recreational Navigation, Waste, Health and Socio-Economics	Traffic and transport, commercial and recreational navigation impacts and waste transport have the potential to impact on health and socio-economics. Interactions between these topics was considered to ensure that both direct and indirect impacts were considered and appropriate mitigation measures put in place where necessary.
Light, Terrestrial Ecology and Birds and Aviation	The impacts from light have been considered in the assessment of the impacts terrestrial ecology and birds, as well as on aviation.

6 *LIMITATIONS OR DIFFICULTIES*

6.1 *OVERVIEW*

6.1.1 There were two key difficulties in assessing the cumulative effects:

- The information available for some projects considered was limited; and
- It is not possible to know the timing of the delivery of certain projects.

6.1.2 These two difficulties have been resolved the best they can within this cumulative effects assessment.