# Humber Zero Environmental Statement Volume II: Appendices

VPI Immingham and Phillips 66 Limited

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## Quality information

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# List of Abbreviations

| Abbreviation | Definition |
|---|---|
| AADT | Average Annual Daily Traffic |
| AAI | ADMS Additional Information |
| ABP | Associated British Ports |
| ACoP | Approved Code of Practice |
| ADMS | Atmospheric Dispersion Modelling System |
| AELs | Achievable Emissions Levels |
| AEP | Annual Exceedance Probability |
| AERA | Air Emissions Risk Assessment |
| AGL | Above Ground Level |
| AIL | Abnormal Indivisible Load |
| ALARP | As Low As Reasonably Practicable |
| ALC | Agricultural Land Classification |
| AMEP | Able Marine Energy Park |
| AOD | Above Ordnance Datum |
| APIS | UK Air Pollution Information System |
| AQAL | Air Quality Assessment Level |
| AQMA | Air Quality Management Area |
| AQMAU | Air Quality Modelling and Assessment Unit |
| AQS | Air Quality Standards Regulations 2010 (as amended) |
| ATC | Automated Traffic Counts |
| BAT | Best Available Techniques |
| BAT-AEL | Best Available Technique – Achievable Emission Level |
| BC | Background Concentration |
| BCT | Bat Conservation Trust |
| BEIS | Department for Business, Energy and Industrial Strategy |
| BEMP | Biodiversity Enhancement and Management Plan |
| BGL | Below Ground Level |
| BGS | British Geological Survey |
| BNG | Biodiversity Net Gain |
| BPM | Best Practicable Means |
| BRE | Building Research Establishment |
| BS | British Standard |
| BSI | British Standards Institute |
| BTO | British Trust for Ornithology |
| CAA | Civil Aviation Authority |
| CAT | Cable Avoidance Tool |
| CBC | Common Bird Census |
| CBR | California Bearing Ratio |
| CCGT | Combined Cycle Gas Turbine |
| CCS | Carbon Capture and Storage |
| CCSA | Carbon Capture and Storage Association |
| CCUS | Carbon Capture Usage and Storage |
| CD | Construction Dust Receptor |
| CD&E | Construction, Demolition and Excavation |

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|---|---|
| CDM | Construction (Design and Management) Regulations 2015 |
| CEH | Centre for Ecology and Hydrology |
| CEMP | Construction Environmental Management Plan |
| CFA | Continuous Flight Auger |
| CFMP | Catchment Flood management Plan |
| CHIA | Cultural Heritage Impact Assessment |
| CHP | Combined Heat and Power |
| CIEEM | Chartered Institute of Ecology and Environmental Management |
| CIEH | Chartered Institute of Environmental Health |
| CIfA | Chartered Institute for Archaeologists |
| CIHT | Chartered Institute of highways and Transportation |
| CIRIA | Construction Industry Research and Information Association |
| CL:AIRE | Contaminated Land: Applications in Real Environments |
| CLR | Contaminated Land Report |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| COMAH | Control of Major Accident Hazards |
| CoPA | Control of Pollution Act 1974 |
| COSHH | Control of Substances Hazardous to Human Health |
| CPT | Cone Penetration Test |
| CRoW | Countryside and Rights of Way Act |
| CSM | Conceptual Site Model |
| CSW | clean surface water |
| CTMP | Construction Traffic Management Plan |
| CWTP | Construction Worker Travel Plan |
| dB | Decibel |
| DBA | Desk-Based Assessment |
| DCO | Development Consent Order |
| DECC | Department of Energy and Climate Change |
| DEFRA | Department for Environment, Food and Rural Affairs |
| DMA | Dimethylamine |
| DMNA | Dimethylnitramine |
| DMRB | Design Manual for Roads and Bridges |
| DQRA | Detailed Quantitative Risk Assessment |
| DTM | Digital Terrain Model |
| DWS | Drinking Water Standards |
| EA | Environment Agency |
| EAL | Environmental Assessment Level |
| EC | Evaluation Criteria |
| EcIA | Ecological Impact Assessment |
| EFT | Emissions Factors Toolkit |
| EIA | Environmental Impact Assessment |
| ELV | Emission Limit Values |
| EMS | Environmental Management Systems |
| EMS (in ecology context only) | European Marine Site |

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|---|---|
| EPC | Engineering, Procurement and Construction |
| EPR | Environmental Permitting Regulations |
| EPUK | Environmental Protection UK |
| EQS | Environmental Quality Standards |
| ES | Environmental Statement |
| ESDAL | Electronic Service Delivery for Abnormal Loads |
| ESL | Ecological Services Limited |
| FCC | Fluid Catalytic Cracker |
| FEED | Front End Engineering Design |
| FRA | Flood Risk Assessment |
| FWEP | Flood Warning and Evacuation Plan |
| GAC | Generic Assessment Criteria |
| GCN | Great Crested Newt |
| GCR | Geological Conservation Review |
| GHG | Greenhouse Gas |
| GI | Ground Investigation |
| GIS | Geographic Information System |
| GLNP | Greater Lincolnshire Nature Partnership |
| GLVIA | Guidelines for Landscape and Visual Impact Assessment |
| GPP | Guidance for Pollution Prevention |
| GPR | Ground Penetrating Radar |
| GQRA | Generic Quantitative Risk Assessment |
| GT1 | Gas Turbine 1 |
| GT2 | Gas Turbine 2 |
| Ha | Hectares |
| HDV | Heavy Duty Vehicle |
| HE | Historic England |
| HE | Highways England |
| HEO | Historic Environment Officer |
| HER | Historic Environmental Record |
| HGV | Heavy Goods Vehicle |
| HLCP | Humber Low Carbon Pipelines |
| HMWGS | Halton Marshes Wet Grassland Scheme |
| HRA | Habitats Regulations Assessment |
| HSI | Habitat Suitability Index |
| HVO | Hydrotreated Vegetable Oil |
| IAQM | Institute of Air Quality Management |
| IARC | International Agency for Research on Cancer |
| iCSM | Initial Conceptual Site Model |
| IDB | Internal Drainage Boards |
| IEMA | Institute of Environmental Management and Assessment |
| IRPOI | Imperative Reasons of Overriding Public Interest |
| IRR | Internal Rate of Return |
| Km | Kilometre |
| LCA (in landscape context only) | Landscape Character Areas |
| LCA | Lifecycle Analysis |

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|---|---|
| LCC | Lincolnshire County Council |
| LCRM | Land Contamination Risk Management |
| LERC | Lincolnshire Environmental Records Centre |
| LFRMS | Local Flood Risk Management Strategy |
| LGS | Local Geological Sites |
| LGV | Light Goods Vehicles |
| LHA | Local Highway Authority |
| LLFA | Lead Local Flood Authorities |
| LLT | Local Landscape Types |
| LNR | Local Nature Reserve |
| LPA | Local Planning Authority |
| LRN | Local Road Network |
| LSE | Likely Significant Effects |
| LT | Landscape Types |
| LVIA | Landscape and Visual Impact Assessment |
| LWS | Local Wildlife Site |
| LWT | Lincolnshire Wildlife Trust |
| m | Metre |
| mAOD | Metres Above Ordnance Datum |
| MEA | Mono-ethanolamine |
| MMA | Monomethylamine |
| MMP | Materials Management Plan |
| NAQS | National Air Quality Strategy |
| NDELA | Nitrosodiethanolamine |
| NDMA | N-nitrosodimethylamine |
| NE | Natural England |
| NELC | North East Lincolnshire Council |
| NERC | Natural Environment and Rural Communities Act 2006 |
| NGR | National Grid Reference |
| $NH_3$ | Ammonia |
| NHBC | National House Building Council |
| NHLE | National Heritage List for England |
| NIHHS | Notification of Installations Handling Hazardous Substances |
| NKM | North Killingholme Marshes |
| NLC | North Lincolnshire Council |
| NLHLC | North Lincolnshire Historic Landscape Characterisation |
| NNR | National Nature Reserve |
| $NO_2$ | Nitrogen Dioxide |
| NOAEL | No Observed Adverse Effect Level |
| NOEL | No Observed Effect Level |
| NOx | Oxides of Nitrogen |
| NPPF | National Planning Policy Framework |
| NPPW | National Planning Policy for Waste |
| NPS | National Policy Statement |
| NPSE | Noise Policy Statement for England |
| NPSs | National Policy Statements |
| NRHE | National Record of the Historic Environment |

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| NRMM | Non-Road Mobile Machinery |
| NRSWA | New Roads and Street Works Act |
| NSE | No Significant Effects |
| NSIP | Nationally Significant Infrastructure Project |
| NSN | National Site Network |
| OCGT | Open Cycle Gas Turbine |
| OE | Operational Ecological Receptor |
| OH | Hydroxyl |
| OMH | Open Mosaic Habitat |
| OR | Operational Receptor |
| OS | Ordnance Survey |
| PBDE | Polybrominated Diphenyl Ethers |
| PC | Process Contributions |
| PCC | Post-Combustion Carbon Capture |
| PEA | Preliminary Ecological Appraisal |
| PEC | Predicted Environmental Concentration |
| PFAS | Polyfluroakyl substances |
| PFOS | Perfluorooctanesulfonic acid |
| PFRA | Preliminary Flood Risk Assessment |
| PINS | Planning Inspectorate |
| $PM_{10}$ and $PM_{2.5}$ | Particulate matter (of 10 and 2.5 micrometres (µm) diameter or less, respectively) |
| PPE | Personal Protective Equipment |
| PPG | Planning Practice Guidance |
| PPM | Parts per Million |
| PRF | Potential Roost Features |
| PRoW | Public Right of Way |
| RIGS | Regionally Important Geological Sites |
| RoFfSW | Risk of Flooding from Surface Water |
| SAC | Special Area of Conservation |
| SCR | Selective Catalytic Reduction |
| SEPA | Scottish Environmental Protection Agency |
| SFRA | Strategic Flood Risk Assessment |
| SHE | Safety, Health and Environment |
| $SO_2$ | Sulphur Dioxide |
| SOAEL | Significant Observed Adverse Effect Level |
| SPA | Special Protection Area |
| SPZ | Source Protection Zone |
| SRN | Strategic Road Network |
| SSSI | Site of Special Scientific Interest |
| SUDS | Sustainable Urban Drainage System |
| SWMP | Site Waste Management Plan |
| T&S | Transport and Storage |
| TA | Transport Assessment |
| TCPA | Town and Country Planning Act |
| TGN | Technical Guidance Note |
| TM | Traffic Management |

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| TSCO | Traffic Safety and Control Officer |
| TSRGD | Traffic Signs Regulations and General Directions |
| UXO | Unexploded Ordnance |
| VPI | VPI Immingham LLP |
| WDA | Water Discharge Activity |
| WFD | Water Framework Directive |
| WGS | Wet Gas Scrubber |
| WHO | World Health Organisation |
| ZoI | Zone of Influence |
| ZTV | Zone of Theoretical Visibility |

# List of Terms

| Term | Definition |
|---|---|
| A-weighting<br>LA or LpA, LWA, | The human ear does not sense all frequencies of sound equally. Our sensitivity is at a maximum at around 2 kHz and steadily decreases above and below. Below 20 Hz and above about 20 kHz we can't hear at all.<br>Within its operating limits a precision measurement microphone measures all frequencies the same so the output it produces does not reflect what we would actually hear. The A-weighting is an electronic filter that matches the response of a sound level meter to that of the human ear. When A-weighted the Sound Pressure Level Lp becomes LpA (or LA) and the Sound Power Level LW becomes LWA. |
| Aquifer | An aquifer is a geological formation which can contain or transmit groundwater. The type of aquifer indicates how permeable it is, its capability to store/yield significant quantities of water and also whether its quality is suitable for potable water supply |
| Attenuation | amount by which sound or vibration is reduced when passing through a structure or system; also used to refer to holding of surface water on site to manage the rate of discharge off site |
| barg | A barg is a unit of gauge pressure. |
| Baseline conditions | Existing conditions and past trends associated with the environment in which a proposed activity may take place |
| Broadband sound | In engineering acoustics the word frequency rather than pitch tends to be used when describing the characteristics of a sound. The unit of frequency is the Hertz (Hz), which is the number of pressure fluctuations per second. |
| Clean Growth Strategy | The CGS sets out the aims of the Government to deliver increased economic growth while reducing carbon emissions |
| Conceptual Site Model | A representation of the characteristics of the site and indicates potential source areas of contamination, pathways and receptors (including human health, groundwater, surface water, ecology and buildings / infrastructure). It is used to identify potentially complete source-pathway-receptor (S-P-R) contaminant linkages |
| Decibels (dB) | The decibel is not a true measurement unit nor is it exclusive to acoustics.<br>The decibel is a logarithmic ratio of two values of a variable. Decibels are used because they can represent very wide ranges of ratios (from trillionths and billionths to billions and trillions) with a small range of decibel values. Decibels can be used to represent measured values by using a known reference value in the ratio. When using decibels to measure something it is therefore important to specify what variable is actually being measured and what reference level has been used. This is done by adding a reference value statement in the form "dB re x units", where the units indicate the variable being measured and x is the reference value.<br>Decibels are used in acoustics because the human ear responds to sound in a logarithmic way and the quantities measured in acoustics vary over wide ranges. However, decibels are used in acoustics to measure several different things which it is important not to confuse with each other.<br>To avoid confusion there is a notation system that identifies what a decibel value is for. The notations take the form of an italic capital letter and some subscript characters. The capital identifies the general type of value and the subscripts give specific details of what is being represented. |

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| | Lxxx denotes a level (ie a value measured in dB by comparison with a reference value);<br>Dxxx denotes a difference between two levels;<br>Rxxx denotes a rating (or index), which is measure of the generalised acoustic performance of a material or construction based on a difference between two levels;<br>Cxxx denotes a correction (or constant)<br>Of these only those with L notations require a reference value statement. Those with D or R notations are effectively ratios of two measured values not one measured value and a reference value and those with C notations are not based on reference values at all. A reference value statement therefore has no meaning when describing D, R and C decibels.<br>Because decibels are logarithmic they have to be added, subtracted, multiplied, divided and averaged using different techniques from normal numbers. |
| Effect | Used to describe the result of an impact on a receptor e.g., loss of grassland may result in loss of ground nesting bird habitat. Effects will be described using standard terminology (major/ moderate/ minor/ neutral and adverse/ beneficial). |
| EIA Regulations | The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) |
| Geotechnical data | Properties of soil and/or rock which are used in engineering design |
| Glacial Till | Unsorted and unstratified material deposited by glacial ice |
| Groundwater | Water present beneath Earth's surface in rock and soil pore spaces and in the fractures of rock formations |
| HP $CO_2$ Compression Station | High pressure carbon dioxide compression station. There will be one of these for each PCC Plant, compressing the carbon dioxide to the correct pressure for injection into the carbon dioxide gathering network. |
| Illustrative viewpoints | Viewpoints chosen specifically to demonstrate a particular effect or specific issues. |
| Impact | Changes or perturbations arising from the Proposed Development e.g., loss of area of grassland. Where relevant, impacts will be considered on the basis of their magnitude, duration and reversibility |
| Impulsive sound | Any sound can be defined by its frequency content. Some sounds comprise just one discrete frequency (tonal sounds). Others are distributed over wide frequency ranges (broad band sound). Impulsive sounds are made up short pulses of high frequency components. Sources often produce all of these types of sound at the same time. |
| Indicator | a value used to indicate the likelihood of a particular response of effect<br>eg. L10,18hr is an index based on statistical processing of sound pressure data that is used as an indicator for road traffic noise response. |
| Landscape | An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. |
| Landscape effects | Effects on landscape as a resource in its own right. |
| Leq,T<br>LAeq,T<br>T = measurement time<br>eg. LAeq,5min | The equivalent continuous sound pressure level over period T (Leq,T),<br>The A-weighted equivalent continuous sound pressure level over period T (LAeq,T).<br>This is effectively the average sound pressure level over a given period. As the decibel is a logarithmic quantity the Leq is not a simple arithmetic mean value.<br>The Leq is calculated from the raw sound pressure data. It is not appropriate to include a reference to the FAST and SLOW time constants in the notation |
| Level | Used solely to describe values measured in decibels |

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| Lmax<br>LAmax<br>LAFmax | The maximum instantaneous sound pressure level (Lmax),<br>The A-weighted maximum instantaneous sound pressure level (LAmax)<br>The A-weighted maximum instantaneous sound pressure level with a FAST time constant (LAFmax).<br>This is the highest instantaneous sound pressure level reached during a measurement period. |
| Lmin , LFmin | The opposite of the Lmax is the minimum instantaneous sound pressure level or Lmin etc.<br>It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value. |
| LN,T<br>LAN,T LAFN,T<br>N = %age value, 0100<br>T = measurement time<br>eg. LA90, LA10, LAF90, 5 min | The percentage exceedence sound pressure level (LN,T),<br>The A-weighted percentage exceedence sound pressure level (LAN,T), the A-weighted percentage exceedence sound pressure level with a FAST time constant (LAFN,T).<br>This is the sound pressure level exceeded for N% of time period T. eg. If an A-weighted level of x dB is exceeded for a total of 6 minutes within one hour, the level will have been above x dB for 10% of the measurement period. This is written as LA10,1hr = x dB.<br>LA0 (the level exceeded for 0 % of the time) is equivalent to the LAmax and LA100 (the level exceeded for 100 % of the time) is equivalent to the LAmin.<br>It is good practice to include the letter which identifies the time constant used as this can make a significant difference to the value. |
| Loudness | The human perception of the level of sound |
| Lp<br>LpA (or LA)<br><br><br><br><br><br>LAF, LAS | The instantaneous sound pressure level (Lp)<br>The A-weighted instantaneous sound pressure level (LpA or LA)<br>This is the root mean square size of the pressure fluctuations in the air. This level can fluctuate wildly even for seemingly steady sounds. To make sound level meters easier to read the values on the display are smoothed or damped out. This is effectively done by taking a rolling average of the previous 0.125 s (FAST time constant) or the previous 1 s (SLOW time constant).<br><br>The letters F or S are added to the subscripts in the notation to indicate when the FAST or SLOW time constant has been used. These are often omitted but it is good practice to include them. |
| Made Ground | Disturbed soils which include man-made or artificial materials |
| Nitrate Vulnerable Zone | Areas designated as being at risk from agricultural nitrate pollution |
| Noise | Has no strict definition and is often used interchangeably with sound however it is usually taken to mean unwanted sound |
| PCC Plant | Post-Combustion Carbon Capture Plant |
| Phillips 66 Site | The planning application boundary for the Proposed Phillips 66 Development. Largely within the operational Humber Refinery, accessed from Eastfield Road, but also includes land to the east of the Refinery for pipeline and cable connections, including part of the railway line between the Port of Immingham and Ulceby which will need to be traversed by pipelines and cables. |
| Pitch, frequency tonal sound | The sound we perceive can have different characteristics. These can range from low-pitched hums to high-pitched squeals and impulsive sounds. |
| Ramsar | Wetlands of international importance designated under the Ramsar Convention |
| Representative viewpoints | Viewpoints that represent the experience of different types of visual receptor. |
| Risk | Risk is defined using a combination of the severity of a risk and the probability of a risk. |

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| Site of Special Scientific Interest | An area of land which is of special interest for its flora, fauna, geological, geomorphological or physiographical features |
| sound | is used to describe the physical phenomenon of the transmission of energy through gaseous or liquid media via rapid fluctuations in pressure. |
| Sound Pressure Level Lp | This is the basic measure of how much sound there is at a given location. It is a measure of the size of the pressure fluctuations in the air that we perceive as sound.<br>Sound Pressure Level is expressed in decibels with a reference level of 20 μPa (Lp in dB re 20 μPa) |
| Special Area of Conservation | A designated area protecting one or more habitats or species listed in the Habitats Directive |
| Specific viewpoints | Key and sometimes promoted viewpoints within the landscape. |
| Susceptibility | The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences. |
| The Applicants | VPI Immingham LLP and Phillips 66 Ltd |
| The Applications | Planning applications for the construction, operation and maintenance of two proposed Post-Combustion Carbon Capture developments and associated facilities located at VPI's Combined Heat and Power Plant and Phillips 66's Humber Refinery. |
| The CHP Plant | The existing VPI Immingham Combined Heat and Power Plant |
| The Phillips 66 Site | The planning application boundary for the Proposed Phillips 66 Development. This is largely within the Humber Refinery, but also includes an area of Network Rail land for crossings over an existing pipe bridge, and an area to the north-east of the Network Rail railway line for connections. |
| The Proposed Developments | The collective term for the Proposed Phillips 66 Development and the Proposed VPI Development together |
| The Proposed Phillips 66 Development | PCC retrofit to the Fluid Catalytic Cracker (FCC) stack at the Humber Refinery |
| The Proposed VPI Development | PCC retrofit to two gas turbines (GT1 and GT2) and two auxiliary gas boilers at the VPI Immingham CHP Plant |
| The Refinery | The Phillips 66 Ltd Humber Refinery |
| The Sites | The collective term for the VPI Site and the Phillips 66 Site together |
| The VPI Site | The planning application boundary for the Proposed VPI Development. This is within and immediately to the south of the operational VPI Immingham CHP Plant, accessed from Rosper Road and separated from the Humber Refinery by the Network Rail railway line. |
| Tidal Flat Deposits | Soil deposits formed from mud flats in the intertidal zone |
| Unproductive Strata | Soil and/or rock layers with low permeability that have negligible significance for water supply or base flow for rivers |
| vibration | is used to describe the transmission of energy through solid media by oscillation |
| Visual effects | Effects on specific views and on the general visual amenity experienced by people. |
| weighted | values modified to reflect sensitivities at particular frequencies. |

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