

ENVIRONMENTAL STATEMENT

VOLUME 1 – MAIN TEXT

Fornax Environmental Solutions Ltd
High Temperature Incineration Plant

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GLOSSARY OF TERMS

Term	Definition
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
BTEX	BTEX is an acronym that stands for benzene, toluene, ethylbenzene, and xylenes.[1] These compounds are some of the volatile organic compounds (VOCs) found in petroleum derivatives such as petrol (gasoline). Toluene, ethylbenzene, and xylenes have harmful effects on the central nervous system.
By-product	A by-product is a secondary product derived from a manufacturing process or chemical reaction. It is not the primary product or service being produced.
CHP	Combined Heat and Power Plant (CHP) integrates the production of usable heat and power (electricity), in one single, highly efficient process.
DEFRA	Department for Environment, Food and Rural Affairs.
Dioxin	Dioxins and dioxin-like compounds, a diverse range of chemical compounds which are known to exhibit “dioxin-like” toxicity. In chemistry, a dioxin is a heterocyclic 6-membered ring, where 2 carbon atoms have been replaced by oxygen atoms.
Eutrophication	Eutrophication or more precisely hypertrophication, is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilisers or sewage, to an aquatic system
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
HVAC	HVAC (heating, ventilation, and air conditioning) is the technology of indoor and vehicular environmental comfort.
ISO14001	ISO 14000 is a family of standards related to environmental management that exists to help organizations (a) minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land); (b) comply

	with applicable laws, regulations, and other environmentally oriented requirements, and (c) continually improve in the above.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
O₃	Ozone.
PAH	Polycyclic aromatic hydrocarbons (PAHs), also known as poly-aromatic hydrocarbons or polynuclear aromatic hydrocarbons, are potent atmospheric pollutants that consist of fused aromatic rings and do not contain heteroatoms or carry substituents. Naphthalene is the simplest example of a PAH. PAHs occur in oil, coal, and tar deposits, and are produced as by-products of fuel burning (whether fossil fuel or biomass).
	As a pollutant, they are of concern because some compounds have been identified as carcinogenic, mutagenic, and teratogenic.
Percentile	The percentage of results below a given value.
PLC	A Programmable Logic Controller, PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such as control of machinery.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PPB parts per billion	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion (10 ⁹) units of air, there is one unit of pollutant present.
PPM parts per million	The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every billion (10 ⁶) units of air, there is one unit of pollutant present.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
RDF	Refuse-derived fuel (RDF) or solid recovered fuel/ specified recovered fuel (SRF) is a fuel produced by shredding and dehydrating solid waste (MSW) with a Waste converter technology. RDF consists largely of combustible components of municipal waste such as plastics and biodegradable waste.
Renewable Energy	Renewable energy is generally defined as energy that comes from resources which are continually replenished on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat. Renewable energy is also defined under the Renewable Energy Directive as comprising energy from the biomass fraction of waste.
SCADA	SCADA (supervisory control and data acquisition) is a type of industrial control system (ICS). Industrial control systems are computer controlled systems that monitor and control industrial processes.
SCR	Selective catalytic reduction (SCR) is a means of converting nitrogen oxides, also referred to as NO _x with the aid of a catalyst into diatomic nitrogen, N ₂ , and water, H ₂ O.

	<p>A gaseous reductant, typically anhydrous ammonia, aqueous ammonia or urea, is added to a stream of flue or exhaust gas and is adsorbed onto a catalyst.</p>
SRF	<p>SRF can be distinguished from RDF in the fact that it is produced to reach a standard such as CEN/343 ANAS.</p>
µg/m³ micrograms per cubic metre	<p>A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.</p>
UKAS	<p>United Kingdom Accreditation Service.</p>
Uncertainty	<p>A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation.</p>
USA	<p>Updating and Screening Assessment.</p>
Validation (modelling)	<p>Refers to the general comparison of modelled results against monitoring data carried out by model developers.</p>
Validation (monitoring)	<p>Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).</p>
VSD	<p>Adjustable speed drive (ASD) or variable-speed drive (VSD) describes equipment used to control the speed of machinery. Many industrial processes such as assembly lines must operate at different speeds for different products. Where process conditions demand adjustment of flow from a pump or fan, varying the speed of the drive may save energy compared with other techniques for flow control.</p>

1 INTRODUCTION

- 1.1 Fornax Environmental Solutions Ltd (henceforth known as ‘Fornax’ or ‘The Applicant’) is seeking to obtain planning permission for a High Temperature Incineration (HTI) Plant processing clinical and hazardous wastes located on land known as Plot 1.2, Land south of Heighington Lane, Newton Aycliffe (henceforth known as ‘Site’).
- 1.2 This Environmental Statement (ES) has been prepared on behalf of The Applicant by Sol Environment Ltd, independent environmental and sustainability consultants, to accompany their planning application for the proposed *‘Construction and operation of a High Temperature Incineration (HTI) Plant for the processing and treatment of hazardous and clinical waste.’*
- 1.3 This ES have been updated and revised in order to respond to the recommendations and comments made by the Planning Inspectorate as part of a request for more information under Regulation 25¹ of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the EIA Regulations).

SUMMARY OF ES REVISIONS

- 1.4 Although the main body of the ES and the material conclusions of the assessment have not changed as a result of this update, the revisions largely relate to the following points;
- Updated Development Description;
 - Updated description for the Baseline Environment;
 - Updated Assessment on the Impact on Climate;
 - Updated Assessment Methodology;
 - Updated assessment on Cumulative Effects; and
 - Revised Non-technical Summary.
- 1.5 For ease of reference within the ES, the Applicant has prepared a tabular signposting summary below that directs the reader to each the points raised within the Regulation 25 request and provides information on the key changes and where they are placed with the ES document;

¹ PINS Regulation 25 Request for additional information dated 29th April 2022

Table 1.1: Summary of Amendments to ES

Subject / Issue	Summary of key change	Location within revised ES	Materiality
Development Description	<p>The scheme description has been modified to provide information relating to the new access and landscaping.</p> <p>Chapter 6 now includes confirmation of the key dates of construction, commencement of operations and lifecycle, such that they are consistent with the revised construction schedule.</p>	Chapter 5 and Chapter 6.	None, these changes are ancillary to the main conclusions of ES.
Baseline Environment	The baseline environment relating to the Climate Change and Green House Gas chapter has been updated so that it is consistent with the IEMA Guidance.	Chapter 7.	None, the conclusions of the assessment confirm that the project has a positive carbon.
Climate Impacts	The climate change chapter has been revised to more accurately reflect the guidelines provided by the Institute of Environmental Management & Assessment (IEMA) Guide: Assessing Greenhouse Gas Emissions and Evaluating their Significance.	Chapter 7 has been revised to reflect the IEMA Guidance and incorporates a lifecycle carbon assessment evaluation using WRATE.	The overall assessment of the revised Chapter 7 is that the project provides a positive environmental benefit and reduces the overall carbon impact when compared to the baseline – ‘no development’ scenario.
Assessment Methodology	Further clarity has been provided throughout the ES on the baseline scenario i.e. ‘no-development’ scenario.	Chapter 3 ‘Assessment Methodology’ has been updated and all technical chapters (7-13) reviewed and updated where required.	None.
Cumulative Effects	<p>The principal areas identified that have the potential to have cumulative effects with the development were in the areas of air quality (and human health) and in traffic generation.</p> <p>In the matter of air quality, no relevant existing or proposed projects were identified by either DCC or the appellant that were not already within background datasets that are used for modelling, and as such it was concluded that there would be no cumulative effects from relevant projects in this area.</p>		

	In the matter of transport, the level of traffic generation proposed is substantially below that approved in association with existing site permissions, and as such further consideration of this area is not necessary.		
Non-Technical Summary	A new NTS has been prepared which aligns with the updated ES.	New Vol 3.	None of the changes within the ES materiality change the outcome of the ES conclusions and recommendations.
Waste Management	The Waste Management Chapter has been removed from the ES and the contents integrated into Chapter 5 (The Proposed Development) and Chapter 6 (Development Construction and Programme).	Chapters 5 and 6 have been expanded to incorporate the pertinent information of operational and construction generated wastes.	None – the information presented in the ES is the same as previously submitted.

THE PROPOSED DEVELOPMENT

- 1.6 The proposed development will require the construction and development of a new facility on an undeveloped industrial plot located on land south of Heighington Lane. The proposed site is located immediately north of the Hitachi Rail factory and associated sidings and holds planning consent as part of Merchant Park for B1 (Business), B2 (General Industry) and B8 (Storage and Distribution) Uses.
- 1.7 The proposal seeks to construct a facility which will include an HTI process that will safely handle hazardous and clinical waste. The project has been designed to recover all available heat produced during the incineration of waste and will subsequently utilise the heat for onsite uses and to meet the building heating and process loads.
- 1.8 Furthermore, the project has been designed with a highly efficient building design, integrated building renewable technologies (solar PV) and with the capacity to export approximately 5MWth of process heat to neighbouring industrial users should it be commercially possible.
- 1.9 Further technical details of the facility are described in Chapter 5 – The Proposed Development.
- 1.10 The site location is shown in Figure 1.1 below.

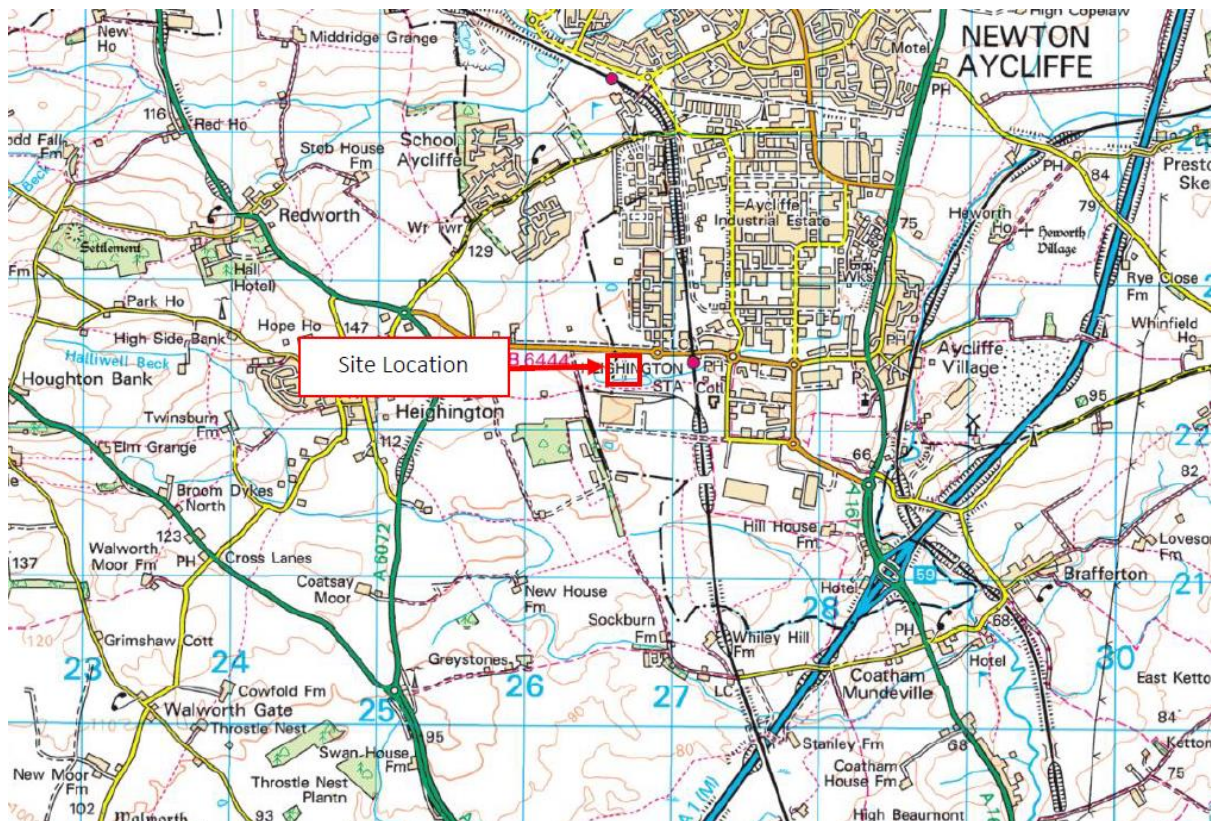


Figure 1.1: Site Location (OS license ref: 100062750)

LEGISLATIVE FRAMEWORK FOR THE EIA

- 1.11 This ES has been prepared in accordance with the requirements set out in *The Town and Country Planning (Environmental Impact Assessment) Regulations 2017* (hereafter referred to as the EIA Regulations).
- 1.12 The EIA Regulations require that, before consent is granted for certain types of development, an EIA must be undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require assessments if they give rise to significant environmental impacts (Schedule 2 development). The reporting of an EIA takes the form of an Environmental Statement (ES).
- 1.13 The proposed development has been screened by both the applicant and by the Durham County Council who concur that the Installation meets the definition of a Schedule 1 EIA development according to Paragraph 9 which states:

9. Waste disposal installations for the incineration, chemical treatment (as defined in Annex I to Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste(3) under heading D9), or landfill of hazardous waste as defined in Article 3(2) of that Directive.

SCOPING REPORT

- 1.14 An EIA Scoping exercise was undertaken by Durham County Council (DCC) (Ref: SCO/21/00003) to determine what topics the EIA should include. It was based on a review of the proposed development provided by the Applicant and the conclusions it reached on likely significant environmental effects.
- 1.15 The following environmental topics were scoped into the EIA and are addressed within this document:
- Climate Change;
 - Population and Human Health;
 - Accidents and Natural Disasters;
 - Air Quality;
 - Water Quality and Hydrology;
 - Waste Management; and
 - Cultural Heritage.
- 1.16 With the exception of Waste Management, an ES chapter is provided for each of the topics scoped into the EIA and meets the requirements stated within the scoping report. The quantification and management of construction and operational wastes generated by the development are provided within the relevant chapters (Chapter 5 ‘*The Proposed Development*’ and Chapter 6 ‘*Development Programme and Construction*’).
- 1.17 DCC have scoped out the following:
- Landscape and Visual Impact;
 - Noise and Vibration;
 - Ecology and Nature Conservation;
 - Transportation;

- Soils, Geology and Contamination; and
 - Odour.
- 1.18 Confirmation has been provided by the Council that the focus of the scope of the Population, Health and Social Impacts should relate to human health impacts of the incinerator emissions as opposed the social and economic impacts which are considered to be **Negligible**.
- 1.19 A copy of the scoping opinion is provided within Appendix 4 of the Planning Statement which details the consultee responses and their associated technical justification for the inclusion or exclusion of a particular technical chapter. The scoped-out areas have been addressed further in the planning statement.
- 1.20 Although Landscape and Visual Impact Assessment was originally scoped out of the ES by DCC, in response to a number of questions raised by during the Regulation 25 request, it was decided that the ES would be strengthened through the inclusion of a dedicated LVIA chapter. This chapter forms Chapter 12 of the ES.

STRUCTURE OF THE ENVIRONMENTAL STATEMENT

- 1.21 The ES has been prepared on behalf of the Applicant, by a team of specialist consultants and also draws on existing studies and information where necessary. The consultant team of specialists providing input to the Environmental Impact Assessment are identified in Table 1.2 below:

Table 1.2: Environmental Impact Assessment Consultant Team	
Discipline	Consultancy
Climate Change	Sol Environment Ltd
Population and Human Health	Gair Consulting Ltd
Accidents / Natural Disaster	Sol Environment Ltd
Population, Health and Social Impacts	Gair Consulting
Air Quality	Gair Consulting Ltd / Sol Environment Ltd
Water Resources	Burrows Graham Ltd / RMA Environmental Ltd
Heritage	M.B Heritage
Landscape and Visual Impact	Sightline Ltd

- 1.22 The specific expertise, competence and experience of each of the technical consultants have been provided within each of the Chapters and summarized in Appendix 1.

1.23 The ES comprises three volumes – the Main Text (Volume 1), the Figures and Technical Appendices (Volume 2) and the Non-Technical Summary (Volume 3).

1.24 The ES provides:

- A description of the Application Site and its surroundings (Chapter 2);
- An overview of the approach and methodology of the EIA (Chapter 3);
- A description of alternatives and design evolution (Chapter 4);
- A description of the proposed development (Chapter 5);
- Identification of the development programme, demolition and construction (Chapter 6);
- The results of the analysis of the potentially significant environmental effects of the proposed development for the following disciplines:
 - Climate Change (Chapter 7);
 - Population and Human Health (Chapter 8);
 - Accidents / Natural Disaster (Chapter 9);
 - Air Quality (Chapter 10);
 - Water Quality, Hydrology and Flood Risk (Chapter 11);
 - Landscape and Visual Impact (Chapter 12);
 - Heritage (Chapter 13).
- Cumulative impacts are assessed within each of the Chapters where relevant.

1.25 During consideration of the environmental impacts of the appeal proposals, a review was undertaken of existing and proposed projects and plans which could have a cumulative effect with the appeal proposal. These comprise either comparable developments that are already in existence, developments which are currently not yet built but which have or are seeking planning consent, and developments which are proposed within local plan documents. To do this a number of sources were consulted.

- Correspondence was undertaken with DCC to confirm whether they were aware of any relevant projects;
- A review was undertaken of the Durham and Darlington Local Plans; and
- A review was undertaken of the planning records of the Durham and Darlington councils.

-
- 1.26 The principal areas identified that have the potential to have cumulative effects with the development were in the areas of air quality (and human health) and in traffic generation.
- 1.27 In the matter of air quality, no relevant existing or proposed projects were identified by either DCC or the appellant that were not already within background datasets that are used for modelling, and as such it was concluded that there would be no cumulative effects from relevant projects in this area.
- 1.28 Each of the technical sections of the ES comprises: an introduction; a methodology of assessment, review of relevant policy context, a description of the baseline (existing) conditions, an assessment of the likely environmental effects of the development, a description of mitigation measures and discussion on residual effects. Technical Appendices in relation to these chapters are provided as **Volume 2**.
- 1.29 In conclusion, with reference to the EIA Regulations, the ES contains those matters which must be included:
- A description of the development comprising information on the Site, design and size of the development;
 - A description of measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects;
 - The data required to identify and assess the main effects which the development is likely to have on the environment;
 - An outline of the main alternatives studied by the applicant; and
 - A non-technical summary of the above information (**Volume 3**).

2 THE SITE AND SURROUNDINGS

INTRODUCTION

- 2.1 This chapter summarises the predominant existing land uses and activities occurring on the Site and within its surrounds. The chapter also identifies the key environmental characteristics of the Site and its adjacent areas, thereby identifying potential sensitive receptors which may be affected by the Proposed Development. A full description of the baseline conditions relevant to each environmental topic is provided in each of the technical chapters within this Environmental Statement (ES).

SITE LOCATION AND SETTING

- 2.2 The proposed development will be sited on land south of Heighington Lane, Newton Aycliffe and forms the undeveloped portion referred to as Plot 1.2 Merchant Park of the a wider undeveloped plot that sites immediately north of the Hitachi Rail manufacturing facility.
- 2.3 The application site is centred on National Grid Reference (NGR) NZ 26654 224216 and lies at an elevation of approximately 109 mAOD.
- 2.4 The Site will be approximately 2.02ha in size. The Site is generally level, with significant earthen embankments forming the south, east and western boundaries. It is currently undeveloped and has been prepared in readiness for development of phases 2 and 3 of the consented planning permissions (7/2010/0248/DM and A/2012/0425/DM) and as such does not contain any notable vegetation, trees or shrubs.
- 2.5 The Site is located in a predominantly industrial area sited on the south western perimeter of the Newton Aycliffe Industrial Estate and lies approximately 850m southeast of School Aycliffe, 1.3km west of Aycliffe Village and 1.9km east of Heighington Village.
- 2.6 The site is bound to the north by a belt of mature trees and Heighington Lane (B6444) beyond which lies Aycliffe Industrial Estate including Prefere Resins and Formica. To the east and west of the site lie undeveloped areas, which are known to form Plots for development under the extant planning permission. At present they contain numerous earthen embankments and mounds. To the south beyond a planted embankment lies Demons Beck and associated balancing pond, beyond which is the Hitachi Rail depot.

- 2.7 The northern section (Darlington to Bishops Auckland) of The Stockton and Darlington Railway runs approximately 400 m to the east of the site with a local spur feeding the Hitachi Rail facility to the south.
- 2.8 Approximately 400m directly to the east of the site is the Heighington Household Waste Recycling Centre. With the exception of Hitachi Rail there are no immediate neighbouring businesses to the site.
- 2.9 Access to the Site is via Heighington Lane and utilizes the shared entrance that has been constructed as part of the wider development. Access from the Site to the A1 (M) at Junction 59 is achievable without having to pass through any residential areas via the industrial estate roads and a short section of the A167 and B6444.
- 2.10 The Site has no nearby residential neighbours, the nearest dwellings are located approximately 800 m to the north west of the site along Heighington Lane and comprise two single farmhouses.
- 2.11 The surrounding land uses are outlined within Table 2.1 below.

Table 2.1: Surrounding Land Uses			
Address	Name	Nature of Business	Planning Use
Hitachi Rail	Hitachi Rail	Industrial	B2
Plot 1.3 / 1.4	TBC	TBC	B1 / B2 / B8 or Sui- Generis
Plot 2	DCC	Startup/Small Business Units	
Plot 1.1	Durham Animal Feeds ²	Distribution	
Heighington Lane	Newton Aycliffe Business Park	Manufacturing	B2
Heighington Lane	Newton Aycliffe Business Park	Distribution	B8
Long Tens Way	Household Waste Recycling Centre	Waste	B2
Long Tens Way	UTC Durham	School	

² Planning application submitted, and conditional contract in place



Figure 2.1: Site and Surroundings (Stockton to Darlington railway shown in orange)

- 2.12 Cumby Pond Local Wildlife Site is located 0.5 km distance from the site. There are no other nature related sites with statutory designations within 2km of the site, and it is remote from sensitive residential receptors.
- 2.13 There are a number of listed buildings present within 2km of the site, these being presented in Table 2.2 below:

Table 2.2: Listed Building within 2km of proposed Development		
No.	Name	Type
1	Wilkinson Headstone, 14 metres south of church of St Michael	Listed Building
2	Young Headstone, 10 metres west of church of St Michael	Listed Building
3	Number 45 and Former Smithy	Listed Building
4	Wall to East of Heighington Hall	Listed Building
5	38 and 39 West Green	Listed Building
6	Ivy House	Listed Building
7	16 East Green	Listed Building
8	The Pump House	Listed Building
9	Northcott	Listed Building

10	Gazebo, Terrace Wall and Sheds South-east of Number 7	Listed Building
11	Hodgson Chest Tomb, 5 m. South of south porch of church of St. Andrew	Listed Building
12	3, The Green	Listed Building
13	Oakles Farmhouse	Listed Building
14	Hodgson Tomb, 2 metres north of the church of St Michael	Listed Building
15	Hearse House, 35 metres north east of church of St Michael	Listed Building
16	Churchyard Wall and Gate Piers to East of Number 10	Listed Building
17	The Village Hall	Listed Building
18	The Manor House	Listed Building
19	Eldon House	Listed Building
20	Lawn House	Listed Building
21	Dovecote west of Dovecote Cottage	Listed Building
22	Trafalgar House and Garden Wall attached to North	Listed Building
23	Walls Gate Piers and Pigsty to west and north of Trafalgar House	Listed Building
24	1, West Green	Listed Building
25	Holly House	Listed Building
26	Greenbank	Listed Building
27	Heighington Hall	Listed Building
28	Garden Screen Wall northeast of Heighington Hall	Listed Building
29	Gazebo and Walls to rear of Number 43	Listed Building
30	Rutter Headstone, 12 metres south of church of St Michael	Listed Building
31	Carter Headstone, 30 metres southwest of church of St Michael	Listed Building
32	14, High Street	Listed Building
33	Nurses' Teaching Centre, wall and gate piers	Listed Building
34	Lamp Post 7 metres east of number 7, The Green	Listed Building
35	The Bay Horse Public House	Listed Building
36	Wall and Gate Piers in front of Number 43	Listed Building
37	The Cottage	Listed Building
38	Surtees Table Tomb, 2.5 metres north of church of St Michael	Listed Building
39	Garden wall and Gate piers south of number 16 and 18	Listed Building
40	Dovecote and Outbuildings northwest of Trafalgar House	Listed Building
41	Church of St Andrew	Listed Building

42	Headstone to John Gibson, 7 metres south of south porch of church of St Andrew	Listed Building
43	Locomotion One public house and east platform	Listed Building
44	Old Farm cottage	Listed Building
45	39 Church View	Listed Building
46	The Old Hall	Listed Building
47	Church of St Michael	Listed Building
48	Churchyard Wall, Gate and Gate Piers to north of Village Hall	Listed Building
49	17 Darlington Road	Listed Building
50	Manor Farm House	Listed Building
51	East and north Garden Walls to southeast of Number 7	Listed Building
52	7 West Green	Listed Building
53	42 West Green	Listed Building
54	Heighington signal box	Listed Building
55	Heighington War Memorial	Listed Building
56	Aycliffe War Memorial	Listed Building

- 2.14 These fall within five distinct clusters, at School Aycliffe (33 and 44), Heighington Station (43 and 54) Heighington Village (1 – 10, 14 – 31, 35 – 40, 45 – 53 and 55), Aycliffe Churchyard (11, 41, 42 and 56) and Aycliffe Village (12, 13, 32, 34). The closest listed buildings are located at Heighington Station approximately 350m to the east. The Stockton to Darlington Railway heritage action area is also located to the east.
- 2.15 Archaeology has been scoped out of the Environmental Statement by Durham County Council, as archaeological issues were addressed in the Outline planning consent for the wider site. Heritage is discussed further within this ES in Chapter 13.

EXISTING SITE USES

- 2.16 The Site is currently vacant and has been partially prepared in readiness for the development of Phase 2 and 3 of the consented planning permission, as such it does not contain any notable vegetation, shrubs or trees. The site has been observed to be waterlogged, containing significant areas of standing water.

- 2.17 The site has been subject to extensive ecological appraisal and habitat relocation as part of the consented development due to the presence of Great Crested Newt and creation of a protected reception area to the south of the Hitachi site.

HISTORICAL USES OF THE SITE

- 2.18 Historically the site has comprised simply agricultural land with a track running north-south through the centre since at least the earliest available historical mapping in 1856.

GEOLOGY

- 2.19 According to the BGS Geology of Britain Viewer and BGS Geology Mapping (1:50,000, Sheet 33, Stockton) the Site is underlain by:
- Superficial Deposits – the Site is underlain by Devensian Glacial Till typically comprising gravelly sandy clay.
 - Bedrock Deposits – the underlying bedrock geology is the Ford Formation. This is described by the BGS Lexicon of named rock units as: *‘Dolomite that comprises three distinct facies: shelf-edge reef that separates a broad belt of back-reef and lagoonal beds to the west from a belt of fore-reef talus aprons and off-reef beds to the east.’*
- 2.20 Ground investigation at the Site undertaken by Sirius in 2008 (Ref: 2.1) indicated no Made Ground present across the site area.

HYDROGEOLOGY

- 2.21 A review of the Site’s hydrogeology has been carried out using publicly available BGS and Environment Agency (EA) Mapping.
- 2.22 The aquifer classification system was updated on 1st April 2010 which provided new aquifer designations to replace the old system of aquifer classifications, such as Major, Minor and Non-Aquifer. This new system is in line with the EA’s Groundwater Protection Policy (GP3) and the Water Framework Directive (WFD) and is based on BGS mapping.
- 2.23 From a review of the EA on-line maps the Site is located on:
- Superficial Deposits – the Till has been classified as a Secondary Undifferentiated aquifer.

- Bedrock Geology – the limestone of the Ford Formation has been classified as Principal Aquifer.
- 2.24 The EA have defined Groundwater Source Protection Zones (SPZs) for 2,000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones are designated to protect the location from the risk of contamination from any activities that might cause pollution in the area, i.e. the closer the activity, the greater the risk.
- 2.25 The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon the quality of a drinking water abstraction. They are split into various subdivisions:
- Zone 1: (Inner Protection Zone) - This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table;
 - Zone 2: (Outer Protection Zone) - This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction; and
 - Zone 3: (Total catchment) - This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.
- 2.26 The third-party database (Groundsure) and EA website indicate that the Site is located within a SPZ Zone III.
- 2.27 The European Water Framework Directive (WFD) came into force in December 2000 and became UK law in December 2003. The EA has a duty to analyse the characteristics of the 11 River Basin Districts in England and Wales and assess the impact of human activity on the water bodies (including groundwater) within these districts. In addition, the EA are required to monitor the status of water bodies against the objectives set for them and prepare, review and keep an up to date a register of protected areas for each River Basin District whilst preparing and consulting on River Basin Management Plans. No current water quality data is available on the EA website.
- 2.28 According to the database, there is one active groundwater abstraction licence within 2km of the site, located 980m to the north for general use and operated by Ineos Newton Aycliffe Ltd.

HYDROLOGY

- 2.29 The closest surface water feature to the Site is a balancing pond and Demons Beck located along the sites southern boundary. Demons Beck flows in an easterly direction before entering the River

- Skerne, at a point approximately 2.3 km northeast. The River Skerne itself runs in a north-south direction and is approximately 2km east of the site at its closest point.
- 2.30 A number of ponds and drains are present to the south of the site beyond the Hitachi Rail Depot associated with low lying ground and Moordale Park.
- 2.31 The Environment Agency's flood risk map indicates that the Site lies within Flood Zone 1; an area where there is a low risk of flooding from rivers and the sea. This is land assessed as having a chance of flooding of less than 1 in 1000 (0.1%) each year.
- 2.32 The Site is located in an area at low risk of flooding from groundwater sources, significant thicknesses of cohesive superficial deposits with limited discontinuous groundwater within them further lower this risk.
- 2.33 The Site is located in area at low risk of pluvial flooding from extreme rainfall events. Drainage networks onsite are designed to include an attenuation pond designed for all events up to and including the 100 year plus climate change allowance (20%).
- 2.34 For each River Basin District, the WFD requires a River Basin Management Plan to be published. These are plans that set out the environmental objectives for all the water bodies within the River Basin District and how they will be achieved. The plans are based upon a detailed analysis of the pressures on the water bodies and an assessment of their impacts. The plans must be reviewed and updated every six years.
- 2.35 The ecological status of surface water bodies is based on the following quality elements: biological quality, general chemical and physio-chemical quality, water quality with respect to specific pollutants (synthetic and non-synthetic), and hydromorphological quality.
- 2.36 There are five classes of ecological status (i.e. high, good, moderate, poor or bad). Ecological status and chemical status together define the overall surface water status of a watercourse.
- 2.37 The closest watercourse is the River Skerne which runs in a southerly direction approximately 1.5km to the east of the of the Site. The Skerne, from Demons Beck to the Tees, in the second cycle of water body classification (2016), achieved '*good*' chemical classification, a '*moderate*' ecological classification and a '*moderate*' overall classification. The Skerne flows through Darlington into the River Tees at a point approximately 13.4 km south.
- 2.38 There are no on-site surface water features, although the site is low lying and often waterlogged.

REFERENCES

Ref 2.1: Sirius, Geo-Environmental Appraisal, Report C2761, Heighington Lane West, Newton Aycliffe. March 2008.

3 ENVIRONMENTAL STATEMENT METHODOLOGY

INTRODUCTION

3.1 The main objectives of the ES comprise:

- establishing the existing baseline environmental conditions and the sensitivity of receptors.

This task was divided into two phases:

- (i) collection and review of existing data relating to the Site, including a review of information held by statutory and non-statutory consultees; and
 - (ii) the enhancement of existing data, where necessary with information collected through site investigation and surveys.
- identifying, predicting and assessing the significance of the environmental impacts including beneficial, adverse, direct, indirect, long term, medium term, short term, temporary, permanent and cumulative impacts which could be expected as a result of the development proposals on those environmental issues that were considered to be potentially significant during the scoping process carried out on behalf of the Applicant;
- determining mitigation and management measures, which would be required in order to prevent, reduce or remedy any significant adverse effects along with consideration of enhancement measures which could be implemented to ensure positive benefits as a result of these proposals; and
- identifying any residual significant effects once mitigation has been taken into account.

CONSULTATION

3.2 Consultation is an essential part of the EIA process and has been used to:

- identify available baseline data and the need for any further field surveys; and
- identify the main environmental issues that need to be assessed in detail.

3.3 Both statutory and non-statutory consultees have been consulted as part of the EIA. In addition, the Applicant is committed to consultation with local interested residents and parties regarding the development proposals. This updated ES will be formally published on DCC's website, and

notification of this will be sent by DCC to all parties who have made comments on the planning application previously.

3.4 The Local Authority planning team have been consulted as part of the planning pre-submission programme. The main stages of consultation were:

- Liaison and pre-application discussions with the relevant Planning Officers at Durham County Council in relation to the installation of a High Temperature Incineration Plant at the Site;
- Environmental Permitting Basic Pre-Application discussion with the Environment Agency in relation to the permitting of the Site;
- Engagement with local MP's, Councillors and Business Durham; and
- Further public consultation will be carried out with members of the public as part of the statutory consultation during the planning determination period.

3.5 A copy of the Scoping Opinion provided by Durham County Council has been included as Appendix 4 of the Planning Statement.

3.6 Details of the names and addresses of all public consultees is provided as Appendix 11 of the Planning Statement.

ASSESSMENT CRITERIA

3.7 A number of criteria have been used to determine whether or not the potential effects of the development proposals are significant. Where possible the effects have been assessed quantitatively.

3.8 The significance of effects have been assessed using one or more of the following criteria:

- International, national and local standards;
- Relationship with planning policy;
- Sensitivity of receiving environment;
- Reversibility and duration of effect;
- Inter-relationship between effects; and
- The results of consultations.

- 3.9 The effects that were considered to be significant prior to mitigation have been identified within the ES. The significance of these effects reflects judgement as to the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes. For example, a large adverse impact on a feature or site of low importance will be of lesser significance than the same impact on a feature or site of high importance.
- 3.10 The following terms have been used to assess the significance of effects where they are predicted to occur:
- **Major Beneficial or Adverse** effect – where the development would cause a significant improvement (or deterioration) to the existing environment;
 - **Moderate Beneficial or Adverse** effect – where the development would cause a noticeable improvement (or deterioration) to the existing environment;
 - **Minor Beneficial or Adverse** effect - where the development would cause a barely perceptible improvement (or deterioration) to the existing environment; and
 - **Neutral / Negligible** – no discernible improvement or deterioration to the existing environment.
- 3.11 Where individual assessment sections deviate from these terms, the alternative terminology has been explained as appropriate within the relevant chapter.
- 3.12 A summary impact table that describes the potential impacts, mitigation measures and any residual effects for each of the environmental issues considered is provided at the end of each chapter, where relevant.
- 3.13 A non-technical summary of the ES is provided as **Volume 3**.

CUMULATIVE EFFECTS

- 3.14 Cumulative impacts from proposed or committed developments in the vicinity of the proposed development have been considered within each of the following technical Chapters.
- 3.15 There are no identified already constructed and established waste management, combustion or other technically similar facilities within close proximity to the site for which cumulative effects have been considered.

3.16 In addition, the Applicant has investigated the details of any other projects which could in combination the proposed development, give rise to cumulative significant effects. No such other schemes have been identified.

4 ALTERNATIVES, NEED AND DESIGN EVOLUTION

INTRODUCTION

- 4.1 This chapter sets out the need for the Proposed Development and the main alternatives considered by the Applicant.
- 4.2 In line with the Industrial Emission Directive, incineration and co-incineration plants must operate at temperatures in excess of 850°C for 2 seconds for non-hazardous waste feedstocks and are required to operate at 1,100°C for 2 seconds to ensure the complete destruction of hazardous waste compounds. Due to the nature of the wastes that will be processed at the Proposed Development, the Incineration plant has been designed to operate at the higher temperature requirements as necessary.
- 4.3 The Emission Limit Values (ELVs) for incineration plants were tightened in 2019 as detailed within the BREF Waste Incineration BAT Conclusions document. The Proposed Development will be one of the first plants to be built in line with the new ELVs. Any existing incineration plants have until December 2023 to meet the new ELVs, with a majority requiring significant infrastructure improvements to the existing emissions abatement technology and performance.

THE NEED FOR THE PROPOSED DEVELOPMENT

- 4.4 There is an identified national and regional need for new clinical and hazardous waste treatment capacity primarily driven by the following issues:
- There is an existing capacity shortfall of high temperature incineration plants, creating a lack of competition and market distortions. Accordingly, there is a desire by the waste sector to seek more reliable long-term regional solutions;
 - A long-term underinvestment in the sector in the UK combined with the requirement for the incinerator sector to meet much tighter environmental standards and 'BAT' requirements by December 2023. In short, none of the existing high temperature incineration plant is capable of meeting the requirements of the new Industrial Emission Directive BREF Guidance without substantial upgrading (Ref 4.1);
 - An increasing reliance on the export of material for incineration (which is complex and subject to a variety of future changes in the market); and

- A growth in the aging population of the UK (discussed further below).

UK Population Growth

- 4.5 The number of people in the UK aged over 75 is expected to grow from 5.4 million in 2015 to 8.8 million in 2035. As the Office of Budget Responsibility identifies, demand (and cost) of healthcare rises with age. The NHS has recently estimated that this demographic pressure will increase demand by around 1.4% per annum and, absent any other factors, it would be reasonable to assume that this should drive up future tonnages of clinical waste.
- 4.6 This growth in demand, alongside cost pressure from non-demographic drivers, is putting immense pressure on both the NHS and Private Healthcare market which has two direct consequences for the clinical waste market. The first is the increasing trend to place more patients into the community for (cheaper) treatment at home. This in turn is leading to a clinical waste challenge as responsibility for collection of clinical waste from domestic properties largely (although not exclusively) lies with the local authority, with it being reported that 76% of all local authorities provide such a service.
- 4.7 The second consequence is that, in order to reduce costs, there is an ongoing focus on the correct segregation of clinical waste, particularly in hospitals to ensure that incorrect disposal of hazardous clinical / medical wastes is avoided.
- 4.8 Most significantly however, there is both an immediate and long term regional capacity shortfall in the North East which will be addressed by the proposed facility. Figure 4.1 below, provides a summary showing all UK clinical waste facilities currently operating, which clearly identifies the North East as being poorly served in terms of clinical waste treatment.
- 4.9 The significant lack of regional capacity³ combined with the recent changes in the Environmental Permitting framework, now requires all clinical waste incineration plants to meet a higher set of emissions limit values, thus meaning that a majority of the existing and aged High Temperature Incineration (HTI) infrastructure will either need to be upgraded or replaced within the next 3 to 4 years.
- 4.10 HTI facilities fall broadly into two groups, generally older hospital-based facilities which were originally part of the NHS estate but which have been largely outsourced to the private sector,

³ It should be noted that the nearby SharpSmart facility is an alternative treatment facility that sterilizes infectious wastes and not a HTI facility and such, the two facilities serve different markets. The recently consented facility for SharpSmart has both a different feedstock profile and a fundamentally different treatment process. SharpSmart primarily act as a waste transfer facility targeting sharps and associated materials and are carrying out a sterilisation process without energy recovery. Autoclaving (as at the SharpSmart facility) does not meet the same high temperature treatment requirements as the proposed facility, and as such is intended for a different purpose.

together with a limited number of privately owned and developed facilities. There are only 3 comparable HTI facilities similar to that proposed here, and the location of these is shown in Figure 4.1.

- 4.11 Since 2012 HTI facilities have closed in Wolverhampton (New Cross), Salford (Hope Hospital) and Nottingham (relocated by SRCL to Avonmouth).
- 4.12 Following the national publicity in 2018, Healthcare Environmental (who, despite being one of the larger players in the market had no HTI facilities of their own) suggested that there was insufficient HTI capacity in the UK market and indeed this was initially supported by comments by NHS Improvement and Environment Agency officials suggesting a shortfall in capacity.

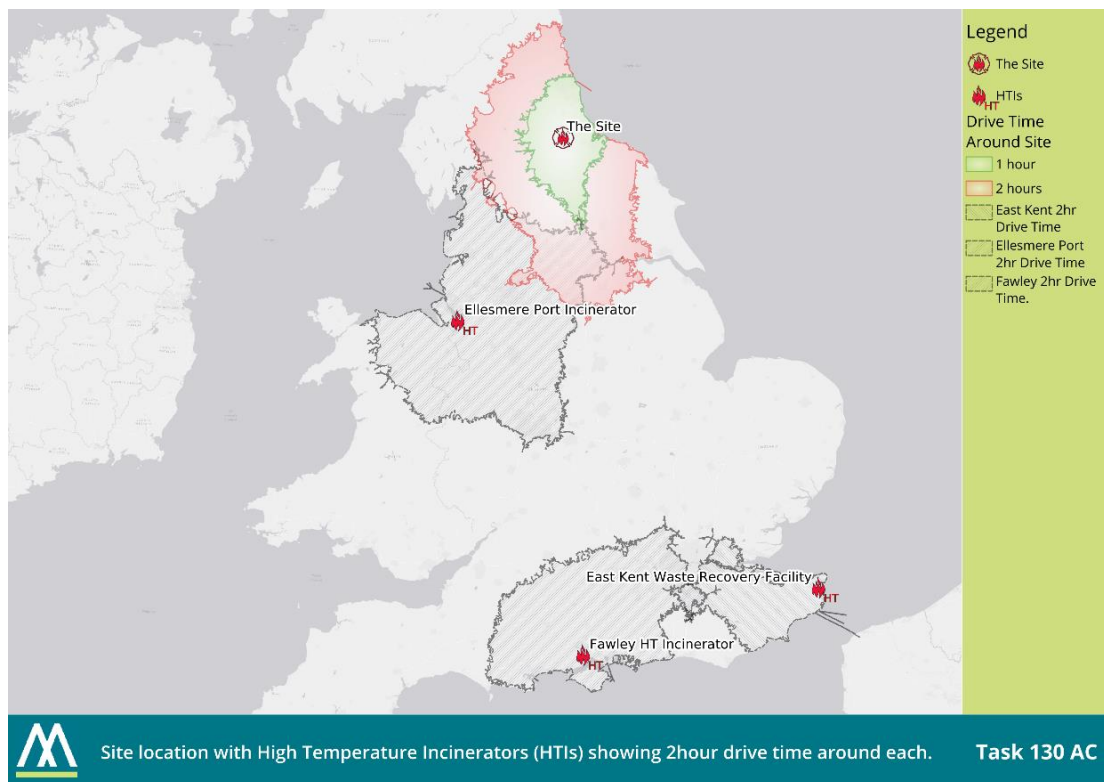


Figure 4.1: Site Location with HTIs showing 2 hour Drive Time Around Each (Gresham data)

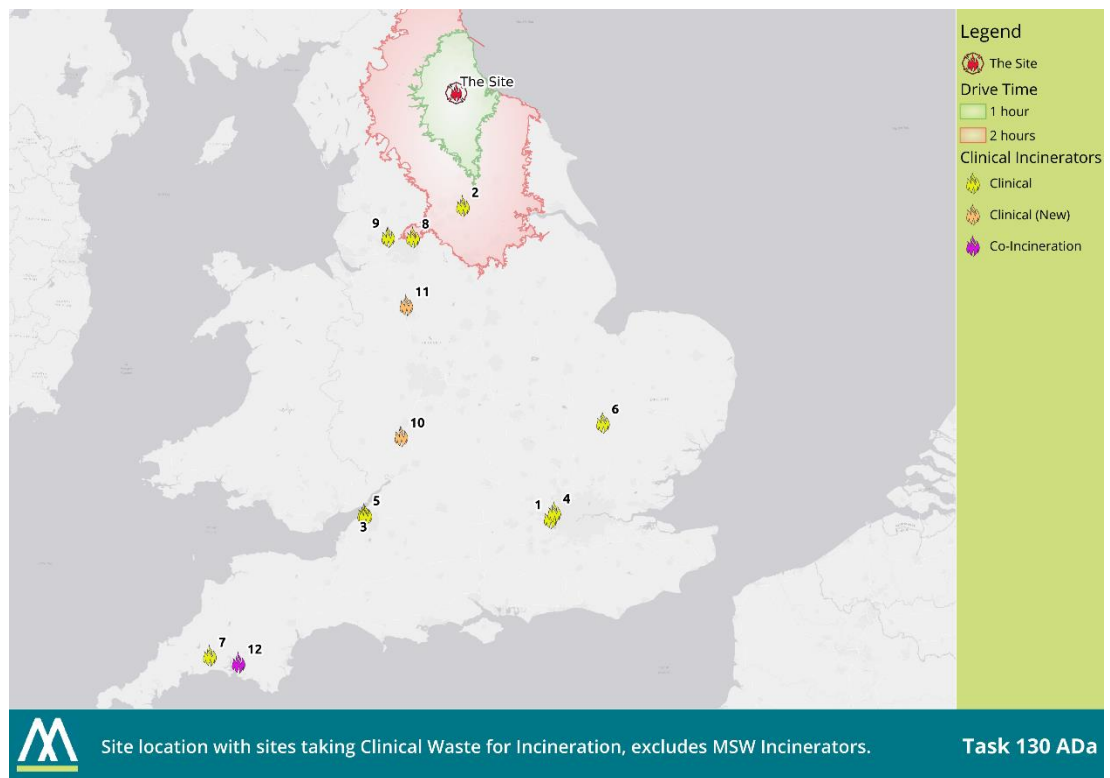


Figure 4.2: Site Location with Sites Taking Clinical Waste for Incineration (Excludes MSW Incinerators)

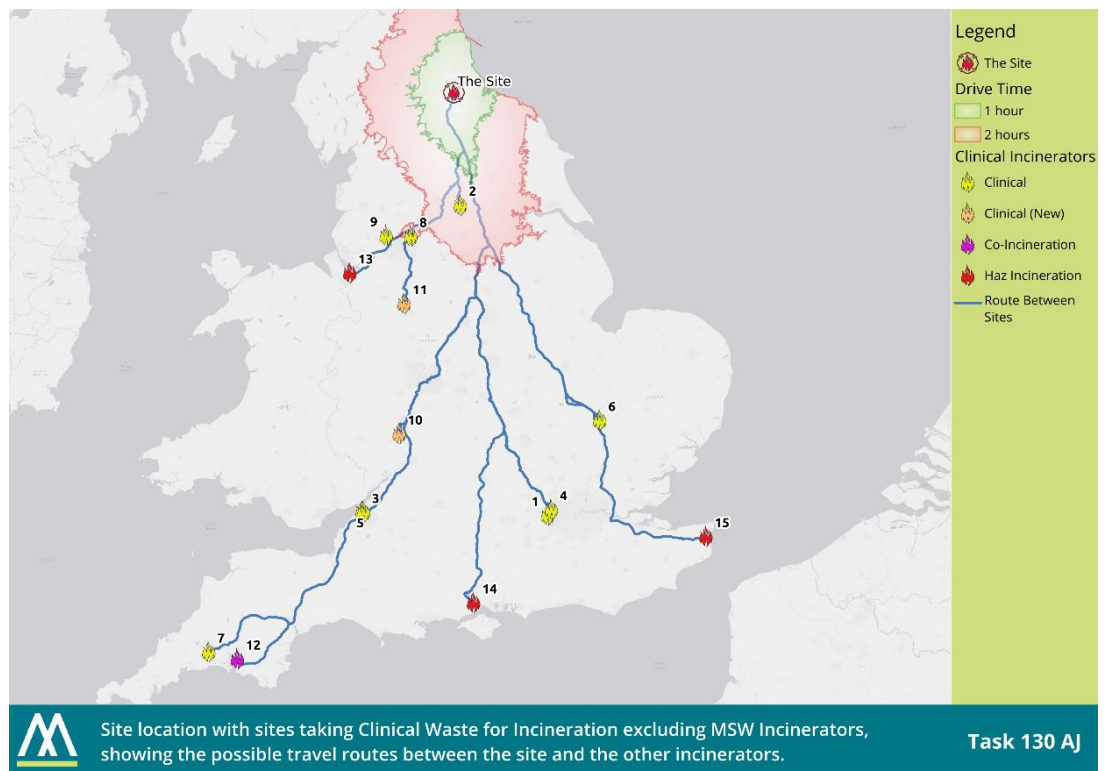


Figure 4.3: Site Location with Sites Taking Clinical Waste for Incineration (Excludes MSW plant) with Travel Routes

- 4.13 The need for alternative waste management is also recognised by European, National and Local waste policies. A summary of the key waste planning policy documents relevant to the Proposed Development, and which identify the need for the Proposed Development is set out in the Planning Statement. The need for the proposed development is also further detailed in the Planning Statement, which accompanies this ES.
- 4.14 Directive 2008/98/EC (the Waste Framework Directive) (Ref 4.2) sets out the broad policy hierarchy with regard to waste management. The waste hierarchy places a priority order as: (a) prevention; (b) preparing for re-use; (c) recycling; (d) other recovery and (e) disposal. The waste hierarchy, as set out in Article 4 of the Directive, indicates energy recovery should be undertaken in preference to the disposal of waste. This project is considered to meet the definition of Recovery as set out by the Directive.

County Durham Plan

- 4.15 Durham County Council produced and adopted the County Durham Plan in 2020 (Ref: 4.3). This Strategy sets clear policy and actions to build and successful and sustainable future County Durham.
- 4.16 One of the main objectives for the plan is waste management and states:
- Objective: Waste Management – Support the development of a network of modern waste management facilities which help ensure that society's waste arisings are managed in accordance with the principles of the waste hierarchy; which facilitate re-use, recycling, composting and recovery of value from waste and enabling the disposal of waste as the last resort; while also protecting the environment, the amenity and health of local communities; and existing and proposed facilities from incompatible development.
- 4.17 The Proposed Development meets Policy 47 – Sustainable Minerals and Waste Resource Management and Policy 60 – Waste Management Provision as locally / regionally generated clinical waste and hazardous wastes will be moved up the waste hierarchy recovering energy during the controlled treatment.
- 4.18 The introduction of a new high temperature treatment facility for clinical and hazardous waste using incineration at Newton Aycliffe is in line with policy for the following reasons:
- Regional capacity is limited, therefore a majority of local clinical waste arisings are transported and treated out of area (the nearest comparable facility being in excess of two hours drive away);

- The provision of new specialist capacity will reduce the ‘waste miles’ associated with this waste stream;
- The onset of Covid-19 has created significantly more clinical waste streams that require treatment and disposal. Due to the restrictions imposed by the clinical waste regulations, high temperature incineration is the only suitable treatment method;
- The proposed HTI facility recovers all available energy as heat and presents a viable opportunity for the offsite export of low carbon heat.

4.19 It should also be noted that in-line with Durham County Council’s Waste Management Strategy (Ref: 4.3), the Proposed Development shall apply the waste hierarchy, as outlined in Figure 4.4, where disposal to landfill is considered as the last choice.

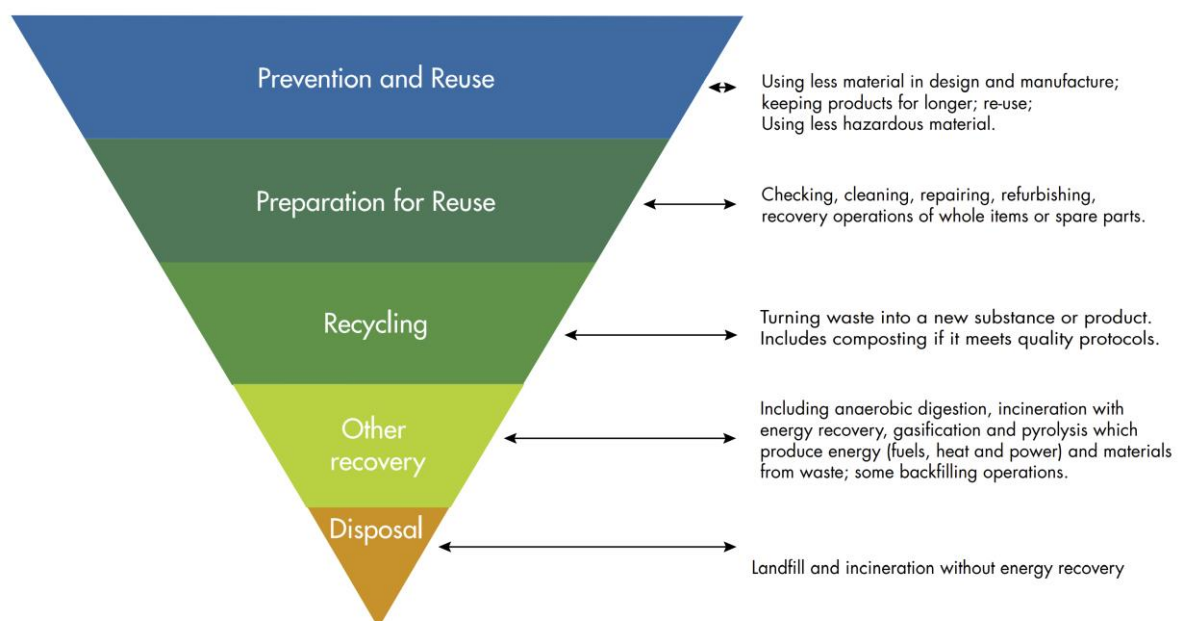


Figure 4.4: Waste Hierarchy

ALTERNATIVES

4.20 The EIA Regulations (Ref 4.4) states that an Environmental Statement (ES) should include:

“An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice made, taking into account the environmental effect”.

- 4.21 The EIA Regulations do not expressly require the Applicant to study alternatives; however the nature of certain developments and their location may make the consideration of alternative sites a material consideration. Moreover, case law indicates that the EIA regulations do not require an assessment of alternatives.
- 4.22 The following sections describe the main alternatives to the Proposed Development considered by the applicants. In accordance with best practice guidance, consideration has also been given to and commentary is provided to provide an outline of any alternatives or options considered by the Applicant:
- The '*No Development*' alternative;
 - Alternative Sites;
 - Alternative Technologies; and
 - Alternative Designs.

'NO DEVELOPMENT' ALTERNATIVE

- 4.23 Guidance on the preparation of ES's (Ref 4.4) suggests that it is good practice to consider the evolution of a site in the absence of specific proposals, i.e. the '*Do-nothing*' or '*No-Development*' alternative.
- 4.24 There is an immediate local and national need for the safe and secure disposal of clinical and hazardous wastes.
- 4.25 The waste sector has a local treatment capacity shortfall meaning that the nearest available HTI facilities for these wastes are located '*out of region*' and require considerable specialist transport by road, followed by further transport and disposal to alternative older HTI plants.
- 4.26 The proposed project will significantly reduce the transportation impacts associated with the local and regional disposal of clinical and hazardous wastes.
- 4.27 The '*No-Development*' option refers to leaving the Site in its current state, and continuing with the current methods for the disposal of waste. Key issues are summarised below:
- The failure to supply a sustainable local source of hazardous waste disposal;
 - Locally arising medical and hazardous wastes will continue to be exported long distances to locations as far distant as West Midlands for disposal to alternative older HTI plants; and

- Inefficient and unsustainable HGV movements both on-site and beyond which could be eliminated.

SITE SUITABILITY AND ALTERNATIVE SITES

- 4.28 The applicant has actively pursued a number of alternative site locations but has selected this site following consultation with the Durham County Council Sustainability Team, and having regard to a series of practical and commercial considerations.
- 4.29 At feasibility stage the development team engaged with local land agents and DCC's Asset Strategy Officer to explore land availability and suitability options across a broad range of physical, legal and planning constraints. The site search included available plots as far as Teesport, and several other sites around the Newton Aycliffe Business Park.
- 4.30 An alternative location, at Preston Road within the Newton Aycliffe Industrial Estate had been considered for this development, however, this location was unable to be pursued due to title defect rights over the land ownership.
- 4.31 This Merchant Park location, both being allocated for commercial and industrial use and within the vicinity of the Hitachi Rail factory and other development plots is considered suitable as it provides an immediate potential market for the commercial renewable district heat generated by the facility.
- 4.32 The proximity of the site to potential commercial users of heat is considered to be a key factor in site selection as it provides a potential for the sale of sustainable and renewable heat, thus increasing the overall thermal efficiency and carbon benefit of the scheme.
- 4.33 In concluding the development appraisal, the applicant site offers low potential negative environmental impact, sits within a supportive planning policy context and offers a simple freehold legal interest when compared against the other sites being appraised.
- 4.34 The proposed development would be constructed within an unused plot of land to the north of the existing Hitachi Rail Facility on a lot referred to as Plot 1.2.
- 4.35 The Applicant has considered national and local planning policies which have been assessed as set out in the Planning Statement in support of this planning application. The proposals are compliant with the Development Plan.
- 4.36 The Site does not contain any designated ecological, habitat, heritage features, landscapes or views.

- 4.37 Due to the nature of the proposed development, there will be no direct impacts to off site conservation.

ALTERNATIVE TECHNOLOGIES

- 4.38 A review of available waste treatment and energy recovery processes has been carried out by the project design team.
- 4.39 The findings of this review identified that although there are a number of small scale technologies which are capable of processing clinical and hazardous wastes, many have been discounted on the basis of scale, operational cost or resource efficiency.
- 4.40 Due to the specific nature of clinical and hazardous wastes, their management and disposal is limited to a very few approved processes. Certain hazardous wastes are required by law undergo high temperature incineration (i.e. at temperatures of 1,100°C rather than 850°C) and need to adhere to the key principles of the Healthcare Waste: Appropriate Measures for Permitted Facilities and Department of Health Guidance (Ref 4.5) relating correct segregation, storage, disposal and documentation of waste.
- 4.41 On the basis of the above a short list of two high temperature incineration technologies have been identified, both of which are fundamentally similar and involve a two-chamber thermal oxidation and incineration plant.
- 4.42 The rotary kiln technology has been selected for the following reasons:
- The rotary kiln incineration system is ideal for processing mixed industrial and hazardous wastes that include a combination of solid, sludge, and liquid waste streams and is highly tolerant of highly varied waste sizes and properties;
 - The technology provider has a system which enables a broad range of waste storage and feed systems (ram feeders, sludge feed systems, liquid injection systems), thus allowing all types of hazardous and clinical waste types to be processed without the need for separate loading systems;
 - The chosen rotary kiln provides a very high level of flexibility for simultaneously processing a wide variety of mixed waste streams with large variations in heating value whilst ensuring that that the secondary residence time of 2 seconds minimum and temperatures of 1100°C (2012°F) are maintained; and
 - The system provides effective heat recovery to produce steam or hot water.

ALTERNATIVE DESIGNS & LAYOUTS

- 4.43 The Merchant Park site has been orientated to ensure ease of access from the B6444 Heighington Lane and to minimize the internal traffic routing of the site.
- 4.44 A constraints analysis of the Site has determined building layout is ideally situated in the southern portion of the site in an east / west orientation for the following reasons:
- Offsets the main development to the back of the site when viewed from the B6444 and provide physical distance between the green boundary thus minimising the potential visual impacts from the road.
 - The building and plot size prohibits the ability to orientate the building in a north/south orientation and therefore constrains the layout to being east/west.
 - The construction of the site in the southern portion of the development plot allows the existing belt of trees along the northern boundary to be retained without any modification or impact to either the canopies or roots.
 - HGV egress / entry onto the site from the internal service roads of the wider development was modelled and the proposed layout provides the largest turning circle and yard areas for the HGV manoeuvring and does not cause any interface risk or congestion with the other phases of the Merchant Park Development.
 - The fall of the land towards the south, requires the SUDs pond and drainage to be located in the southernmost portion of the site. Earlier iterations of the design located the SUD pond in the north, thus necessitating pumped drainage to be installed. This was discounted for a number of reasons, the most relevant being the need to ensure that the site can retain all firewater on site during emergency situations.
 - The chosen configuration minimises the interface between HGV's, employee vehicles and pedestrians and thus significantly reduces the health and safety risks associated with the site layout.
 - A south facing roof enables the most efficient use of the proposed roof mounted solar array.
- 4.45 It is considered desirable for planning simplicity purposes to contain the entire site within a single borough county (Durham) rather than to encroach into the neighbouring Darlington Borough Council;

- 4.46 In light of the above, it has been concluded by the project team that the location of the main building in the southern portion of the site provided the best overall balance of operational safety and environmental impact.
- 4.47 An alternative, earlier layout iteration has been provided in Figure 4.5 below. Noting that this was discounted for the following reasons;
- Located the offices to the east of the site creating a pedestrian, HGV interface risk;
 - Required a pumped water storage solution;
 - Created a vehicular pinch point in the North West portion of the site; and
 - Encroached over two district planning authorities.

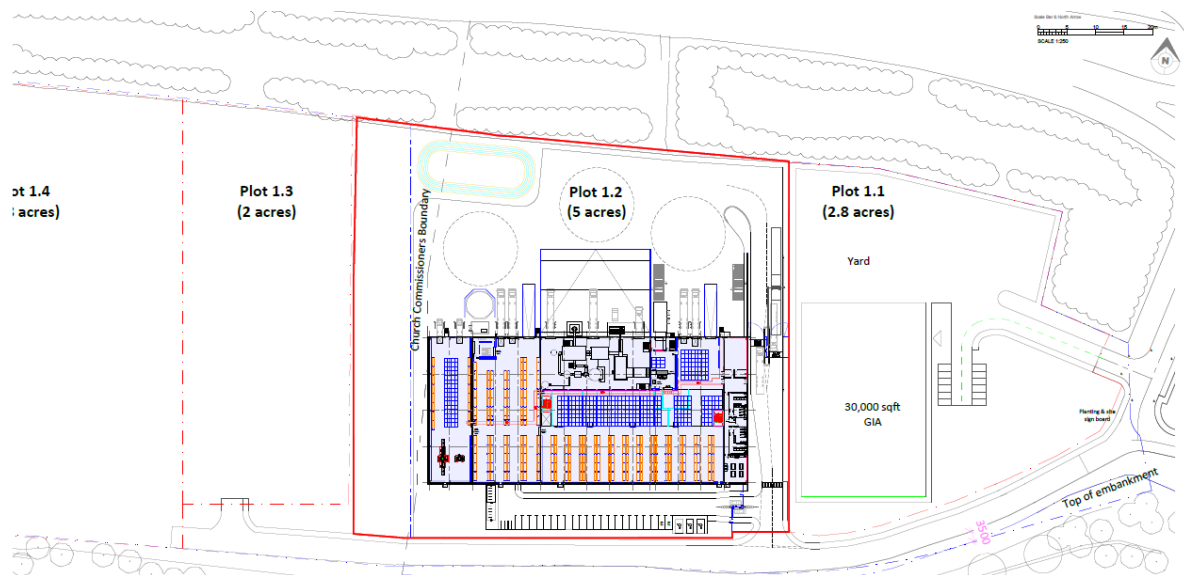


Figure 4.5: Alternative Layout Iteration (discounted – due to entrance and SUDs)

SUMMARY

- 4.48 The Proposed Development has evolved over a number of design iterations, responding to local authority planning and development aspirations and taking account of the Applicant's development objectives, design aspirations and prevailing environmental constraints.
- 4.49 The evolution of the Proposed Development has therefore responded to a variety of design and environmental issues and the resultant proposals are considered to offer the most advantageous design solution.

REFERENCES

Ref 4.1: COMMISSION IMPLEMENTING DECISION (EU) 2019/2010 of 12 November 2019 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for waste incineration (notified under document C(2019) 7987)

Ref 4.2: European Commission (2008) Waste Framework Directive (2008/98/EC)

Ref 4.3: County Durham Plan Adopted in 2020

Ref 4.4: Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017

Ref 4.4: Impact Assessment Guidelines and ES Review Criteria from the Institute of Environmental Management and Assessment (IEMA), 2004.

Ref 4.5 Management and disposal of healthcare waste (HTM 07-01) - Health Technical Memorandum (HTM) 07-01 on best practice for waste management and ways to improve the environment and carbon impacts of managing waste.

5 THE PROPOSED DEVELOPMENT

INTRODUCTION

- 5.1 This chapter describes the Proposed Development, provides details on the buildings and structures and gives an overview of the processes that will be employed at the Site.
- 5.2 The Proposed Development will incorporate a High Temperature Incineration (HTI) Plant using sector proven combustion and air pollution control and monitoring equipment. The project has been designed to recover all available heat produced during the incineration of waste and will utilise the heat for potential parasitic process heat and building loads. Furthermore, the project has been designed with the capacity to export approximately 5MWth of heat to neighbouring industrial users should it be practically and commercially possible to do so.
- 5.3 The proposed development consists of a conventional portal frame building, within which a thermal waste to energy process will be operated, processing up 10,500 tonnes per annum of clinical and hazardous wastes.
- 5.4 The proposed development consists of a conventional industrial-style building (footprint 5,792 m²), penthouse roof height 16.7m, main ridge height 14.8 m, main eaves height 11.2 m), within which a HTI plant will be operated. An associated stack would be up to 30m tall, at around 0.7m in diameter.
- 5.5 The building heights are comparable to the Hitachi Rail Facility next to which the proposed development sits (Hitachi Rail Facility roof height is 13 m) as shown in Figure 5.3. The building will be clad with a profiled steel panel system, of a grey colour to blend with existing buildings.
- 5.6 The proposed site layout is identified in Figure 5.1 and 5.2 below.

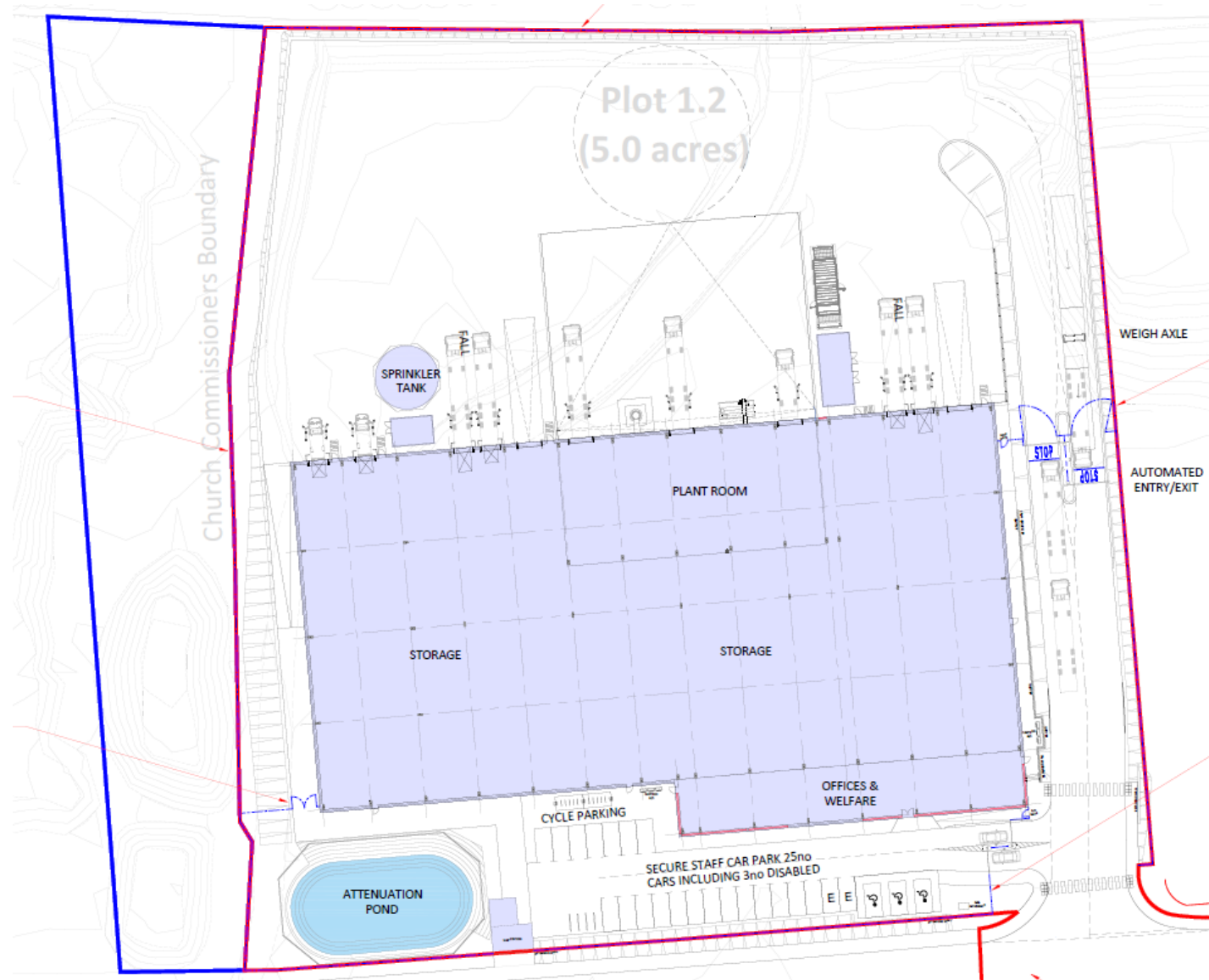


Figure 5.1: Site Layout

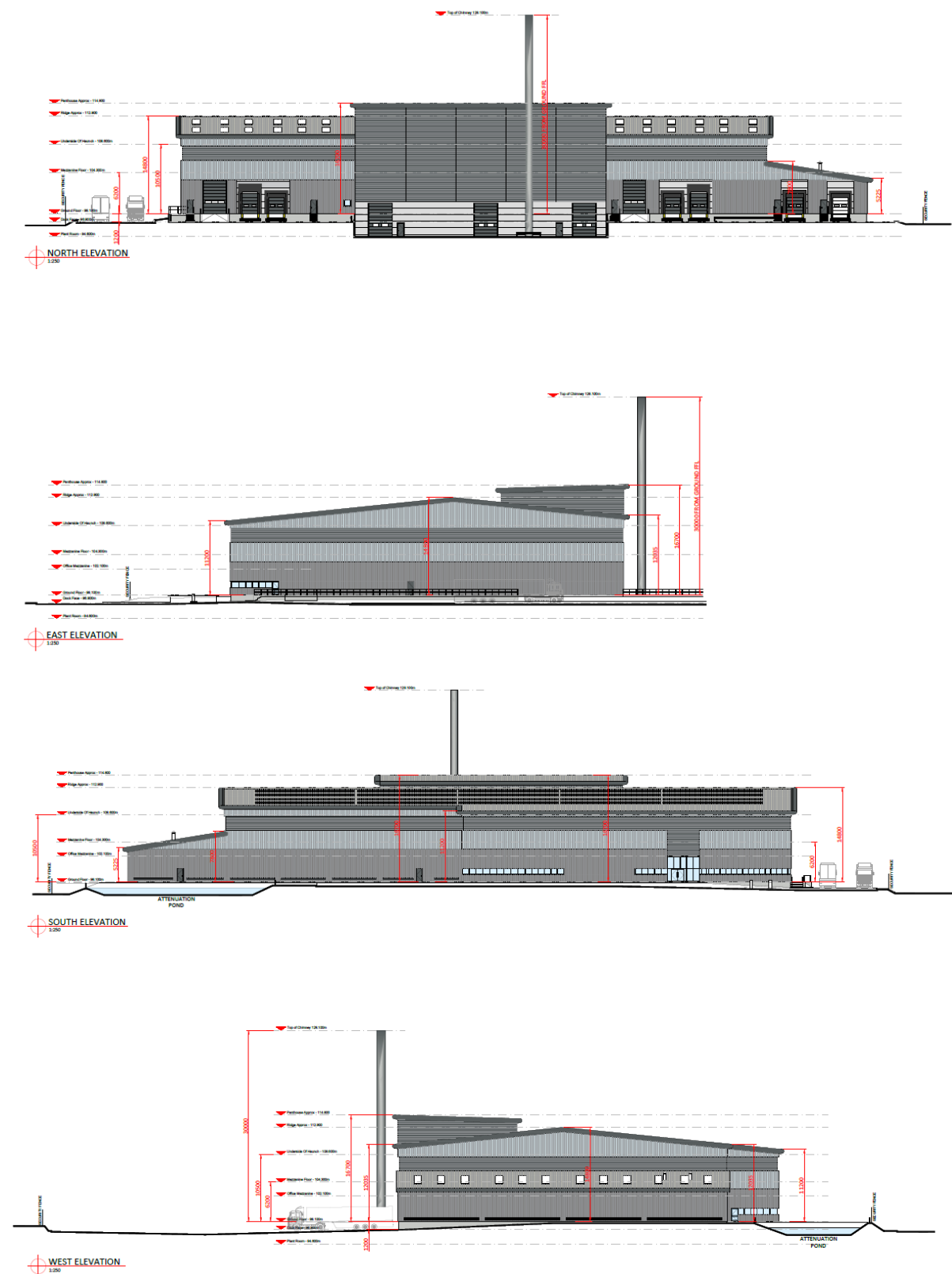


Figure 5.2: Site Elevations



Figure 5.3 Comparable Elevations with Hitachi Rail Facility

5.7 The proposed site layout is illustrated in Figure 5.1 above and will involve the following elements of infrastructure:

- Inside the building it is proposed to include:
 - Waste reception area up to which vehicles will reverse to offload the waste containers;
 - Container storage area (dirty and clean);
 - Cold room for refrigerated storage;
 - Bin washing facility;
 - Automatic feeding system;
 - Rotary kiln and afterburner equipment;
 - Heat recovery system;
 - Emission abatement system; and
 - Welfare facilities for staff.
- External infrastructure:
 - 30m exhaust flue;
 - Sprinkler tank and pump room;
 - Switch room;
 - Generation sets and other electricity infrastructure;
 - AC Compound;
 - Weighbridge;
 - Ash skips and removal; and
 - Parking / Cycle Shelter.

5.8 In accordance with the requirements of the mandatory Environmental Permitting Regulations and Healthcare Waste: Appropriate Measures for Permitted Facilities, a significant proportion of the internal space of the building will be occupied by bin storage. The requirements of the regulations

dictate that all material is unloaded and secured within a sealed controlled building and that no material is stored externally in an uncontrolled manner.

- 5.9 In addition to the process building, a hard-surfaced yard would be required for access, manoeuvring and parking, and a surface water runoff attenuation pond will be provided, along with appropriate landscaping. The overall site footprint will be around 2.02ha including the access.
- 5.10 Within the building would be a reception area for materials, a small office, a bin store and wash area, and the principle process equipment. The operation will occupy a basement level (702m² gross area), ground floor (4,548m² gross area) and mezzanine floor (972m² gross area). Vehicles will reverse into the docking system and unload the incoming waste. A ramp will be provided for vehicles to access the building's lower area. An office to accommodate staff for the documentation, and emission and system monitoring will also be provided within the building. Weighing of the waste will be take place on the process line, with an external weighbridge also provided.

DESCRIPTION OF THE TECHNOLOGY

Overview

- 5.11 The proposed High Temperature Incineration (HTI) plant includes a suite of key technologies that can be broken down in to three key stages. A summary description of each of the processes is provided in Table 5.1.

Table 5.1: Summary Process Description	
Process	Description
Plant Loading	Waste will be delivered to the site in bins, containers or sealed packaging in accordance with the necessary guidance and stored internally within the building. Once inside the building all waste will be logged and tracked through the dedicated waste tracking system. Once required for incineration, the containers are transferred to the feeding system that will convey the contents of the bin into the rotary kiln incinerator.
High Temperature Incineration	Once the contents of the container have been loaded into the incineration system, the wastes are thermally oxidised and destroyed. The after burner is designed to produce a gas residence time of 2 seconds at temperatures up to 1,100°C to in line with the Industrial Emissions Directive. Once combusted, the resultant gases are passed through to the air pollution control system. The high temperature thermal treatment of the waste generates bottom ash which will subsequently be extracted and removed from the process plant. The thermal treatment plant has been designed to comply with all aspects of the Industrial Emissions Directive.

Air Pollution Control	<p>Flue gas cleaning and pollution control consists of Selective Non-Catalytic Reduction (SNCR) through urea injection, a bag filter to remove particulates and a calcium / carbon injection for absorption and removal of heavy metals, dioxins, volatile organic compounds (VOCs) and other harmful substances. The cleaned gases will then be released via the 30m stack. All emissions will be continuously monitored using the EA's Monitoring Certification Scheme (MCERTS) accredited monitoring equipment and controlled.</p> <p>The plant will be fully compliant with the latest iteration of the Industrial Emissions Directive, the Waste Incineration Best Available Techniques (BAT) Reference Documents (BREF) document and the requirements of the Environmental Permitting Regulations. The plant will be regulated as a Part A(1) Installation by the Environment Agency.</p>
Heat Recovery	<p>The plant has been designed to incorporate a 5.4MWth heat recovery boiler that produced steam and hot water for onsite and offsite use. The boiler is a conventional tube type recover boiler that will produce steam at 16 bar pressure at 204°C.</p> <p>The heat transfer loop at site will provide all onsite thermal requirements whilst also making available approximately 5MWth for offsite transfer and use. Although there are currently no contracts in place, a number of potential commercial partners for the offsite heat offtake have been identified such as Hitachi, UTC South Durham and future occupiers of Station Place (DCC Industrial Scheme). As such the site has been designed with flow and return connection points that will facilitate off site heat transfer should it be commercially viable.</p>

Waste Feedstocks

- 5.12 The HTI plant has been designed to process approximately 1.25 tonnes per hour with deliveries taking place 06:00 to 20:00 Monday to Friday, 07:00 to 13:00 Saturday and no deliveries on Sundays. This will require approximately 12 deliveries of waste per day. In addition, there is likely to be 1 delivery per week of reagents, 3 skip collections per week for ash and general packaging waste and 2 vehicles per day for pallet collection, miscellaneous skip collection, consumable deliveries, and other miscellaneous materials.
- 5.13 The plant will process approximately 10,500 tonnes of feedstock per annum.
- 5.14 Typically speaking, each HGV will contain an average of 40 bins depending on whether the HGVs are single or double decked.
- 5.15 The waste feedstocks processed by the Site are expected to include:

- Health Care Waste;
- Hazardous Waste;
- Hygiene Waste;
- Pharma Waste;
- Medicinal Waste; and
- Law Enforcement Confiscated Material.

5.16 The developer has identified a need within this area to serve the A1 corridor, including the urban areas of Newcastle, Durham, Newton Aycliffe, Sunderland and other local towns. It is not anticipated that feedstocks would travel substantial distances.

5.17 The Site would not be open to the public or general trade use. Materials will be stored and processed on site in accordance with the sites Environmental Permit.

Waste Reception

5.18 All vehicles will enter the Site and waste will be unloaded into the waste reception area of the building.

5.19 The building is equipped with a number of docking stations that will permit the secure and safe delivery of the waste from the HGV vehicles.

5.20 Once inside the building all waste containers are logged and tracked through the various processing stages of the thermal treatment plant. All waste arriving at site will be tracked by the sites dedicated waste tracking system and passed into the storage system. All records will be kept in line with the Environmental Permit requirements.

5.21 All wastes will arrive on site in accordance with the necessary legal packaging requirements as part of the sites waste acceptance protocol.

5.22 When required, the waste will be transferred to the feeding system that will convey the contents of the bin into the rotary kiln incinerator. The waste will be fed into the incinerator by the ram mechanism and pushed into the rotary kiln incinerator.

5.23 After unloading, containers are internally transferred to a bin wash facility where they are cleaned and disinfected using recirculated heat from the process and detergent cleaners, as required by the clinical waste regulations. Wastewater will be discharged to foul sewer under the appropriate discharge consent.

- 5.24 Disinfected (i.e. cleaned) bins are then transferred to an internal clean bin storage area where they will be collected by the waste delivery vehicles and removed off site.

Thermal Treatment Plant

- 5.25 The facility will process feedstock and recover energy 24/7 except for shutdowns during routine maintenance.
- 5.26 The proposed HTI plant has been specifically designed to meet the strict requirements of the clinical and hazardous waste sector.
- 5.27 The furnace unit is designed to use gas oil as a start-up fuel until the rotary kiln and afterburner meets the required temperature required by the Industrial Emissions Directive.
- 5.28 Once the waste has been loaded into the incineration system, the wastes are thermally oxidised and destroyed at temperatures in excess of 850°C for at least 2 seconds and converted into ash. The after burner is designed to reach up to 1,100°C which is required for certain clinical and hazardous wastes. The temperature requirements will be detailed within the sites Environmental Permit. Once combusted, the resultant gases are passed through to the pollution control system.
- 5.29 All loading activities are carried out through the use of an automated enclosed, air tight loading system which ensures that optimised combustion conditions are maintained within the primary chamber.
- 5.30 All hot gases arising from the combustion of the waste materials are evacuated from the rotary kiln and combusted under oxygen rich conditions within the afterburner.
- 5.31 The design of the afterburner is such that the flue gases can achieve a residence time of 2 seconds after the last secondary air inlet at 1,100°C which is required for certain hazardous and clinical wastes. This configuration achieves low Carbon Monoxide (CO), Volatile Organic Compounds (VOC's) and Nitrogen Oxide (NOx) emissions concentrations.
- 5.32 The combustion process produces a bottom ash which is collected in a container for export off site to a suitably licensed facility. The frequency of ash removal is dependent on the ash content of the waste materials with the plant expected to produce approximately 1,500 tonnes per annum.

Energy Recovery

- 5.33 The plant has been designed to recover all heat produced by the incineration process which is converted to hot water and steam and used to offset the need for building heating, domestic hot water and for use within the bin wash plant.

- 5.34 The heat recovery boiler is able to provide hot water and steam at 16 bar pressure and 204°C into a pumped heat loop to enable the onsite and off site use.
- 5.35 Based on the design proposals, after onsite uses are accounted for, the plant has the capabilities to export of approximately 5MWth of heat to nearby neighbouring industrial users. The design proposals have included for all necessary flow and return connection points to facilitate connection should it be practically and commercially viable to do so.

Air Pollution Abatement Plant

- 5.36 All emissions from the plant will be passed through a pollution control system fitted with a continuous emissions monitoring system.
- 5.37 Flue gas cleaning and pollution control consists of Selective Non-Catalytic Reduction (SNCR) through urea injection, a bag filter to remove particulates and a calcium / carbon injection for absorption and removal of heavy metals, dioxins, VOCs and other harmful substances.
- 5.38 The ash from the air pollution abatement plant is collected from the bag filter plant within dedicated containers, prior to offsite export and treatment at a suitably licensed facility.
- 5.39 The plant will be fully compliant with the latest iteration of the Industrial Emissions Directive and the requirements of the Environmental Permitting Regulations and be regulated as a Part A(1) Installation by the Environment Agency.

Operational Waste Management

- 5.40 Due to the nature of the wastes being treated at the proposed facility (namely hazardous and clinical wastes) there are a significant number of regulatory controls (Ref: 5.1) and requirements (Ref: 5.2) that need to be met.
- 5.41 The facility will receive clinical and hazardous wastes for high temperature incineration (HTI) in accordance with regulatory requirements for assured thermal destruction.
- 5.42 The HTI plants largest waste stream (estimated at circa 2,000 tonnes per annum based on input of 10,500 tonnes per annum) will be bottom ash. Any ash produced by the HTI plant will be tested for composition and used off site as a secondary aggregate material (i.e. recycled) where possible.
- 5.43 The materials will be removed off-site for either recovery, recycling, or undergo chemical treatment and stabilisation before landfilling.
- 5.44 The HTI plant will require a permit to operate as a Part A(1) process regulated by the EA under the Environmental Permitting (England and Wales) (Amendment) Regulations 2013. As part of the

permit application process the EA will require the operator to demonstrate that all wastes generated will be recycled, as far as is practicable, and that wastes are handled in accordance with best available techniques (BAT). In addition, it will be necessary for the Operator to satisfy EA that their proposed techniques for collecting, handling and storing waste materials will be adequately controlled and in line with the respective hazardous and clinical waste guidance.

- 5.45 Operators must also ensure that all wastes stored on-site are in a manner that complies with the Hazardous Waste Regulations 2015 and in line with the EA's Healthcare Waste Guidance (Ref: 5.3).
- 5.46 In addition to the aforementioned solid wastes, the Proposed Development will also generate small volumes of wastewater which will be disposed to sewer under consent from the Sewerage Undertaker.

DESCRIPTION OF BUILDINGS, TANKS AND STRUCTURES

Building Construction

- 5.47 The proposed development consists of a conventional industrial-style building (footprint 5,792m²), penthouse roof height 16.7m, main ridge height 14.8 m, main eaves height 11.2 m), within which a HTI plant will be operated. An associated stack would be up to 30m tall, at around 0.7m in diameter.
- 5.48 The building will be clad with a profiled steel panel system, of a grey colour to blend with existing buildings of the adjacent Hitachi facility.
- 5.49 In outline terms the construction of the building is scheduled to take 10.5 months (45 weeks). This includes 1 week site setup at the start and 4 weeks commissioning of the building, with the installation of the technology commencing approx. 5 months into construction programme.
- 5.50 Commissioning of the technology will continue for 4 months after construction of the building has been completed, giving a total approximate construction time (including civils, equipment installation and commissioning) of 14 months.
- 5.51 Further detail relating to the building construction is provided within Chapter 6 – Development Programme and Construction.

Ancillary Buildings and Structures

- 5.52 A number of ancillary structures will be located adjacent to the building, including a sprinkler tank and back-up generators.

Roadways and external areas

- 5.53 A roadway system has been designed to allow safe access and egress to the building for delivery and collection vehicles.
- 5.54 Separate segregated pedestrian walkways and car parking areas have been provided to allow for safe access and egress of all personnel at site.
- 5.55 Details of the external layout, vehicle routing and equipment arrangements are provided in Appendix 5 Volume 2 of the ES.

REFERENCES

REF 5.1: The Hazardous Waste (England and Wales) Regulations 2005 UK Statutory Instruments 2005 No. 894.

REF 5.2: Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste and Environment and sustainability Health Technical Memorandum: 07-01: Safe management of healthcare waste.

REF 5.3: Environment Agency Guidance: Healthcare waste: appropriate measures for permitted facilities. Published by the Environment Agency - Published 13th July 2020.

6 DEVELOPMENT PROGRAMME AND CONSTRUCTION

INTRODUCTION

- 6.1 This chapter describes the anticipated programme of development works and the key activities that would be undertaken on the Site during the construction phase of the project. It identifies, in general terms, the potential effects associated with construction activities and outlines proposals for their mitigation. Detailed consideration of construction related environmental effects upon the various technical topics assessed, together with their associated mitigation measures, are provided in each of the technical assessment chapters of this Environment Statement.
- 6.2 It is proposed that a Construction Environmental Management Plan (CEMP) would be prepared and implemented for the construction phase of the Proposed Development. This would be discussed and agreed with the Local Authority prior to the commencement of works at the Site. An outline of the content of the CEMP is provided in this chapter.
- 6.3 Planning for construction is necessarily broad at this stage and may be subject to modification. For example, specific construction activities could vary in frequency depending upon the particular stage of works. Consequently, where uncertainty exists the assessment has assumed a reasonable worst-case situation. It is considered, however, that sufficient information is available at this stage to enable the likely significant environmental effects relating to the construction works to be identified and their significance assessed.

PROGRAMME OF WORKS

- 6.4 The main elements of the Proposed Development are described in Chapter 5: The Proposed Development and illustrated in Appendix 5 Volume 2 of the ES.
- 6.5 Construction works, installation and commissioning of the technology is estimated to take 14 months with a 4-month commissioning period, with operation of the plant commencing immediately thereafter.
- 6.6 Table 6.1 provides an indicative design and construction works programme and the approximate duration of the main elements of the Proposed Development. The programme includes initial plant design and preparatory work, enabling works, erection of substructure and superstructure, fit-out and commissioning.

Table 6.1: Indicative Construction Activities and Duration

Sequence	Activity	Approximate Duration of Works
1	HTI PLANT DESIGN AND CONSTRUCTION	441 days total
1.1	Technical Design	4.5 months
1.2	Design Freeze	0 days
1.3	Manufacture	7 months
1.4	FAT acceptance Test	5 months
1.5	Deliveries	4 months
1.6	Installation	6.5 months
1.7	Commissioning	5.5 months
1.8	Acceptance	2 weeks
1.9	Training / Handover Papers	2 weeks
1.10	Take Over	0 days
2	CONSTRUCTION	368 days total
2.1	Instruction to proceed with design	0 days
2.2	Produce construction stage design information	8.5 weeks
2.3	Procurement Order	0 days
2.4	Sub-contractor design/procurement	29 weeks
2.5	Construction of temporary access road	0 days
2.6	Site Set Up	1 week
2.7	Construction	44.2 weeks
2.8	Utilities connection	0 days
2.9	Early Access for HTI Plant Deliveries	0 days
2.10	Early Access for HTI plant construction	0 days
2.11	Racking / Mez installation	4 weeks
2.12	Commissioning	4 weeks
2.13	Final Finish to estate road	0 days
2.14	Practical Completion	0 days
2.15	Principal Contractor Role Extension	0 days
2.16	Handover	0 days

DESCRIPTION OF THE WORKS

Enabling Works and Site Preparation

- 6.7 All non-critical infrastructure will be removed. All site investigation work, contamination and remedial works (if required) will be completed prior to the main construction works commencing.

- 6.8 In the absence of any buildings, site preparation works are therefore limited to infrastructure works and earthworks.
- 6.9 All internal and external process areas will be constructed with impermeable concrete hardstanding which will be designed in accordance to the load bearing requirements of the processing equipment and vehicles used at the facility. Typically, all non-structural concrete areas will comprise reinforced concrete hardstanding of at least 300mm thickness. All other load bearing elements will be significantly thicker as required and determined.
- 6.10 The construction of the facility will introduce new buildings and hence new impermeable internal and external areas which will require rainfall capture and runoff retention and attenuation of surface water.

Construction of New Buildings and Infrastructure

- 6.11 Refer to Chapter 5 – The Proposed Development for information on the proposed building and infrastructure.

Services, Utilities, Drainage and Infrastructure

- 6.12 As part of the preparatory works, the Site would involve provision of utilities (e.g. electricity, etc) and new drainage infrastructure.
- 6.13 The operation of construction vehicles and general construction activities may give rise to the potential for surface runoff to become contaminated with hydrocarbons, silt or other construction materials. This may in turn lead to a contamination event should site drainage be allowed to enter watercourses. Excavations may require dewatering (of accumulated rainfall or runoff) during construction. In such circumstances, it will be important to ensure that the quality of this water is sufficiently high to allow discharge to an appropriate point. Further details on drainage and mitigation are provided in Chapter 11 (Water Quality, Hydrology and Flood Risk).
- 6.14 The Site would require new mains water, foul water discharge, IT, telephone and electricity connections.

EXCAVATIONS, FOUNDATIONS AND SUBSTRUCTURE CONSTRUCTION

- 6.15 Although the detailed foundation design is yet to be completed, the initial proposals exclude piling.
- 6.16 All tanks will be installed with secondary containment and designed to comply with the Environment Agency Pollution Prevention Guideline Note 2 'Above Ground Oil Tanks'. All storage and process

tanks will be enclosed within the main processing building apart from the sprinkler tank which will be located external to the building.

- 6.17 The floor slabs, kiln foundations and roadways will generally be constructed with a re-enforced concrete slab.

SUPERSTRUCTURE, CLADDING AND ROOF CONSTRUCTION

- 6.18 The building will be constructed around a structural steel frame which will support the cladding between the main structural members without secondary steel.
- 6.19 Some lateral restraint members will be required between the main frames, both to enable erection and to maintain stability. However, these members can be designed as removable to facilitate the installation of plant and equipment by removing individual cladding panels, when required.
- 6.20 The building would be an engineered sealed industrial construction using a portal steel frame with composite external cladding panels. The structural steel frame would be fabricated off-site and delivered in the largest possible sections that could be safely lifted into place by a mobile crane. Unloading from lorries would take place on-site, as close to the working areas as possible.
- 6.21 As above, building cladding would be made of an external panelised system, maximising the amount of off-site fabrication to minimise construction timescales as well as the waste generated on-site. The preferred method would be to use a module size that could be erected using mobile cranes.
- 6.22 The roof would be of sandwich-style construction and, similarly, would be fabricated off-site and installed using mobile cranes.

INTERNAL FINISHING WORKS, PLANT INSTALLATION AND COMMISSIONING

- 6.23 All major mechanical plant and equipment will be delivered to site pre constructed on a flat bed trailer. All plant will then be offloaded internally and installed using cranes and fork-lifts.
- 6.24 A detailed commissioning programme would be required to be submitted, approved and overseen by the Environment Agency. The period of the commissioning phase would be determined by EA but is expected to be a minimum of 3 months.

EXTERNAL FINISHING WORKS

6.25 The agreed landscaping and access would be completed during the commissioning phase once all construction work is complete.

PLANT AND EQUIPMENT

6.26 The following plant and equipment is anticipated to be used during the construction works.

Table 6.2: Indicative Plant used During Construction							
Plant and Equipment	Enabling works	Construction of foundations and substructure	Construction of the structural envelope, shell and core;	Infrastructure	Services installations;	Fit out	Landscaping
Concrete silo and ready-mix lorries							
Concrete cutter, saws and splitters							
Cranes and hoists							
Cutters, drills and small tools							
Excavators and breakers							
Floodlights							
Fork lifts trucks							
Hydraulic benders and cutters							
Road Brush Vehicles							
Lorries/vans							
Tarmac laying equipment							
Scaffolding and access platforms							
Temporary supports							
Tipper lorries							
Wheel washers							
Skips & Skip trucks							

HOURS OF WORK

- 6.27 It is anticipated that the construction of the High Temperature Incineration Facility will take approximately 14 months including a 4-month commissioning period.
- 6.28 Across this period external civils work will normally take place between the following hours with temporary increased hours during the fit out:
- 0700 – 1800 Monday to Friday;
 - 0800 – 13.00 Saturday; and
 - No construction works will take place on Sundays or Public Holidays.
- 6.29 These proposed hours would be agreed with the Local Authority Planning department prior to commencement of the works. Special working outside these hours, such as heavy plant activities, and crane and equipment assembly, would be kept to a minimum and would be subject to prior agreement with reasonable notice by Local Authority's Environmental Health Officer (EHO).

WASTE MANAGEMENT AND GENERATION

- 6.30 Excavated soils associated with the site clearance and construction works will be the dominant and most environmentally significant waste stream, however, it will be temporary in nature. Insofar as a summary of the management of wastes arising from the Proposed Development is concerned, the following aspects are pertinent:
- The CL:AIRE 'Definition of Waste: Development Industry Code of Practice' (CoP) Version 2 (Ref: 6.1), as issued in March 2011 will be used to assess whether excavated materials are classified as waste or not. If excavated materials are dealt with in accordance with the CoP, the EA considers that these materials are unlikely to be waste if they are used for the purpose of land development. An integral part of the CoP is the production of a Materials Management Plan (MMP) which documents how all of the material to be excavated is to be dealt with. The recovery and re-use of materials will be in accordance with the Waste Management Licensing Regulations 2011 (as amended).
 - Development of a Site Waste Management Plan (SWMP), in-line with best practice guidance the requirements will be produced as part of the sites Construction Environmental Management Plan (CEMP). The main objectives of which will to make sure that all building

materials are managed efficiently, that waste is disposed of legally, and that material recycling, re-use and recovery is maximised.

- All excavations will be monitored and analysed by qualified and experienced field scientists to ensure the chemical characteristics of the materials are understood and that they are handled and segregated appropriately (e.g. contaminated soils will not be mixed with uncontaminated soils).
- Arisings from piling operations, if required, will be treated similarly to other excavated materials and will be appropriately monitored, analysed and managed.
- Detailed records (and where appropriate a photographic log) will be kept of all construction phase waste arisings and their management and fate. This will be recorded as part of the SWMP and CEMP.

6.31 Waste waters likely to be generated on-site during the construction phase include the following:

- Temporary septic tanks and/or portable toilets to be utilised by the construction workers;
- Waste waters from dewatering of excavations (groundwater and surface water runoff); and
- Dirty water from the temporary on-site wheel wash (should one be required during the construction works).

6.32 Temporary portable toilet units will be emptied frequently under a maintenance contract. The waste from the units will be taken off-site for treatment and disposal at a local municipal wastewater treatment works.

6.33 Any water arising from the dewatering of excavations will be discharged back over the ground surface and allowed to infiltrate. All works will be undertaken with due attention to appropriate guidance including the now withdrawn EA Guidance for Pollution Prevention PP5: Works and Maintenance in or Near Water (Ref: 6.2).

6.34 Waste water generated from the on-site wheel wash (if required) will be either be collected in a sealed system for reuse, or collected in a sealed system for authorised disposal, following the guidance set out in Pollution Prevention Guideline PPG13: Vehicle Washing and Cleaning (Ref. 6.3).

6.35 To ensure best practice is achieved, in-line with current sustainable construction practices, Waste and Resources Action Programme (WRAP) guidance (Ref. 6.4) will be utilised during the design, procurement and construction phases. Best practice recommendations will be incorporated within the formally documented Site Waste Management Plan (SWMP).

- 6.36 Overall, the generation and management of solid and liquid wastes associated with the construction phase are considered to be both short term and minor in their nature and will be fully controlled through the deployment of a detailed construction environmental management plan as outlined below.

CONSTRUCTION ENVIRONMENTAL MANAGEMENT AND MITIGATION

Construction Environmental Management Plan

- 6.37 A Principal Contractor will be responsible for all aspects of the construction operations. In line with best practice, the Principal Contractor will subscribe to the CCS (Considerate Contractors Scheme).
- 6.38 A Construction Environmental Management Plan (CEMP) would be prepared by the Principal Contractor which would include all details of relevant environmental management controls necessary for environmental protection during the construction works. This would follow best practice guidelines and would be agreed with the Local Council Environmental Health Department.
- 6.39 The CEMP would place stringent contractual and procedural performance obligations upon trade contractors. Such obligations would be enforced through subsequent detailed agreements with, and consents provided by the Local Authority. A clear management structure and description of the responsibilities and authority of a specific Project Environmental Manager (PEM) would be included.
- 6.40 The PEM would have primary responsibility for liaising with the Planning Authority and other statutory agencies on environmental matters. It is anticipated that regular meetings would take place to review progress and to agree necessary options. Notwithstanding this, it is recognised that positive action and reaction by site operatives at the time of any environmental incident or breach of targets are essential components for effective environmental management.
- 6.41 The CEMP would address requirements in relation to environmental controls and would allow for, and include the following:
- The appointment of an experienced PEM responsible for the preparation and implementation of the CEMP;
 - Details of the phasing of the works, including information on construction works that may be carried out by trade contractors;
 - Procedures for construction activities, highlighting any operations likely to result in adverse environmental effects, with an indication of the mitigation measures to be employed;

- Reference to, and provision of a framework for compliance with all legislation that would be relevant;
- Emergency procedures that would be implemented on the Site;
- Prohibited or restricted operations;
- Control limits of target criteria for environmental issues, where practicable;
- Requirements for monitoring and record-keeping;
- Mechanisms for third parties to register complaints and the procedures for responding to complaints;
- Provisions for reporting, public liaison and prior notification, especially where dispensations would be required;
- Details of construction operations, highlighting the operations most likely to result in disturbance and / or working outside core working hours, together with an indication of the expected duration of each activity;
- Possible departures from target criteria, and details of how any adverse effects would be minimised, or potential complaints addressed;
- Details of proposed routes for HGVs travelling to and from the Site;
- Provisions for auditing by the PEM, Local Authority and other regulatory authorities where appropriate;
- Details of plant to be used;
- Details of all construction works involving interference with a public highway, including temporary carriageway/footpath closures, realignments and diversions; and
- Housekeeping procedures and environmental management controls.

Contract Conditions

- 6.42 Individual trade contracts would incorporate appropriate requirements in respect of environmental control, based largely on the standards of ‘good working practice’ outlined in the CEMP in addition to statutory requirements. Contractors would therefore be required to demonstrate how they would achieve the provisions of the CEMP, how targets would be met, and how potential adverse environmental effects would be minimised.

Management of Construction Works

- 6.43 The PEM would deal with queries from the public and other complaints and enquiries. This nominated individual would be named at the site entrance, with a contact number, and would be identified to the Local Authority and community groups, prior to the start of the Site activities, and whenever a change of responsibility occurs.
- 6.44 Any complaints would be logged and reported to the relevant individual within the Local Authority (and vice versa) and soon as practicable.
- 6.45 The CEMP would specify the roles and responsibilities of the PEM and the appropriate Officers within the Local Authority in respect of any breaches or complaints from the public. The required actions would be different in each specific case, depending on the operation, equipment or location.

Emergencies and Accidents

- 6.46 The civils contractor and the process plant contractor will be required to maintain high safety standards on-site, and to be fully compliant with current health and safety legislation.
- 6.47 An Emergency Incident Plan would be in place to deal with potential spillages and/or pollution incidents. Any pollution incidents would be reported immediately to the regulatory bodies.

Materials Storage and Handling

- 6.48 Environmental issues would be considered in the procurement of raw materials and manufactured building components and all such materials would be appropriately stored on the Site to minimise damage by vehicles, vandals, weather or theft. Deliveries of hazardous materials would be supervised and a just-in-time deliveries system would be implemented to minimise storage times and reduce the risk of spillage on-site. Tanks and drums of liquid chemicals and fuels would be stored in bunded compounds. Packaging materials would be returned, where possible.
- 6.49 Excavated materials would primarily be removed from site as there is the potential that such materials would be contaminated. In addition, limited, if any, ground raising is proposed on-site. There is therefore little or no requirement to re-use excavated materials on-site. Any excavated material used on site would be landscaped, or if this is not possible will be loaded into HGVs for transportation to nearby construction sites for re-use (if not contaminated) or to suitable disposal sites.
- 6.50 Contractors and their sub-contractors would be expected to maintain a tidy site and where practical, to operate a 'just-in-time' policy for the delivery and supply of materials for the works.

- 6.51 Where possible, pre-fabricated elements would be lifted directly into position from delivery vehicles. This would assist in reducing on-site storage and labour requirements and construction noise levels to surrounding sensitive receptors.
- 6.52 Mobile cranes would be used for general unloading and hoisting during the structural and envelope works. Passenger / goods materials hoists, fork lift trucks and other electric or hydraulically operated plant may be used to distribute and transport materials around the Site.

Waste Management and Minimisation

- 6.53 Waste would be generated during all stages of the construction works. Although specific materials cannot be identified at this stage of the design, major and potential sources of waste within the construction process are anticipated to comprise:
- Excavated material;
 - Packaging – including plastics, wooden pallets, expanded foams;
 - Waste materials generated from inaccurate ordering, poor usage, badly stored materials, poor handling, spillage; and
 - Dirty water, for example from site runoff containing silt.
- 6.54 At this stage, it is estimated that on-site excavations would generate minimal material for off-site disposal. It is the intention of the project to use all excavated material, wherever possible.
- 6.55 A Site Waste Management Plan (SWMP) would be developed and implemented detailing how waste created during the construction phase would be managed. This would be prepared by the Principal Contractor in accordance with the non-statutory guidance on preparation of SWMPs. All relevant contractors would be required to investigate opportunities to minimise waste arisings at source and, where such waste generation is unavoidable, to maximise the recycling and reuse potential of construction materials. Recycling of materials would take place off-site, where noise and dust are less likely to result in effects to the occupants of surrounding properties. Appropriate waste management and recycling centres, close to the Site would be identified prior to the construction works and contracts would be established with registered waste carriers and authorised waste disposers for the construction waste.
- 6.56 All waste would be stored on the Site in accordance with the relevant legislation, in particular the Duty of Care Regulations, 1991 (as amended) (Ref: 6.5) and no burning of construction waste would be undertaken at the Site.

- 6.57 The destination of all waste or other materials removed during construction would be notified to the relevant authority by the Principal Contractor for approval. Loads would only be deposited at authorised waste treatment and disposal sites. Deposition of waste would be in accordance with the requirements of EA and other regulatory controls.

Traffic and Access Management

- 6.58 As assessment of the potential effects of the Proposed Development on traffic and the local transportation network is presented in the Transportation Statement provided as part of the Planning Application.
- 6.59 Specific detail relating to the detailed management of the construction traffic will be detailed within a dedicated construction transportation plan, which will be submitted for approval by the Local Authority post planning.
- 6.60 Deliveries would be phased and controlled on a 'just-in-time' basis, wherever possible. This would minimise travel time and traffic congestion around the Site.
- 6.61 Abnormally large loads will only be associated with the delivery of the major mechanical plant and equipment and the chimney stack during the construction phase of the plant. The delivery of these components will be subject to an agreed special access and delivery agreement with the Local Police and Highways Authority.
- 6.62 The majority of all deliveries would be made by standard HGVs, with no special access / delivery requirements.
- 6.63 The Traffic Management Plan would detail the management of the above measures as well as the management of car parking on the Site and the site labour force travel to the Site. No parking on public roads would be allowed and the Principal Contractor / Construction Manager would be responsible for enforcing this requirement. Provision would be made within the Site for essential on-site parking. Any local traffic management measures for Site access would be agreed with the relevant authorities.

Air Quality and Dust

- 6.64 Site-specific best practice measures would be implemented by contractors to minimise the disturbance to neighbouring receptors. These measures would include:
- Damping down surfaces during dry weather;

- Providing appropriate hoarding and / or fencing to reduce dust dispersion and restrict public access;
- Sheeting buildings, chutes, skips and vehicles removing wastes with the potential for dust generation;
- Appropriate handling and storage of materials, especially stockpiled materials;
- Restricting drop heights onto lorries and other equipment;
- Fitting all equipment with dust control measures such as water sprays wherever possible;
- Using a wheel wash, limiting speeds on site to 5mph, avoiding unnecessary idling of engines and routing of site vehicles as far from sensitive properties as possible;
- Using gas powered generators rather than diesel if possible (these are also quieter) and ensuring that all plant and vehicles are well maintained so that exhaust emissions do not breach statutory emission limits;
- Switching off all plant when not in use;
- No fires would be allowed on the Site; and
- Ensuring that a road sweeper is available to clean mud and other debris from hardstanding, roads and footpaths.

6.65 Full assessments of the potential effects of the construction works on air quality are presented in Chapter 9 – Air Quality.

Hazardous Materials and Contaminated Land

6.66 Based on the historical land uses of the Site, which lack any likely contaminating activities, there is very low potential for ground contamination. Prior to construction, the contractor would be required to prepare a Method Statement and Risk Assessment demonstrating how the safety of construction workers and the public would be addressed in terms of potentially harmful substances should they be identified. Protective measures would include:

- Provision of adequate facilities and procedures for personal washing and changing;
- Provision and use of personal protective equipment (PPE);
- Implementation of dust suppression methods; and
- Implementation measures to avoid surface water ponding and the collection and disposal of the site runoff.

- 6.67 Such measures should be carried out in accordance with the Protection of Workers and the General Public during the Development of Contaminated Land document and CIRIA Report 132: *A Guide for Safe Working on Contaminated Sites* (Ref: 6.6).

Site Drainage and Effects on Water Resources

- 6.68 The assessment of the potential effects of the development proposals on water resources is presented in Chapter 11 – Water Quality, Hydrology and Flood Risk. In summary, a precautionary approach would be adopted to appropriately manage construction-derived surface water run-off. As such, particular care would be taken to prevent any release or mobilisation of pollutants, which could pose a potential risk to receptors such as groundwater.
- 6.69 Best practice pollution prevention measures would be put in place to isolate environmentally damaging substances and prevent their release. These measures would be agreed in consultation with the Environment Agency and would include:
- Secure, careful siting and bunding of fuel storage facilities and any areas used for the storage of potentially hazardous materials;
 - Use of drip trays when filling smaller containers from tanks or drums to avoid drips and spills;
 - Works involving concrete would be carefully controlled and ready-mix concrete wagons would be washed out in a safe designated area;
 - The avoidance of stockpiling materials wherever possible to prevent spills and where undertaken, sheeting and covering these stockpiles and haulage vehicles loads;
 - Management of the site drainage to prevent sediment laden / contaminated runoff entering the wider environment;
 - Surface drainage would pass through settlement and oil interceptor facilities where required;
 - Provision for the treatment and safe disposal of wastewaters, including water from dewatering pumping operations;
 - Appropriate management and transportation of the site waste including the establishment of dedicated waste storage areas designed to prevent pollution, regular inspections and the implementation of waste minimisation and management plans as described above; and
 - Ensuring that any water which may have come into contact with contaminated material would be disposed of in accordance with EA requirements.

- 6.70 An Emergency Plan would be implemented, forming part of the CEMP, outlining procedures to follow in the instance of any accidents involving spillages. This would involve the provision of on-site equipment for containing spillages, such as emergency booms and chemicals to soak up spillages.

Protection of Ecological Resources

- 6.71 An assessment of the potential effects of the Proposed Development on ecological resources is presented within the Planning Statement, which identifies relevant mitigation.
- 6.72 Any necessary protection measures will be incorporated in the CEMP.
- 6.73 Should the site be required to undergo decommissioning and site closure, similar protection measures will be incorporated into a formal Site Closure Plan, decontamination and demolition environmental management plan in accordance with the Environmental Permitting Regulations.

SUMMARY

- 6.74 The construction effects of the Proposed Development would be managed through the development of a project and site-specific CEMP. The CEMP would be agreed with the Local Authority and other relevant bodies prior to the commencement of works, which as a minimum would comply with the mitigation measures, set out in this ES. The CEMP would outline methods for contractor and general public liaison, hours of work, methods to deal with complaints, and outline management practices to control dust, traffic and access, waste, water resources and ecological effects, ensuring a high level of control throughout the construction works.
- 6.75 The procedures within the CEMP would ensure the delivery of a high level of environmental control throughout the construction phase, thereby minimising the potential for adverse effects. Further detail regarding specific mitigation during construction works for the Proposed Development is presented within Chapters 7 to 13 of this ES.

REFERENCES

Ref 6.1: CL:AIRE (2011), 'Definition of Waste: Development Industry Code of Practice (CoP)' Version 2, March 2011.

REF 6.2: Environment Agency Guidance: Works in, near or over watercourses, PPG5: prevent pollution How to prevent pollution and comply with the law when planning construction, maintenance or other works in, near or over watercourses. Published by the Environment Agency - Published 1 November 2007 (Last updated 15 April 2014)

REF 6.3: EA Guidance: Vehicle washing and cleaning, PPG13: prevent pollution Advice on preventing pollution and complying with environmental law when washing and cleaning vehicles. Published by the Environment Agency - Published 1 July 2017

REF 6.4: Waste and Resources Action Programme (WRAP), Practical solutions for sustainable construction, Achieving good practice Waste Minimisation and Management Guidance for construction clients, design teams and contractors.

Ref 6.5: HMSO (1992) 'The Controlled Waste Regulations' 1992 (as amended).

Ref 6.6: CIRIA (2002) CIRIA Report 132 Good Practice Guidance For The Management of Contaminated Land. Safe Working Practices on Contaminated Sites.

7 CLIMATE CHANGE

INTRODUCTION

- 7.1 This chapter of the ES considers the possible climate change impacts derived from the proposed High Temperature Incineration (HTI) Plant development of the application site.
- 7.2 The chapter follows IEMA Guidance for *Assessing Greenhouse Gas Emissions and Evaluating their significance*. As noted in previous chapters, full details of the development proposals are set out in Chapter 5: The Proposed Development above. Other aspects of climate change, such as the susceptibility of the plant to future climate change effects, are addressed within other chapters within the ES e.g. Chapter 11 sets out how the Proposed Development is not located in an area at risk from flooding, nor will it increase flood risk elsewhere, both now and under a future scenario where climate change allowances have been factored in. As such, the ‘Mitigation’, ‘Screening Process’, and ‘Scoping Process’ stages of the guidance has been clarified and discussed within the accompanying technical chapters of the ES. Therefore, this chapter focusses on the remaining stages of the guidance, namely; ‘GHG Emissions Assessment’, ‘Significance’, and ‘Communications/Reporting’.
- 7.3 The proposal seeks to construct a facility which will include a HTI process that will safely handle hazardous and clinical waste. The project has been designed to recover all available heat produced during the incineration of waste and will utilise the heat for potential parasitic process heat and building loads.
- 7.4 Furthermore, the project has been designed with a significant PV array that will both generate and export electricity as well as having the capacity to export approximately 5MWth of heat to neighbouring industrial users should the necessary commercial agreements be agreed. This measure enables the displacement of carbon emissions over the baseline ‘no-development’ scenario.
- 7.5 The potential impact of the proposed HTI Plant on climate change, and the potential impact of climate change on the Proposed Development have been considered throughout the design of the proposal.
- 7.6 It is key to note that the principal Climate Changes benefits of the proposed scheme come primarily through the provision of new regional infrastructure and the corresponding reduction in transportation and using the most modern and best available technology relating to the treatment and disposal of hazardous and clinical wastes. Due to the nature of the wastes and the

corresponding controls around the treatment and disposal, assured high temperature incineration is the only disposal route that is available. Secondary benefits comes from the ability to displace fossil fuel by the neighbouring industrial facility through the supply of heat in to a local area heat network.

- 7.7 The plant has been designed to recover all heat produced through the incineration of waste to hot water and steam, which is in turn used to offset the need for building heating, domestic hot water, and for the disinfecting and cleaning of the outgoing waste bins.
- 7.8 Due to the proximity of the site to other major industrial users (Hitachi Rail) the potential opportunity for the offsite export and use of the remaining 5MWth exists and will be utilised should viable commercial terms be agreed.
- 7.9 To quantify the impact on climate change from the proposed development, Sol have conducted a WRATE assessment to calculate and compare the Global Warming Potential (GWP) of the proposed Newton Aycliffe Facility with existing clinical waste incinerators.
- 7.10 This chapter of the ES has been prepared by Steve Butler and Adam Stone of Sol Environment Ltd. Sol Environment are established low carbon and sustainability consultants. The qualification and competence of the Sol team are provided in Appendix 1 of Vol 2 of the ES.

PLANNING POLICY AND GUIDANCE

- 7.11 There are a number of underlying key national planning policy and guidance documents that underpin and support the current proposal. These policies are discussed in detail in the main planning statement that accompanies this ES.
- 7.12 The principal Directives and policies that are considered applicable are provided below:
- EU Directive 2009/28/EC (published 23rd April 2009): Directive on the promotion of the use of energy from renewable sources establishes a common framework for the production and promotion of energy from renewable sources. This Directive recognises Biomass is then defined as *“the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste”*.

In the case of the proposed HTI Plant, not only are the feedstocks used solely derived from waste, but a proportion will be of biological origin and therefore meet the acceptable definition of being from renewable origin.

- UK Climate Change Act 2008: Which sets legally binding targets for greenhouse gas emissions through action in the UK and abroad of at least 80% by 2050, and reductions in CO₂ emissions of at least 26% by 2020, against a 1990 baseline. In June 2019, the Climate Change Act was amended to reduce the UK's net emissions of greenhouse gases by 100% relative to 1990 levels by 2050.
- The White Paper “Meeting the Energy Challenge” (published 23rd May 2007): Sets out the UK Government’s international and domestic energy strategy. It addresses the long-term energy challenges the UK faces and delivers energy policy goals of cutting carbon dioxide emissions, maintaining reliability of supply, promoting competitive markets and ensuring every home is adequately and affordably heated.
- Of particular relevance to the proposed HTI development, section 5.3 of the White Paper addresses waste derived energy with the following being of note: *“Generating energy from that portion of waste that cannot be prevented, reused or recycled has both energy and waste policy benefits. Energy generated either directly from waste or through the use of a refuse derived fuel has benefits for security of supply. In addition, the biodegradable fraction of waste is a renewable resource” (paragraph 5.3.44)*
- The UK Low Carbon Transition Plan (published 15th July 2009): A published strategy for the UK’s transition to become a low carbon country. The White Paper sets out the Transition Plan to 2020 for transforming the power sector; homes and workplaces; transport; farming and the way waste is managed to meet carbon budgets.
- UK Renewable Energy Strategy 2009: A strategy to help tackle climate change, reducing the UK’s emissions of carbon dioxide and promote security of energy supplies.
- Carbon Plan (published March 2011): A government wide plan of action on climate change. The plan specifically supports ‘*..making use of a range of technologies to produce valuable resources, such as heat and electricity from waste that cannot be prevented, reused or recycled.*’
- National Planning Policy Framework (Re-published in 2019): Provides a strong presumption in favour of sustainable development together with strong encouragement to projects that would lead to a reduction in greenhouse gases.

- Durham County Council – Declaration of Climate Emergency and Planning for Climate Change:
Durham County Council have a number of pledges and commitments in place to reduce the climate change of their operations and to achieve a carbon neutral county by 2050. It is recognised within their policies that it is more important than ever to develop adaptation strategies to reduce the future impact of severe weather events and a changing climate.

SCOPE OF ASSESSMENT

- 7.13 The assessment follows IEMA Guidance for *Assessing Greenhouse Gas Emissions and Evaluating their significance*. The assessment presented in this chapter covers the impacts of the project on climate through the quantification of GWP resulting from the Proposed Development. The impact of future climate change on the resilience of the Proposed Development will be addressed in Chapter 9: *Accidents and Natural Disaster*.
- 7.14 A WRATE assessment has been completed by Sol Environment and is included as an appendix to this document. Results data from the WRATE assessment is presented and utilised for GHG assessment in the following sections.
- 7.15 The WRATE software has been used for comparison of the baseline and the proposed scenarios, assessing the climate change impact from the proposed Newton Aycliffe Facility against existing processing options. The model analyses the impact and GWP from the life cycle of the waste from collection, to processing, to disposal.
- 7.16 This assessment focuses on the transport related emissions and incinerator design (heat recovery). Emissions from materials and water demand were not included in the WRATE assessment as they have been considered earlier in the design phase and are not compatible with the model. These emissions will be discussed at the end of this chapter in the Mitigation and Limitations sections.

ASSESSMENT METHODOLOGY

- 7.17 The Waste Resources Assessment Tool for the Environment (WRATE) software has been utilised to assess and model the potential environmental impacts and benefits of the proposal.
- 7.18 The aim of this assessment was to complete a GHG assessment for the operation of the proposed facility and compare these assessment results with the Baseline and reasonable worst case scenarios.

- 7.19 Results are presented as GWP rather than specific GHG emissions as this is how WRATE presents the data.
- 7.20 Mitigation opportunities will be considered following the results of the above scenarios and then repeating the model.
- 7.21 The significance of the Climate Change impacts from the proposed development will then be concluded.

SCENARIOS AND BASELINE

- 7.22 Due to a lack of local available capacity all regionally arising hazardous and clinical wastes are currently being transported out of area – there are no directly comparable facilities available within a 2 hour drive of this site.
- 7.23 Table 7.1 provides a summary of all the specialist clinical and hazardous waste facilities in the UK that are designed to operate using the same mix of waste types that will be accepted at the proposed facility.

Table 7.1: Existing UK Clinical and Hazardous Waste Incinerators	
Site Name	Distance (miles)
Lakeside Clinical Waste Incinerator	254
Knostrop Clinical Waste Incinerator	67
Kins Weston Lane, Avonmouth	260
Hillingdon Clinical Waste Incinerator	249
Avonmouth Clinical Waste Incinerator	262
Addenbrooke's Hospital Incinerator	204
Stoneybridge, Cornwall	391
Oldham Clinical Waste Incinerator	99
Bolton Clinical Waste Incinerator	109
Haylers End Energy Recovery Plant	211
Scotia Business Park	141
Derriford Incinerator	375
HTI Incinerators	
Ellesmere Port Incinerator	140
Fawley HTI	300
East Kent Waste Recovery Facility	317

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- 7.24 From the table it can be seen that the closest available site to the region is 67 miles away (Knostrop) and the furthest 391 miles away (Stoneybridge). Of these sites, the closest HTI is Ellesmere Port, 140 miles away.
- 7.25 None of the existing specialist and clinical waste capacity in the UK is configured to export heat or generate electricity.
- 7.26 The calculation for reporting the baseline emissions assumes the current Business as Usual (BaU) scenario by which the facility is not constructed and proposed waste feedstocks are being transported out of the area to the nearest HTI facility.
- 7.27 The amount of waste for each scenario is assumed to be 10,500t (the design capacity of the proposed facility).
- 7.28 University Hospital in Durham is assumed to be the largest producer of clinical waste in the region, therefore collections from this site have been used as a default to calculate approximate regional transport distances.
- 7.29 The baseline assessment assumes clinical waste is transported to Ellesmere Port Incinerator, which is the closest HTI site to the region. This travel distance between University of Durham Hospital, to Ellesmere Port HTI will be used in the model as the baseline.
- 7.30 The Baseline scenario also makes the following assumptions ready for the assessment:
- The incinerator does not export recovered heat (in line with 7.24);
 - All onsite heat uses are natural gas fired; and
 - Waste ash and residues from the incinerator is collected and transported to the nearest landfill for disposal.
- 7.31 In addition to the baseline assessment, there will be a worst-case scenario produced in line with the IEMA's Assessing GHG Emissions and their Significance guidance, and two operational scenarios.
- 7.32 A reasonable worst case would transport waste to the furthest HTI location; in this case the East Kent Waste Recovery Facility (see Table 7.1) but would keep the same technologies and end fate for the bottom ash and other wastes at the nearest landfill facility.
- 7.33 The operational scenarios use the default distance from the University Hospital to the Newton Aycliffe site, and an incinerator type altered to enable heat recovery with the best available efficiency (the WRATE defaults are out of date and modern day plant efficiencies are often higher than is available in the modelling software).
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7.34 The incinerator waste in all 3 scenarios is taken to the nearest landfill. Following the mitigation stage (discussed further in the chapter), a second operational scenario was input with incinerator bottom ash (IBA) being transferred to a nearby site for recycling into construction aggregate. Rejects and other waste was still being disposed of in landfill.

7.35 Scenarios assessed:

1. *Baseline Scenario*

This model assumes the proposed facility is not constructed or operational, and transfers 10,500 tonnes of clinical waste from locally arising healthcare sources within a 40 mile radius to Ellesmere Port Recovery Facility. The incinerator waste is then transported to a local landfill site.

2. *Worst Case Scenario*

This model assumes the same parameters as the baseline, but transfers waste from locally arising healthcare sources within a 40 mile radius to the East Kent Facility for processing. The incinerator waste is then transported to a local landfill site.

3. *Operational Scenario 1*

This model uses the same incoming UK electricity mix as the previous scenarios. 10,500 tonnes of clinical waste is transported from locally arising healthcare sources within a 40 mile radius to the proposed site. Incinerator waste is transferred to a landfill facility in a nearby location. Heat from the plant is recovered for use.

4. *Operational Scenario 2*

This model uses the same incoming UK electricity mix as the previous scenarios. 10,500 tonnes of clinical waste is transported from locally arising healthcare sources within a 40 mile radius to the proposed site. Bottom Ash is recycled in a nearby facility and rejects disposed of in landfill. Heat from the plant is recovered for use.

WRATE MODEL ASSUMPTIONS AND PARAMETERS

7.36 *Scope* - The facility is assumed to receive primarily clinical waste from locally arising healthcare sources within a 40 mile radius. Clinical waste is the only waste used in the model due as a site specific waste composition is unavailable at this stage. Waste will be transported to the incinerator and processed, with the rejects transported to a nearby landfill station or recycling facility.

7.37 *Incinerator* - The model assumes power-only recovery type (from the PV array) for the baseline and worst case scenario as there are no current sites which export heat. The operational scenarios assume both heat and power recovery.

- 7.38 *Vehicles* - Waste will be collected using WRATE's default Rigid 7.5-17.5t medium goods vehicle. From the incinerator to landfill, a roll on-off vehicle will be used, assuming ash is collected in skips. The same vehicle will be used from the incinerator to the recycling facility in scenario 4.
- 7.39 *Landfill* - Landfill has been assumed as a clay lined and capped landfill with no gas collection or energy recovery on the basis that all wastes will be ash residues and therefore non-reactive.
- 7.40 *Ash Recycling* - A nearby aggregates company has been assumed to receive the IBA in scenario 4 for recycling into road aggregate.
- 7.41 *Locations and Transport* - The locations of the waste source, incinerators, landfill and recycling facilities used in each scenario can be found in the Table 7.2 overleaf.

Table 7.2: Locations				
Scenario	Waste Source	Incinerator	Landfill	Recycling
Baseline	Locally arising healthcare sources within a 40 mile radius	Veolia Environmental Services, Bridges Rd, Ellesmere Port CH65 4EQ	Hapsford Landfill, New Hey, Chester Road, Great Sutton, L66 2LS	N/A
Worst Case		WasteCare Ltd, River Rd, Sandwich CT13 9ND	Shelford Farm Estate, Broad Oak Road, Canterbury CT2 OPR	N/A
Operational [Op1]		Newton Aycliffe DL5 6QQ	Stonegrave Aggregates, Aycliffe Quarry Aycliffe, Co. Durham. DL5 6NB	N/A
Operational with Recycled IBA [Op2]				Cemex Durham, Littleburn Industrial Estate, Langley Moor, Durham DH7 8HH

- 7.42 Waste is collected from the locally arising sources, transported to the incinerator, and waste then taken to a landfill or recycling facility, all using commercial vehicles. The distance between the facilities in each scenario can be found in the table below:

Table 7.3: Waste Transportation Distances			
Scenario	Source to Incinerator (km)	Incinerator to Landfill (km)	Total distance (km)
Baseline	272	8.6	280.6

Worst Case	543	26.5	569
Operational [Op1]	26	3.8	29.8
Operational with Recycled Bottom Ash [Op2]	26	2.4 to Ash Recycling	29.8 max
		3.8 to Landfill	

7.43 The WRATE model requires the road type split for the journeys between these locations. The percentage road types entered into the model for each journey can be found in table 7.4 overleaf.

Table 7.4: Percentage Road Type between locations in WRATE				
Scenario	Journey	Urban (%)	Motorway (%)	Rural (%)
Baseline	Source to Incinerator	3.5	96.5	0
	Incinerator to Landfill	100	0	0
Worst Case	Source to Incinerator	8.54	91.55	0
	Incinerator to Landfill	3.77	0	96.23
Operational [Op1]	Source to Incinerator	30.2	69.8	0
	Incinerator to Landfill	100	0	0
Operational with Recycled Bottom Ash [Op2]	Source to Incinerator	30.2	69.8	0
	Incinerator to Landfill	100	0	0

Electricity Fuel Mix

7.44 The electricity mix is a dataset used in WRATE to assess the impact of drawing electricity from the grid supply, as well as the benefit of exporting any energy recovered back to the grid, because of avoided generation. The electricity mix selected is the default UK 2022. The fuel mix can be found in Table 7.5 below.

Table 7.5: Grid Electricity Fuel Mix used in Assessment 2022		
Energy Source	Baseline Fuel Mix (%)	Generation Efficiencies (%)
Coal	5.10	33.92
Oil	0.49	26.49
Gas	2.31	41.19
Gas CCGT	33.96	46.84
Nuclear	17.86	35.71
Waste		19.38
Thermal Other	0.56	22.64
Renewables Thermal	7.69	27.47

Solar PV		15.52
Wind	27.35	25
Tidal	1.61	82
Hydro		82
Wave	1.94	82
Geothermal		82
Renewable Other	1.41	82

7.45 The WRATE models are shown overleaf.

Figure 7.1: WRATE Model for Scenarios 1-3

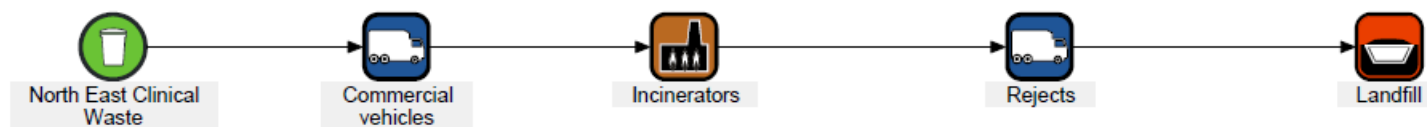
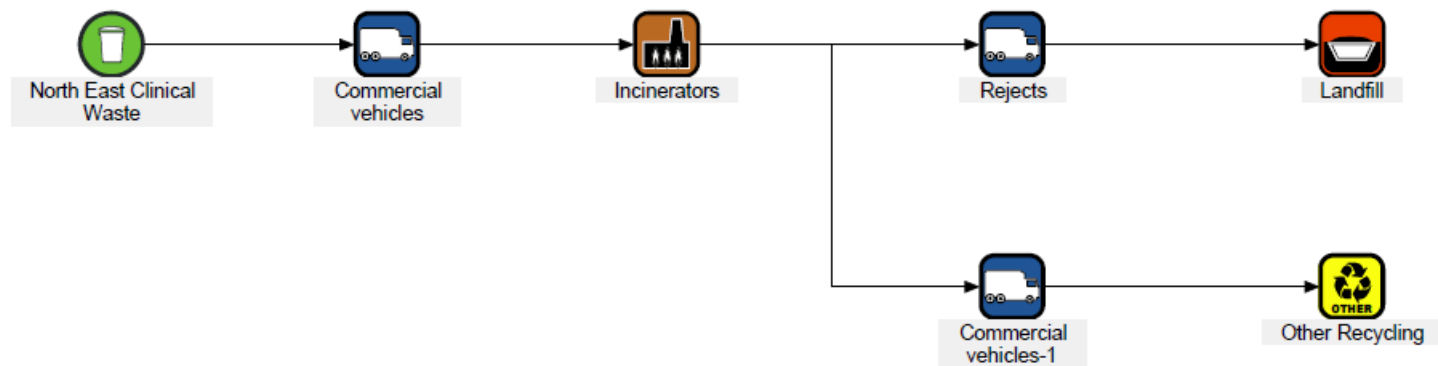


Figure 7.2 WRATE Model for Scenario 4



RESULTS

7.46 In accordance with the IEMA GHG assessment guidance, the assessment quantifies the difference in GHG emissions between the proposed project and the baseline scenario, as well the reasonable worst case. The WRATE assessment results reflect the difference in emissions between these scenarios and the affect the proposed facility would have on emissions.

7.47 Full results are included in the WRATE Project Report Appended to this document. However, the headline results are included in figure 7.3 overleaf and table 7.6 below.

Table 7.6: WRATE Assessment Results for GWP		
Scenario	GWP (kgCO ₂ e)	Eur. Person
Baseline	1,426,669	110
Worst Case	2,011,665	156
Op1	834,839	64.6
Op2	953,909	73.8

7.48 The results clearly show the GWP benefits from the construction of the proposed Newton Aycliffe Facility compared to the current baseline and worst-case scenarios.

7.49 Operational Scenario 1 reduces the baseline GWP by more than 40%.

7.50 The graph in figure 7.3 also shows the beneficial impact the proposed facility would have on resources. This is largely down to the reduction in transport distances but the heat recovery of the improved incinerator technology is also a factor.

7.51 The mitigation opportunity of recycling the IBA has increased the GWP between Operational Scenarios 1 and 2, this is because of the added resources needed for recycling the ash into road aggregate. This is not taken into account when building the WRATE model as the fate of residues and rejects from the finalised development is not yet known. The relatively small quantities of waste also means the effect of landfilling are much less significant in these models compared to the transport impacts.

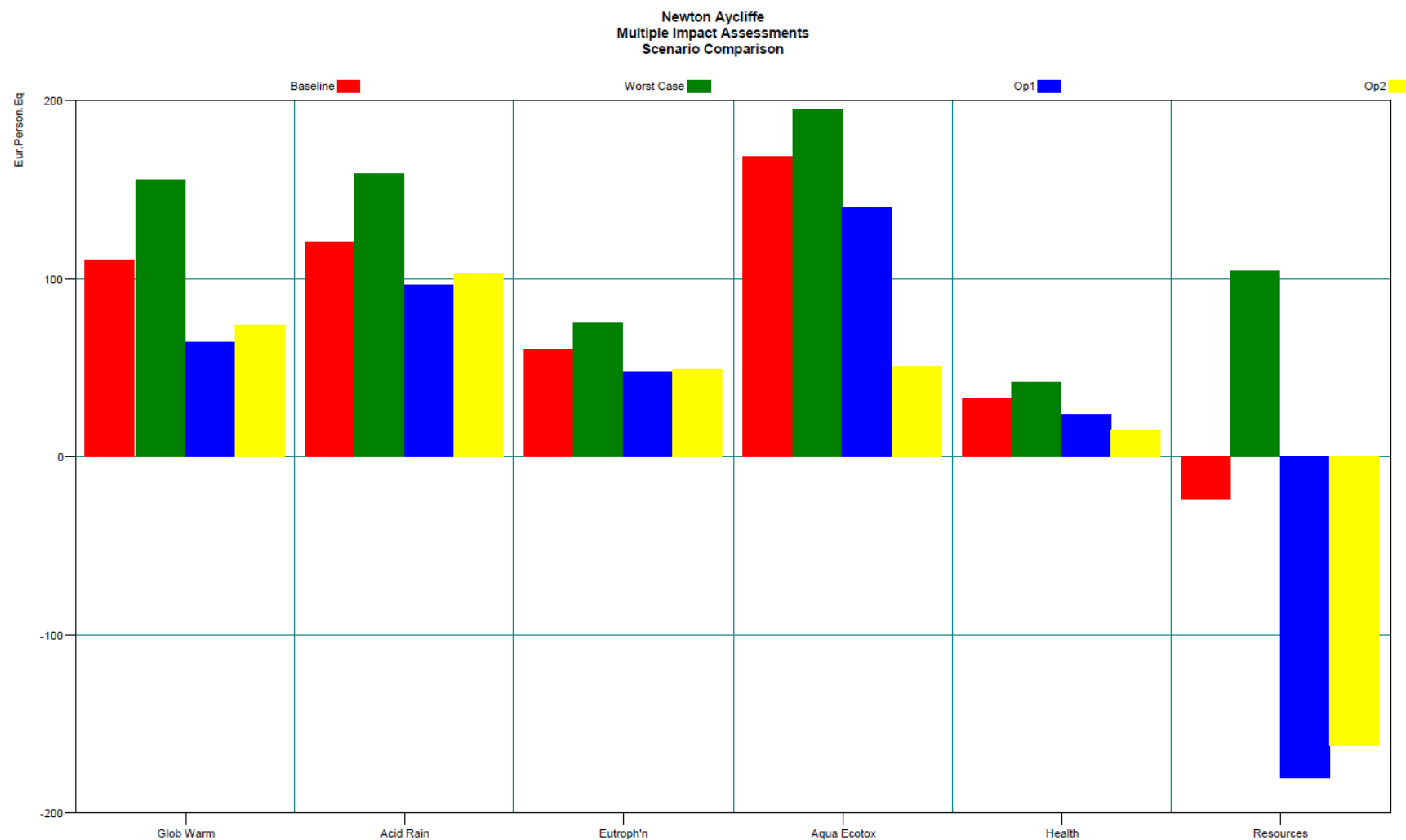


Figure 7.3: Impact Assessment result graph from the WRATE Assessment

MITIGATION

7.52 Mitigation has been considered at all stages of the facility's design development. The mitigation measures for energy, transport and materials detailed in this section are in line with IEMA's GHG management hierarchy principles, Table 7.7.

Table 7.7: IEMA GHG Mitigation Hierarchy	
Principle	Description
Do Not Build	Evaluate the basic need for the proposed project and explore alternative approaches to achieve the desired outcome/s
Build Less	Realise potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required
Design Clever	Apply low carbon solutions (including technologies, materials and products) to minimise resource consumption and embodied carbon during the construction, operation, user's use of the project, and at end-of-life
Construct Efficiently	Use techniques (e.g. during construction and operation) that reduce resource consumption and associated GHG emissions over the life cycle of the project
Offset and Remove Emissions	As a complementary strategy to the above, adopt off-site or on-site means to offset and/or sequester GHG emissions to compensate for GHG emissions arising from the project

7.53 The mitigation opportunities below were unable to be considered in this GHG assessment due to the limitations of the WRATE Model.

Energy

7.54 Key mitigation measures adopted by the Proposed Development to minimise GHG emissions from energy use over the building's operational phase include the following:

- Heat recovery
- No natural gas
- Renewable Energy

7.55 An opportunity to further mitigate GHG emissions would be to recycle the bottom ash from the incineration process and recover metal residues and aggregates. This has been initially explored in this assessment but has not been fully reviewed due to too many unknown variables at this stage.

Transport

7.56 Mitigation of transport impacts was established during site selection and follows the *Construct Efficiently* principle in the hierarchy. The development is well located to accept waste from the

region, reducing transportation of waste to alternative sites at further distances. This will reduce the overall transport emissions and travel demand associated with clinical waste incineration over the lifecycle of the project.

- 7.57 Another potential mitigation is the use of biodiesel fuelled or electric vehicles for the various transport stages of the process. At this stage the vehicles and collections vehicles are unknown at this stage for use in the model.

Design and Materials

- 7.58 The design and materials used on the project follow the *Design Clever* principles.
- 7.59 The design of the HTI facility has been developed to maximise the use of natural light and ventilation and minimise carbon dioxide emissions.
- 7.60 The materials proposed for the facility, such as steel, glass, and aluminium can be recycled with almost no loss of performance. Materials which contain CFCs or use them in their manufacture will be avoided. Recycled aggregate and masonry will be used where practicable, including base material for the construction of the access road for the facility.
- 7.61 Ground Granulated Blast Furnace Slag (GGBS) would be considered for all concrete works as a replacement for Portland cement in concrete mixes to reduce carbon emissions.
- 7.62 Established principles of low energy design have been used in the design of the offices, together with the HTI building itself. These include:
- Having the accommodation on the western façade of the building reduces the cooling requirements in hotter months by protecting the glazed areas from excessive solar gain;
 - To reduce cooling requirements, the structure would incorporate mass concrete to increase the thermal mass of the building. Raised access floors would be provided to accommodate cabling;
 - The heat requirement of the offices is generated on site by the HTI Plant;
 - The construction methods and systems used would keep air leakage to a minimum. The building envelope would be to, or in excess of, the new airtight standards required by the building regulations;
 - Using locally sourced materials and suppliers. This requirement would be built into the employers' requirements; and
 - Using materials with a high recycled content and high sustainability / low embedded carbon content.

DATA LIMITATIONS

7.63 There were various limitations to the scope and results due to unknown aspects of the project and WRATE defaults. Summarily, these are:

- The waste composition mix was unknown at the time of the assessment. Only clinical waste has been assumed in this model, due to the very limited range of hazardous wastes being accepted at site (oily rag, etc) it is similar in nature in terms of the WRATE assessment.
- Construction materials and waste not included in WRATE assessment.
- Operational water use not included in WRATE assessment.
- Transport vehicle fuel assumed to be diesel at this stage.

SIGNIFICANCE CRITERIA

7.64 The UK has set a legally binding GHG reduction target for 2050 with interim five-yearly carbon budgets which define a trajectory towards net zero. The 2050 target (and interim budgets set to date) are, according to the CCC, compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement, thereby limiting severe adverse effects.

7.65 To meet the 2050 target and interim budgets, action is required to reduce GHG emissions from all sectors, including projects in the built and natural environment. EIA for any proposed project must therefore give proportionate consideration to whether and how that project will contribute to or jeopardise the achievement of these targets.

7.66 The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.

7.67 The principles in table 7.8 overleaf are a guide to determining significance of GHG emissions.

7.68 The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. Therefore, the project is considered to be **beneficial**.

Table 7.8 Significance Principles	
Level of Significance	Definition
Major Adverse	The project's GHG impacts are not mitigated or are only compliant with do-minimum standards set through regulation, and do not provide further reductions required by existing local and national policy for projects of this type. A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.
Moderate Adverse	The project's GHG impacts are partially mitigated and may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type. A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.
Minor Adverse	The project's GHG impacts would be fully consistent with applicable existing and emerging policy requirements and good practice design standards for projects of this type. A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.
Negligible	The project's GHG impacts would be reduced through measures that go well beyond existing and emerging policy and design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050. A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.
Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

CONCLUSIONS

- 7.69 The development of the proposed project of a regional HTI facility would deliver carbon benefits over the current management method (baseline scenario) involving the out of area incineration of hazardous and clinical wastes.
- 7.70 A regional facility will provide an 70% reduction in overall vehicle transport miles and associated carbon emissions.

- 7.71 The proposals would deliver carbon equivalent savings of more than 40% under normal operating conditions.
- 7.72 In the event that the proposed development exports the available 5MWth of heat to the neighbouring industrial sites, then the potential carbon equivalent saving that can be delivered by the development would be even greater.
- 7.73 The impact of the resulting GHG emissions from the project are considered to be **Beneficial**, as the results of the WRATE assessment demonstrate that the project will achieve the definition provided by IEMA.
- 7.74 The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

REFERENCES

NONE

8 POPULATION AND HUMAN HEALTH

INTRODUCTION

- 8.1 The effects of the development on population and human health can be considered in three segments:
- Social Effects;
 - Economic Effects; and
 - Human Health Effects.
- 8.2 Since receipt of the scoping opinion, social and economic effects have been largely screened as requiring no detailed assessment as shown in Appendix 8.1 Volume 2 of the ES (Ref: 8.1), with human health risks limited to those as a result of air quality impacts.
- 8.3 As such, this chapter presents the findings of an assessment of the potential effects on human exposure from emissions to air associated with the Proposed Development which is further detailed within the Human Health Risk Assessment (HHRA) provided within Appendix 8 Volume 2 of the ES.
- 8.4 The HHRA supplements the Air Quality Assessment (AQA) detailed in Chapter 10 – Air Quality (Ref: 8.2) due to further assessment of health impacts of the emissions of dioxins and furans and dioxin like-PCBs being required. The AQA also provides an assessment of construction impacts including dust. As such, construction impacts are not referenced in this chapter, which will only focus on operational impacts.
- 8.5 Reference to social and economic effects has been included where relevant in the following sections.
- 8.6 The potential impacts of the Proposed Development on local air quality during both the construction and operational phases have been assessed and the results provided within Chapter 10 – Air Quality. The air quality assessment provided a comparison of predicted concentrations for pollutant emissions at off-site locations with background air quality, and air quality standards and guidelines for the protection of human health.
- 8.7 The air quality assessment assumes that the maximum permissible emission limit values (ELVs) stipulated for compliant incineration plant are emitted during all times of operation, thus forming a very conservative estimate as this condition is considered unlikely to be a realistic operating scenario. The true impacts are highly likely to be less than those (worst case scenarios) modelled.

- 8.8 Given the above operating scenario, the emissions from the proposed combustion unit associated with the facility would contain a number of substances that cannot be evaluated in terms of their effects on human health simply by reference to ambient air quality standards. Health effects could occur through exposure routes other than simple inhalation, for example they could occur through direct contact or ingestion following deposition. As such, an assessment needs to be made of the overall human exposure to the substances in the local population, and the subsequent risk that this exposure causes.
- 8.9 The assessment has been undertaken by Gair Consulting Ltd and undertaken has only considered emissions to air as human exposure to any harmful pollutants discharged directly to the aquatic environment, and from solid waste disposal, is considered to be negligible.
- 8.10 The assessment has been undertaken by Gair Consulting Ltd. Details of specific competence are provide in Appendix 1 of the ES Vol 2.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

- 8.11 Emissions from the proposed facility during the modelled operational scenario would contain a number of substances that cannot be evaluated in terms of their effects on human health by reference to ambient air quality standards. Health effects through exposure routes other than inhalation may occur. As such, this chapter provides an assessment of the overall human exposure to the substances by the local population and the subsequent risk that this exposure causes.
- 8.12 The assessment undertaken has considered the potential impact of substances released by the facility which are 'persistent' in the environment with a potential effect upon the health of the local population at the point of maximum exposure. These substances are known as dioxins/furans and dioxin-like polychlorinated biphenyls (PCBs) and may have several pathways from the point of release to the human receptor. Generally, these are typical present in emissions at extremely small quantities (nanograms ($\text{ng} = 10^{-9} \text{ g}$), picograms ($\text{pg} = 10^{-12} \text{ g}$) and femtograms ($\text{fg} = 10^{-15} \text{ g}$)), however they do have the potential to cause long term effects through cumulative exposure. As such the effects are evaluated over a lifetime, which is typically taken to be 70 years.
- 8.13 The exposure scenarios used in the assessment represent highly unrealistic situations in which all exposure assumptions are chosen to represent a worst case and should be treated as an extreme view of the risks to health. While individual high-end exposure estimates may represent actual exposure possibilities (albeit at very low frequency), the possibility of all high end exposure assumptions accumulating in one individual is, for practical purposes, never realised. Therefore,

intakes presented within the assessment should be regarded as an extreme upper estimate of the actual exposure that would be experienced by the real population in the locality.

Approach to the Assessment

- 8.14 The Human Health Risk Assessment has utilised (as is recognised practice) the US EPA Human Health Risk Assessment Protocol (HHRAP) methodology (Ref: 8.3) to assess the human health risk of dioxin/furan emissions from the facility. Human exposure to dioxins and furans has then been compared against the Committee of Toxicity (COT) Tolerable Daily Intake (TDI) of 2 pg/kg per day. An assessment of exposure to dioxin-like PCBs has also been included.
- 8.15 This HHRA protocol has been assembled into a commercially available model, Industrial Risk Assessment Program (IRAP, Version 5.1.0) which has been utilised for the assessment. This is commonly used in assessments such as this.
- 8.16 The approach seeks to quantify the hazard faced by the receptor, the exposure of the receptor to the potential hazard, and then to assess the risk of the exposure, as follows:
- *Quantification of the Exposure:* this includes the dose and intake of key indicator chemicals for an exposed person. The dose is defined as the amount of a substance contacting body boundaries (in the case of inhalation, the lungs) and intake is the amount of the substance absorbed into the body. The evaluation is based upon worst-case, conservative scenarios, with respect to the following:
 - Location of the exposed individual and duration of exposure;
 - Exposure rate; and
 - Emission rate from the source.
 - *Risk Characterisation:* following the above steps, the risk is characterised by examining the toxicity of the chemicals to which the individual has been exposed, and by a comparison of intakes with the tolerable daily intake (TDI) for dioxins/furans and dioxin-like PCBs.

Methodology of the Assessment

- 8.17 An exposure assessment for the purposes of characterising the health impact of the proposed facility emissions requires the following steps:
- (1) Measurement or estimation of emissions from the source;
 - (2) Modelling the fate and transport of the emitted substances through the atmosphere and through soil, water and biota following deposition onto land. Concentrations of the emitted

chemicals in the environmental media are estimated at the point of exposure, which may be through inhalation or ingestion; and

- (3) Calculation of the uptake of the emitted chemicals into humans coming into contact with the affected media and the subsequent distribution in the body.

8.18 This assessment considers the uptake of polychlorinated dibenzo-para-dioxins and polychlorinated dibenzofurans (PCDD/Fs, often abbreviated to 'dioxins/furans') and dioxin-like PCBs by various categories of human receptors.

Potential Exposure Pathways

8.19 There are two primary exposure 'routes' where humans may come into contact with contaminants; direct, via inhalation; or indirect, via ingestion of water, soil, vegetation and animals and animal products that become contaminated through the food chain.

8.20 Additionally, following the introduction of substances into the atmosphere, the following potential exposure pathways may be of concern:

- Ingestion of drinking water;
- Dermal (skin) contact with soil;
- Incidental ingestion of soil; and
- Dermal (skin) contact with water.

8.21 For this assessment, the following exposure pathways have been deemed insignificant:

- Dermal contact with soil – due to the infrequent and sporadic nature of potential contact in conjunction with low dermal absorption factors.
- Dermal contact with water – due to the infrequent and sporadic nature of potential contact through recreational activities such as swimming, fishing.
- Ingestion of drinking water – this would require contamination of a surface water drinking source local to the point of consumption. In addition, cumulation of contamination in the source would be required to counter dilution effects.

8.22 Subsequently, the key exposure routes which are relevant and have been subject to further assessment are as follows:

- Inhalation;

- Ingestion of food (including milk and beef from home-reared cows, eggs and meat from home-reared chickens, home-reared pork, home-grown vegetable and fruit produce and breastmilk); and
 - Ingestion of soil.
- 8.23 The inclusion of all food groups in the assessment conservatively assumes that both arable and pastureland are present in the vicinity of the predicted maximum annual average ground level concentration. This is, in reality, a highly unlikely scenario, but it has been included as a high degree of conservatism into the assessment to reduce the risk of exposures being underestimated.
- 8.24 It should also be noted that the ingestion of home-reared meat and animal products has only been considered by the assessment for farmers and their families rather than all residents.
- 8.25 Ingestion of fish has been screened from consideration as an exposure pathway, despite the presence of Aycliffe Angling Club Pond approximately 2.3 km to the northwest of the proposed facility. The pond is used for recreational coarse fishing and there are no edible fish farms (e.g. trout, salmon) identified within 2 km of the proposed facility. It is therefore considered that the diet of the fisher (and family) is unlikely to be regularly supplemented by fish caught from the Angling Club, and should this be a factor consumption rates are likely to be very small.

Emissions and Dispersion Model Input Data

Compounds of Potential Concern (COPCs)

- 8.26 The substances which have been considered in the assessment are referred to as the Compounds of Potential Concern (COPCs) and include seventeen PCDD/F congeners (see paragraph 8.25 for explanation) that are known to be toxic. In addition, the IRAP model includes two dioxin-like PCBs (Aroclor 1016 and Aroclor 1254). These comprise a mixture of congeners with one to four chlorine atoms for Aroclor 1016 with a chlorine content of 41% by mass (average of three chlorine atoms). Similarly, Aroclor 1254 has between four and seven chlorine atoms and a chlorine content of 54% by mass (average of five chlorine atoms).

Emission Parameters

- 8.27 Emissions from the facility will be via a single stack. Emission parameters assumed for the assessment are consistent with those used for the air quality assessment and are as follows:
- Stack height of 30 m above ground level;
 - Flue diameter of 0.7 m;
 - Emission velocity of 18.0 m s⁻¹;

- Normalised flow rate of 3.67 Nm³ s⁻¹; and
- Emission temperature of 200 °C.

Emission Concentrations for the COPCs

- 8.28 The general terms dioxins and furans denotes a family of compounds, there are 75 individual dioxins and 135 individual furan compounds. Each individual furan or dioxin compound is referred to as a congener and each has a different toxicity and physical properties with regard to its atmospheric behaviour. Exposure methodology must therefore determine the fate and transport of PCDD/Fs on a congener specific basis, by accounting for the varying volatility of the congeners and their different toxicities. Consequently, information regarding the PCDD/F annual mean ground level concentrations on a congener specific basis is required. For the purposes of the exposure assessment, the congener profile for the proposed facility has utilised a standard profile for municipal waste incinerators derived by Her Majesty's Inspectorate of Pollution (HMIP), one of the predecessors of the Environment Agency. The international toxic equivalency factors have then been used to derive the toxic equivalent emission (I-TEQ). These figures are detailed within Table 2.1 of the Human Health Risk Assessment provided in Appendix 8 Volume 2 of the ES.
- 8.29 The European Union Best Available Techniques (BAT) Reference Document (BREF) for Waste Incineration provides BAT Associated Emission Limits (AEL) for new plants and existing plants. For new plant, the emission concentration is 0.06 ng I-TEQ Nm⁻³ and has been assumed to be the ELV for the assessment.
- 8.30 Information on PCB emissions has been obtained from Defra report WR0608 (Ref: 8.4). Based on the information provided, a maximum emission concentration of 3.6×10^{-9} mg m⁻³ is assumed. It is not stated whether this is total PCBs or dioxin-like PCBs. Therefore, as a worst-case it is assumed to comprise entirely of dioxin-like PCBs. Furthermore, it is assumed that this is the total PCB emission and that these data are presented as the toxic equivalent concentration (i.e. 3.6×10^{-9} mg TEQ Nm⁻³). For the dioxin-like PCBs, a toxic equivalent factor (TEF) of 0.1 has been used to provide an actual emission concentration (i.e. 3.6×10^{-8} mg Nm⁻³). The same equivalence factor has been used to convert the total actual dose back to the total toxic equivalent dose.
- 8.31 The emission rates for each PCDD/F substance as input to the IRAP model are provided in Table 2.2 of the HHRA provided in Appendix 8 Volume 2 of the ES.

Dispersion Modelling Assumptions

- 8.32 The AQAs detailed within Chapter 10 – Air Quality utilised the AERMOD dispersion model to estimate ground level concentrations of pollutants, this output can be directly utilised by the HHRA model. The use of AERMOD is consistent with the air quality assessment undertaken for the facility and the

emissions data and model set up are identical to that carried out for the air quality assessment (Ref: 8.2).

8.33 For the modelling, all emission properties, building heights, and other relevant factors were retained from the air quality assessment provided for the facility. As the health risk assessment requires information on the deposition of substances to surfaces as well as airborne concentrations of substances, the AERMOD dispersion model has also been used to predict the following:

- The airborne concentration of vapour, particle and particle bound substances emitted;
- The wet deposition rate of particle and particle bound substances; and
- The dry deposition rate of vapour, particle and particle bound substances.

8.34 For AERMOD, deposition velocities are determined from the assumed particle diameters and particle density of the emissions for three particle sizes based on information provided by the Minnesota Pollution Control Agency (MPCA) (Ref: 8.5).

8.35 Details of particle sizes, density and assumed fractions for input into the AERMOD Model are provided in Table 2.3 of the HHRA provided in Appendix 8 Volume 2 of the ES.

Dispersion Modelling Results

8.36 A summary of the key results from the AERMOD dispersion model is presented in Table 8.1. These have been predicted using the 2015 Tees Valley Airport meteorological data set. This is the nearest appropriate source of meteorological data. This year was selected, as out of the five years considered, it was the year that provided highest predicted annual mean concentrations and deposition rates.

Table 8.1: Maximum Annual Average Particle Phase Concentrations and Particle Phase Deposition Rates Estimated by AERMOD

Pollutant	Max Annual Average Concentration ^(a)	Max Annual Average Deposition Rate ^(b)
PCDD/Fs	(fg m⁻³)	(ng m⁻² year⁻¹)
2,3,7,8-TCDD	0.018	0.13
1,2,3,7,8-PeCDD	0.14	1.1
1,2,3,4,7,8-HxCDD	0.17	1.2
1,2,3,7,8,9-HxCDD	0.12	0.90
1,2,3,6,7,8-HxCDD	0.15	1.1
1,2,3,4,6,7,8-HpCDD	1.0	7.3
OCDD	2.4	17.1
2,3,7,8-TCDF	0.16	1.2
2,3,4,7,8-PeCDF	0.32	2.3
1,2,3,7,8-PeCDF	0.16	1.2
1,2,3,4,7,8-HxCDF	1.3	9.3
1,2,3,7,8,9-HxCDF	0.024	0.17
1,2,3,6,7,8-HxCDF	0.48	3.5
2,3,4,6,7,8-HxCDF	0.51	3.7
1,2,3,4,6,7,8-HpCDF	2.6	18.9
1,2,3,4,7,8,9-HpCDF	0.24	1.7
OCDF	2.4	17.1
Arclor 1016/1254	0.35	2.6

(a) Where 1 fg m⁻³ is equal to 1 x 10⁻¹⁵ g m⁻³

(b) Where 1 ng m⁻² year⁻¹ is equal to 1 x 10⁻⁹ g m⁻² year⁻¹

Selection of Receptors

- 8.37 The IRAP tool can determine the location of the maximum impact over an area based on the results of the dispersion model. For each defined land-use area, IRAP selects the locations which represent the maximum predicted concentrations or deposition rates for the area selected.
- 8.38 Residential exposure within the immediate vicinity of the facility is limited due to the industrial nature of the site. The nearest residential areas are to the west at Heighington and to the northwest at School Aycliffe. Four areas where residential exposure may occur have been defined for the assessment and include School Aycliffe, Newton Aycliffe, Aycliffe Village and Heighington.
- 8.39 There are three areas that have been defined as being dominated by farming activities. These are to the west, south and east of the facility. As a worst-case it is assumed that fields within this area are used for both arable crops and pastureland.

- 8.40 For each type of receptor (farmer and residential) up to nine locations are selected based on the maximum predicted airborne concentration, maximum predicted wet deposition rate and maximum dry deposition rate. Within these locations, eight Residential receptors and four Farmer receptors have been assessed. It is considered that the likelihood of locally caught fish being consumed is low and fisher receptors have not been included in the assessment. For all of the receptor types, adult and child receptors have been considered.
- 8.41 The location of the Resident and Farmer receptors selected for the assessment are presented in Table 8.2 and Figure 8.1 below.

Table 8.2: Human Health Receptors				
ID	Receptor	Type	Easting	Northing
FE	Farmer East	Farmer	427850	522250
FS	Farmer South	Farmer	426350	522250
FW1	Farmer West 1	Farmer	426600	523050
FW2	Farmer West 2	Farmer	426300	522450
RAV	Residential Aycliffe Village	Resident	427900	522500
RH1	Residential Heighington 1	Resident	425200	522500
RH2	Residential Heighington 2	Resident	425200	522450
RN1	Residential Newton Aycliffe 1	Resident	427250	524300
RN2	Residential Newton Aycliffe 2	Resident	427000	524350
RN3	Residential Newton Aycliffe 3	Resident	426900	524350
RS1	Residential School Aycliffe 1	Resident	426300	523400
S2	Residential School Aycliffe 2	Resident	426050	523200

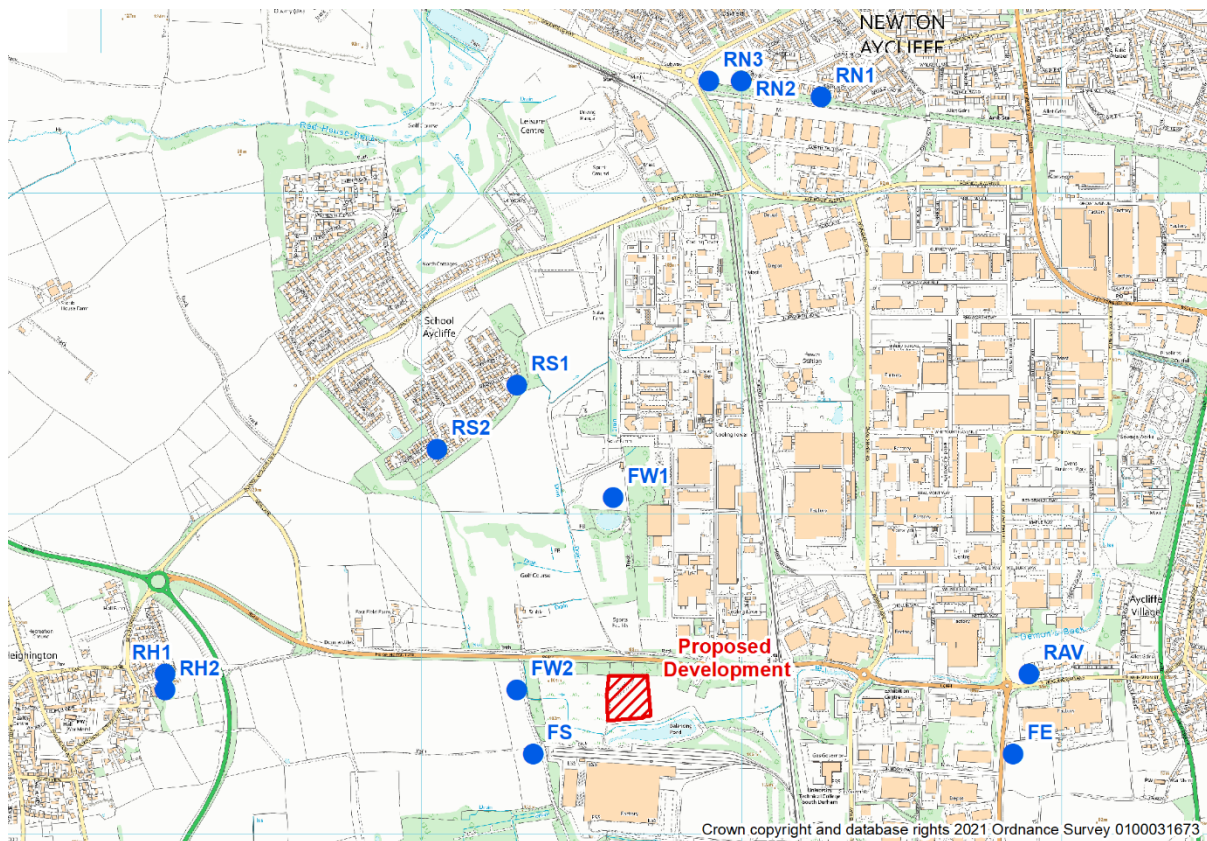


Figure 8.1: Sensitive Human Health Receptor Locations

Exposure Criteria

- 8.42 The World Health Organization (WHO) recommends a tolerable daily intake (TDI) for dioxins/furans of 1 to 4 pg I-TEQ kg-BW⁻¹ d⁻¹ (picogrammes as the International Toxic Equivalent per kilogram bodyweight per day) (Ref: 8.6). The TDI represents the tolerable daily intake for lifetime exposure and short-term excursions above the TDI would have no consequence provided that the average intake over long periods is not exceeded. The UK Committee on Toxicity (COT) also provides a TDI for dioxins and dioxin-like PCBs of 2 pg ITEQ kg-BW⁻¹ d⁻¹.
- 8.43 A tolerable weekly intake (TWI) has been adopted by the European Food Safety Authority's (EFSA's) expert panel on Contaminants in the Food Chain (CONTAM) but has not been adopted as an assessment criterion for the protection of human health by either the EU or the UK government. This weekly criterion is numerically the same as the TDI but is effectively seven times more stringent as it is the tolerable intake for a week rather than a day. The exposure to dioxins, furans and dioxin-like PCBs has also been assessed against this EFSA TWI.

Assessment of Intake

Ingestion Dose

- 8.44 The ingestion intake is calculated as the Average Daily Dose (ADD) from all ingestion exposure routes (e.g. soil, above ground vegetables, meat and dairy products) where for example:

$$ADD_{Ing, TCDD} = \frac{I_{Ing, TCDD} \cdot ED \cdot EF}{AT \cdot 365}$$

- 8.45 Where: $ADD_{Ing, TCDD}$ = total ingestion dose for TCDD; ED is the exposure duration (dependent on the receptor type); EF is the exposure frequency (365 days per year); and AT is the averaging time, and for determining the TDI, is assumed to be equal to the ED. The total dose is the sum of the dose for each of the individual congeners.

Inhalation Dose

- 8.46 For inhalation, the ADD from inhalation exposure is calculated as follows:

$$ADD_{Inh, TCDD} = \frac{C_a \cdot IR \cdot ED \cdot EF}{AT \cdot 365}$$

- 8.47 Where: $ADD_{Inh, TCDD}$ is the total inhalation dose for TCDD, C_a is the concentration of TCDD in air and IR is the daily inhalation rate. The total dose is the sum of the dose for each of the individual congeners.

BASELINE CONDITIONS

Socio-Economic Conditions

- 8.48 The following is a brief summary of relevant baseline dataset regarding Local Authority health and population based on both a desktop review and published data by Public Health England on 3rd July 2018. The Public Health England dataset (Ref 8.9) relates to the County Durham Unitary Authority and has been agreed with Durham County Council as being a suitable baseline for reference within the ES.
- 8.49 County Durham has a population of 530,100 (ONS Population Estimates 2019). 62% of the population is of working age (16-64), very marginally lower than the North East and GB average. Population data for Newton Aycliffe dates back to the 2011 Census, recording approximately 26,000 residents in the town. 63.6% were of working age, above all benchmark areas.
- 8.50 76.3% of the working age population is economically active in County Durham (ONS Annual Population Survey, year to June 2020). This is very marginally higher than the North East average,

but below the GB average of 79.4%. At the time of the 2011 Census, economic activity rates in Newton Aycliffe were higher than County Durham.

- 8.51 The most frequently reported reason for economic inactivity is being long-term sick, 32% (24,500 persons). This is much higher than North East (27.9%) and GB (23.3%) averages. Looking after the family or home (23%) is the second most frequent reason, slightly higher than North East and GB averages. 28.2% of the economically inactive in County Durham report wanting a job. This is higher than North East (24.8%) and GB (21.5%) levels. At the time of the 2011 Census, the proportions of economically inactive due to being long term sick or looking after home or family were higher than the County Durham average.
- 8.52 19.4% of households are recorded as workless in County Durham. This is slightly lower than the North East average (20.3%) but much higher than the GB average (13.9%). The number of Universal Credit claimants in County Durham has been rising since 2016, with a sharp rise as a result of the Covid-19 pandemic. The trend is similar to the North East and GB. Until the recent effects of the pandemic, claimant levels in County Durham have generally been lower than the North East but above the GB average.
- 8.53 The Jobs Density in County Durham, that is the ratio of jobs to working age population stood at 0.62 in 2018 (latest data, ONS). This is below the North East and GB averages. A lower level is typical in more rural areas when compared to more urban settings. An estimated 202,000 total jobs are recorded in County Durham in 2018. The total level of jobs has been rising since 2010 following the global financial crash. Data is not available for Newton Aycliffe.
- 8.54 Employment by sector (ONS Business Register and Employment Survey, 2018) captures the majority, but not all employment. This records 170,000 jobs in County Durham. Some 2,000 jobs are recorded in the utilities sector (Water Supply; Sewerage, Waste Management and Remediation Activities); and 11,000 jobs in the construction sector. Data for Newton Aycliffe records 14,600 jobs in the town. Approximately 50 jobs are recorded in the utilities sector, and 700 jobs within the construction sector.
- 8.55 Full-time gross weekly pay for County Durham residents (£545) is on average higher than the north East (£531) but lower than GB (£587). Data is not available for Newton Aycliffe.
- 8.56 Full-time gross weekly pay for County Durham workers (£528) is on average lower than the north East (£533) and GB (£587). Data is not available for Newton Aycliffe.
- 8.57 The Covid-19 pandemic is having a significant economic effect. This has led to significant rises in benefits claimants, from around 4% at the start of 2020 to around 6.5% in October 2020.

- 8.58 The health of people in County Durham is generally worse than the England average. About 21% (18,700) of children live in low income families. Life expectancy for both men and women is lower than the England average.

Human Health Risk Assessment

- 8.59 Dioxins and furans are ubiquitous in the environment and are present in air, soil and dietary products. The latest assessment of dietary exposure to PCDD/Fs was documented in 2003 based on the 2001 Total Diet Study (TDS) ⁴. This estimated that the average intake for adults decreased from 1.8 pg TEQ kg⁻¹ d⁻¹ (1997) to 0.9 pg TEQ kg⁻¹ d⁻¹ in 2001. For younger children, the average exposure decreased from 4.0 pg TEQ kg⁻¹ d⁻¹ to 1.8 pg TEQ kg⁻¹ d⁻¹. These reductions were likely due to the significant reduction in emissions during the 1990s from waste incineration facilities.
- 8.60 The 2001 TDS is twenty years old and there have been further reductions in emission since this study was published. This is evidenced by PCDD/F emissions data obtained from the UK National Atmospheric Emissions Inventory which indicates that total PCDD/F emissions in the UK decreased from 523 g TEQ a⁻¹ in 1997 to 335 g TEQ a⁻¹ in 2001 and further to 181 g TEQ a⁻¹ in 2019. An updated TDS was undertaken in 2012 ⁵ but this study did not consider dietary exposure to PCDD/Fs.
- 8.61 The contribution of the facility to total intake is provided as follows:
- predicted incremental intake due to emissions from the facility;
 - average daily background intake (i.e. that arising from other sources), referred to as the mean daily intake (MDI);
 - the total intake (i.e. the sum of the predicted incremental intake and the MDI);
 - a comparison of the total intake with the TDI for dioxin/furans.
- 8.62 The MDI is representative of the background exposure and has been derived from data provided by the Environment Agency ⁶ and a value of 49 pg WHO-TEQ d⁻¹. The MDI for an adult receptor and child receptor is calculated as follows:

⁴ Dioxins and dioxin-like PCBs in the UK Diet: 2001 Total Diet Study Samples, Food Survey Information Sheet 38/03 (July 2003)

⁵ Organic Environmental Contaminants in the 2012 Total Diet Study Samples, Report to the Food Standards Agency, The Food and Environment Research Agency (December 2012)

⁶ Soil Guideline Values for dioxins, furans and dioxin-like PCBs in soil, Environment Agency, Science Report SC050021/Dioxins SGV, September 2009

- for an adult receptor a MDI of $0.7 \text{ pg I-TEQ kg}^{-1} \text{ d}^{-1}$ ⁷ is derived by dividing the Environment Agency MDI by a bodyweight of 70 kg;
- for a child receptor a MDI of $1.8 \text{ pg I-TEQ kg}^{-1} \text{ d}^{-1}$ is derived by dividing the Environment Agency MDI by a bodyweight of 20 kg and applying an adult to child correction factor of 0.74.

8.63 These are comparable to the 2001 Total Diet Study exposure and are representative of worst-case conditions.

HUMAN HEALTH

Introduction

8.64 This section outlines the input parameters for the IRAP model used in the human health risk assessment.

8.65 Exposure of an individual to a chemical may occur either by inhalation or ingestion as outlined in the sections above. The IRAP model has been developed to estimate the dose received by the human body, often referred to as the external dose through a combination of the possible pathways.

8.66 Exposure to COPCs is a function of the estimated concentration of the substance in the environmental media with which individuals may come into contact (i.e. exposure point concentrations) and the duration of contact. The concentration at the point of contact is itself a function of the transfer through air, soil, water, plants and animals that form part of the overall pathway. Exposure equations have been developed which combine exposure factors (e.g. exposure duration, frequency and medium intake rate) and exposure point concentrations (as outlined in Section 8.41 – 8.44). The dose equations therefore facilitate estimation of the received dose and account for the properties of the route of exposure, i.e. ingestion and inhalation.

8.67 For those substances that bio-accumulate, i.e. become more concentrated higher up the food chain, especially in body fats, the exposure to meats and milk is of particular significance.

8.68 IRAP allows the adjustment some of the key exposure factors. An example is the diet of the receptor and the proportion of which is local produce, which may be contaminated. Obviously, if a nearby resident eats no food grown locally, then that person's diet cannot be contaminated by the emissions from the source, in this case the proposed facility. It is conventional to investigate two types of receptor, a farmer and a resident. It is assumed that a farmer eats proportionately more

⁷ No correction is provided between the WHO-TEF and the I-TEF but a sensitivity analysis indicates that correcting between the two systems would have negligible impact on the results

locally grown food than a resident. Where the potential exists for the consumption of locally caught fish a fisher receptor may also be considered.

- 8.69 The receptor types can also be divided into adults and children. Children are important receptors because they tend to ingest soil and dusts directly and have lower body weights, so that the effect of the same dose is greater in the child than in the adult.
- 8.70 The IRAP model utilises airborne concentrations and deposition rates to calculate the concentrations of the pollutants of concern in the environmental media, foodstuffs and the human receptor. The dose experienced by the human receptor can then be compared to the tolerable daily intake (TDI) provided by the Committee on Toxicity for dioxins and dioxin like PCBs of $2 \text{ pg kg}^{-1} \text{ d}^{-1}$.
- 8.71 The model requires a wide range of input parameters to be defined, including:
- Physical and chemical properties of the COPCs;
 - Site information, including site specific data; and
 - Receptor information – for each receptor type (e.g. adult or child, resident or farmer or fisher).
- 8.72 For this assessment, the HHRAP default values, which are incorporated into the IRAP model, have been used for the majority of these input values. These data are provided in the following sections.

Input Parameters for the COPCS

- 8.73 The IRAP model contains a database of physical and chemical parameters for each of 206 COPCs. This database is based on default values provided by the HHRAP and all default values have been used for this assessment.
- 8.74 These parameters are used to determine how each of the COPCs behaves in the environment and their presence and accumulation in various food products (meat, fish, animal products, vegetation, soil and water). For 2,3,7,8-TCDD (the most toxic of the PCDD/Fs), the default parameters are provided in Table 3.1 of the HHRA provided in Appendix 8 Volume 2 of the ES.

Site and Site Specific Parameters

- 8.75 The IRAP health risk assessment model requires information relating to the location and its surroundings. The parameters required include the following:
- The fraction of animal feed (grain, silage and forage) grown on contaminated soils and quantity of animal feed and soil consumed by the various animal species considered;
 - The interception fraction for above ground vegetation, forage and silage and length of vegetation exposure to deposition. The yield/standing crop biomass is also required;

- Input data for assessing the risks associated with exposure to breast milk, including:
 - body weight of infant;
 - exposure duration;
 - proportion of ingested COPC stored in fat;
 - proportion of mother's weight that is fat;
 - fraction of fat in breast milk;
 - fraction of ingested contaminant that is absorbed; and
 - half-life of dioxins in adults and ingestion rate of breast milk.
- Other physical parameters (e.g. soil dry bulk density, density of air, soil mixing zone depth).

8.76 For all of these parameters the IRAP/EPA HHRA default values have been used and these are presented in Annex A of the HHRA provided in Appendix 8 Volume 2 of the ES. Other site specific parameters are also required which are not provided by the IRAP model. These parameters were specified for the proposed facility as follows:

- Annual average evapotranspiration rate of 40.6 cm a^{-1} (assumed to be 70% of total precipitation);
- Annual average precipitation of 58.0 cm a^{-1} (based on the average for the five year data set for the 2015 to 2019 meteorological data);
- Annual average irrigation of 0 cm a^{-1} ;
- Annual average runoff of 5.8 cm a^{-1} (assumed to be 10% of the total precipitation);
- An annual average wind velocity of 4.7 m s^{-1} (average for the five years); and
- A time period over which deposition occurs of 30 years.

Receptor Information

8.77 Within the IRAP model there are three receptor types; Resident, Farmer and Fisher. Information relating to each receptor type (adult and/or child) is required by the model where these receptor types are used. As discussed, the fisher receptor has been screened from this assessment. The information required for resident and farmer therefore includes the following:

- Food (meat, dairy products, fish and vegetables), water and soil consumption rates for each receptor type. However, only Farmers are assumed to consume locally reared animals and animal products.

- Fraction of contaminated food, water and soil which is consumed by each receptor type.
- Input data for the inhalation exposure including: inhalation exposure duration, inhalation exposure frequency, inhalation exposure time; and inhalation rate.
- Input data for the ingestion exposure including: exposure duration, exposure frequency, exposure time; and body weight of receptor.

8.78 For the purposes of this assessment the default IRAP/HHRAP parameters have been used to define the characteristics of the receptors. The input data used are presented in Annex B of the HHRA provided in Appendix 8 Volume 2 of the ES. The only variation to this is the assumed body weight of a child receptor. The IRAP/HHRAP default value is 15 kg whereas in the UK a value of 20 kg is typically used.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Human Health: Exposure to Dioxins and Furans

Comparison of Dioxin/Furan Exposure with WHO and UK COT Guidance

Facility Contribution to Intake

- 8.79 The average (lifetime) daily intake of dioxins/furans for the receptors considered derived from the assessment are presented in Table 8.3 below. These are compared to the Committee on Toxicity (COT) TDI for dioxins and dioxin-like PCBs of 2 pg I-TEQ kg-BW⁻¹ d⁻¹.

Table 8.3: Comparison of Average Daily Intakes (pg I-TEQ kg-BW ⁻¹ d ⁻¹)		
Receptor	Adult	Child
Farmer East	0.0040	0.0059
Farmer South	0.023	0.034
Farmer West 1	0.025	0.037
Farmer West 2	0.019	0.028
Residential Aycliffe Village	0.00017	0.00049
Residential Heighington 1	0.000035	0.00010
Residential Heighington 2	0.000035	0.00010
Residential Newton Aycliffe 1	0.000095	0.00027
Residential Newton Aycliffe 2	0.000097	0.00027
Residential Newton Aycliffe 3	0.000092	0.00026
Residential School Aycliffe 1	0.00021	0.00060
Residential School Aycliffe 2	0.00011	0.00032
WHO TDI	1 – 4	
COT TDI	2	

- 8.80 The maximum contribution of the facility to the COT TDI is 1.8% for the Farmer West 1 child receptor and 1.3% for the Farmer West 1 adult receptor. Generally, highest exposures are predicted for farmer receptors as it is assumed that these receptors produce their own home reared and home-grown food at the location of maximum impact for the area and represents an extreme worst-case.
- 8.81 For residents, the maximum contribution of the facility to the COT TDI is 0.03% for the Resident School Aycliffe 1 child receptor and 0.01% for the Resident School Aycliffe 1 adult receptor. Therefore, taking into consideration the extreme worst-case assumptions adopted for the assessment, the contribution of the facility to the intake of dioxins/furans and dioxin-like PCBs is negligible.

Total Intake

- 8.82 A comparison of predicted intakes with the MDI and TDI is presented in Table 8.4. Results are presented for Farmer West 1 and Resident School Aycliffe 1 where highest farmer and resident exposures are predicted, respectively.

Table 8.4 Comparison of Total Intake with the COT TDI				
Receptor	Total Intake from the Facility (pg I-TEQ kg ⁻¹ d ⁻¹)	Total Intake from the Facility + MDI (pg I-TEQ kg ⁻¹ d ⁻¹)	Facility as %age of TDI	Total Intake as %age of TDI
Farmer West 1 Adult	0.025	0.73	1.3	36.3
Farmer West 1 Child	0.037	1.84	1.8	91.8
Residential School Aycliffe 1 Adult	0.00021	0.7	0.01	35
Residential School Aycliffe 1 Child	0.0006	1.8	0.03	90
COT TDI	2	2	-	-

- 8.83 For inhalation and oral intake of PCDD/Fs for adults, total intake is well below the TDI (36.3%). Background exposure represents approximately 35% of total exposure. At worst, the facility contributes 1.3% to the TDI for adults.
- 8.84 For inhalation and oral intake of PCDD/Fs for children, the background intake is relatively high at 90% of the TDI. At worst, the additional contribution from the facility for a child is 0.037 pg TEQ kg⁻¹ d⁻¹ (01.8% of the COT TDI). Combined with the background exposure for a 20 kg child (1.8 pg TEQ kg⁻¹ d⁻¹) the total intake would be 91.8% of the TDI. However, it should be noted that the TDI for PCCD/Fs is set for the purposes of assessing lifetime exposure and these elevated background exposures for children are therefore not representative of long-term exposure.

Comparison of Dioxin/Furan Exposure with EFSA TWI

- 8.85 The average weekly intake (AWI) of dioxins/furans for the receptors considered is presented in Table 8.5. These are also compared to the EFSA TWI for dioxins and furans of 2 pg I-TEQ kg-BW⁻¹ w⁻¹.

Table 8.5: Comparison of Average Weekly Intakes (pg I-TEQ kg-BW ⁻¹ d ⁻¹)		
Receptor	Adult	Child
Farmer East 1	0.028	0.041
Farmer South	0.16	0.24
Farmer West 1	0.18	0.26
Farmer West 2	0.14	0.20
Residential Aycliffe Village	0.0012	0.0034
Residential Heighington 1	0.00024	0.00069

Residential Heighington 2	0.00025	0.00070
Residential Newton Aycliffe 1	0.00067	0.0019
Residential Newton Aycliffe 2	0.00068	0.0019
Residential Newton Aycliffe 3	0.00065	0.0018
Residential School Aycliffe 1	0.0015	0.0042
Residential School Aycliffe 2	0.00079	0.0023
ESFA TWI	2	

8.86 The maximum contribution of the facility to the EFSA TWI is 12.9% for the Farmer West 1 child receptor and 8.8% for the Farmer West 1 adult receptor. As discussed above, this assumes as a worst-case that these receptors produce their own home reared and home-grown food at the location of maximum impact for the area and represents an extreme worst-case.

8.87 For the residential receptors, the maximum contribution of the facility to the EFSA TWI is 0.2% for the Resident Newton Aycliffe receptor.

Infant Breast Milk Exposure to Dioxins and Furans

8.88 Another exposure pathway assessed is infant exposure to dioxins and furans via the ingestion of their mother's breast milk. Potential for contamination of breast milk is particularly high for dioxin-like compounds such as these, as they are extremely lipophilic (fat soluble) and hence likely to accumulate in breast milk. Furthermore, the infant body weight is smaller and it could be argued that the effect is therefore proportionately greater than in an adult.

8.89 This exposure is measured by the Average Daily Dose (ADD) on the basis of an averaging time of 1 year. In the US, a threshold value of $50 \text{ pg kg}^{-1} \text{ d}^{-1}$ of 2,3,7,8-TCDD TEQ is cited as being potentially harmful. The IRAP model calculates the ADD that would result from an adult receptor breast feeding an infant. It should be noted that the ADD calculated by IRAP does not consider dioxin-like PCBs. A summary of the ADD for each of the infants of adult receptors considered for the assessment is presented in Table 8.6.

Table 8.6: Assessment of Average Daily Dose for a Breast Fed Infant of an Adult Receptor	
Receptor	Average Daily Dose from Breast Feeding ($\text{pg kg}^{-1} \text{ d}^{-1}$ of 2,3,7,8-TCDD)
Farmer East 1	0.044
Farmer South	0.25
Farmer West 1	0.27
Farmer West 2	0.21
Residential Aycliffe Village	0.0017
Residential Heighington 1	0.00033
Residential Heighington 2	0.00034

Residential Newton Aycliffe 1	0.00092
Residential Newton Aycliffe 2	0.00093
Residential Newton Aycliffe 3	0.00089
Residential School Aycliffe 1	0.002
Residential School Aycliffe 2	0.0011
<i>US EPA Criterion</i>	<i>50</i>
<i>WHO Criterion</i>	<i>1 – 4</i>
<i>UK Criterion (COT)</i>	<i>2</i>

8.90 The highest ADDs are generally calculated for the infants of farmer receptors since the most significant exposure to dioxins/furans is via the food chain, particularly animals and animal products, which the farmer receptors are assumed to consume. Residential receptors are only assumed to consume vegetable products which are less significant with regard to exposure to dioxins/furans. Highest exposures are predicted for the Farmer West 1 infant and represents 0.54% of the US threshold value of 50 pg kg⁻¹ d⁻¹ of 2,3,7,8-TCDD TEQ. Predicted exposure to infants of residents are 0.01% or less of the threshold.

8.91 As a worst case, the ADD for the highest exposure for the infants is 13.5% of the COT TDI. Furthermore, the duration of exposure is short and the average daily intake over the lifetime of the individual would be substantially less.

8.92 The WHO recognises that breast-fed infants will be exposed to higher intakes for a short duration, but also that breast feeding itself provides associated benefits. As such the impact is considered to be not significant.

Construction Phase

8.93 The construction period is estimated to last approximately 15 months including a 3 month commissioning period. The total cost of the project is estimated at approximately £25million. This scale of investment is anticipated to support approximately 100 person-years of employment. Information provided by the principal contractor indicates an estimated maximum of 75 workers on site at any point in time. It has also been indicated that where possible there will be opportunities for local apprentices or specific local recruitment initiatives. Best practice guidance (Ref: 8.8) on the potential scale of brand new job creation is in the region of 5 new jobs in the sector. The construction phase will therefore support construction employment in the local area, and offer a limited number of employment opportunities for new entrants to the construction sector.

Operational Phase

- 8.94 During the operational phase employment is estimated at circa. 27 jobs, with indirect employment primarily concentrated within the transport and logistics sector related to the inward movement of feed-stock and outward movement of ash. Employment associated with inward movements are likely non-additional as the feed-stock is currently being moved to other locations. The relevant local effects are therefore primarily associated with the 27 direct jobs that will be created at the site.
- 8.95 These figures compare to 170,000 total jobs in County Durham and 15,000 jobs in Newton Aycliffe. For the construction sector there are approximately 9,000 jobs in County Durham and 700 jobs in Newton Aycliffe. The scale of employment generation is therefore considered to be positive albeit in a relatively small way when compared to the regional employment capacity. .
- 8.96 Chapter 4 – Alternatives, Need and Design Evolution provides more information on the need for the development.

RESIDUAL EFFECTS

Construction Phase

- 8.97 There will be no residual effects during the construction phase.

Operational Phase

- 8.98 Emissions from the Proposed Development are not predicted to have a significant impact on human health, therefore the residual effects are also considered to be not significant.

ASSESSMENT OF CUMULATIVE EFFECTS

- 8.99 There are no proposed or consented facilities for the thermal treatment of waste in close proximity to the site and which have the potential to emit dioxins and furans to air. Therefore, a cumulative assessment of human health impacts has not been undertaken.

SUMMARY

- 8.100 The potential effects on population as a result of the proposed development can be viewed in three areas; social, economic and human health.
- 8.101 Socio-economic effects have been deemed to be limited to a very minor or negligible positive effect due to the creation of jobs during both the construction and operational phase.

- 8.102 An assessment has been carried out to determine the possible impacts on human health arising from dioxins and furans and dioxin like PCBS emitted from the proposed facility.
- 8.103 The facility would be situated in a predominantly industrial location, with no immediate nearby sensitive receptors. Impacts have been assessed under the worst-case scenario, namely that of an individual exposed for a lifetime to the effects of the highest airborne concentrations and consuming mostly locally grown food. This equates to a hypothetical farmer consuming food grown on the farm, situated at the closest proximity to the proposed facility. Where there are no active farming areas in close proximity, a residential receptor is considered where it is assumed that the resident consumes locally grown vegetables. The fisher receptor has been screened from consideration due to distance and nature of the Angling Club to the site.
- 8.104 The assessment has identified and considered the most plausible pathways of exposure for the individuals considered (farmer and resident). Deposition and subsequent uptake of the compounds of potential concern (COPCs) into the food chain is likely to be a more significant pathway than direct inhalation.
- 8.105 The maximum contribution of the facility to the COT TDI is 1.8% for the farmer receptors and less than 0.1% for the residential receptors. Therefore, the impact of emissions on local sensitive receptors is considered to be **not significant**.
- 8.106 The facility can therefore be deemed to have a negligible effect on human health.

REFERENCES

Ref 8.1: Hardisty Jones Associates (HJA)(November 2020) Population and Human Health – Addendum to EIA Scoping and Screening Opinion Request: Hazardous Waste Incinerator – Helios and Fornax (North East Ltd)

Ref 8.2: Air Quality Assessment: High Temperature Incinerator, Fornax Environmental Solutions Ltd, Sol Environment Report (April 2021)

Ref: 8.3: US EPA Office of Solid Waste (September 2005) Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

Ref 8.4: WR 0608 Emissions from Waste Management Facilities, ERM Report on Behalf of Defra (July 2011)

Ref 8.5: Refined HHRAP-Based Analysis Form, AERA-26, Minnesota Pollution Control Agency (August 2011)

Ref 8.6: Assessment of the Health Risk of Dioxins: Re-evaluation of the Tolerable Daily Intake (TD), WHO Consultation, May 25-29 1998, Geneva, Switzerland

Ref 8.7: Soil Guideline Values for dioxins, furans and dioxin-like PCBs in soil, Environment Agency, Science Report SC050021/Dioxins SGV, September 2009

Ref 8.8: CITB and NSAfC (2017) Client Based Approach, To developing and implementing an Employment and Skills Strategy on Construction Projects, Local Client Guidance – England.

Ref 8.9: Public Health England, County Durham Unitary Authority Local Authority Health Profile 2018

9 ACCIDENTS / NATURAL DISASTER

INTRODUCTION

- 9.1 This Chapter provides a description of the likely significant effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and / or disasters which are relevant to the project concerned as required by Schedule 4, paragraph 8 of the EIA Regulations 2017 (Ref 9.1).
- 9.2 This is interpreted here to refer to manmade events as 'accidents' and naturally caused events as 'disasters', including those caused by climate change. This Chapter provides an assessment of the likely significant effects arising from the vulnerability of the Proposed Development to major accidents or disasters that are relevant to the Site. Individual topic chapters contain, where relevant, such an assessment, for example, in relation to flood risk, traffic accidents and emissions releases.
- 9.3 This Chapter has been prepared by a planning consultant / EIA practitioner with over 35 years' experience and who has led planning applications for more than 30 thermal treatment facilities. He was supported by a Chartered Member of the Royal Town Planning Institute (RTPI) .

ASSESSMENT METHODOLOGY

- 9.4 There is no specific assessment methodology to follow when assessing the risks of major accidents and / or disasters. The assessment should be guided by professional judgement informed by reliable information resources.
- 9.5 In this case, the relevant baseline conditions on the Site and surrounding area were identified and potential hazards highlighted. The probability of the accident / natural disaster occurring as a result of the identified hazard was then assessed and the magnitude (i.e. the severity) of the potential impact categorised. Once the probability of the accident / natural disaster occurring and the magnitude of the potential impact has been assessed, overall risk is determined.
- 9.6 Where the Proposed Development includes embedded mitigation measures which would alter potential impacts, these are considered within the initial assessment. Where appropriate, additional mitigation measures are suggested and a post-mitigation residual impact assessment presented.

BASELINE CONDITIONS

- 9.7 A summary of relevant baseline information relating to potential accidents and natural disasters on and surrounding the Site, based on a desktop review, is provided subsequently.

Neighbouring Facilities

- 9.8 The Proposed Development is set within an industrial context with other premises nearby containing industrial activities, some of which are considered vulnerable, namely the nearby Upper Tier COMAH (Control of Major Accidents and Hazards Regulations 2015) site operated by Prefere Resins located 70m north of the Site.
- 9.9 The nature of the COMAH 2015 Regulations means that all regulated sites have the potential to cause a major accident to people, local communities and the environment. As such, Regulated COMAH facilities are required to have in place Major Accident Prevention Plans (MAPP) and associated emergency planning response programmes to ensure that the risk to human life and the environment is reduced to a practical minimum.
- 9.10 The Prefere Resins facility stores a number of hazardous substances that are potentially flammable, toxic and hazardous to the aquatic environment, with the main accident scenarios identified as explosion, fire and accidental release of dangerous substances including toxic gas or smoke. The facility is highly regulated by the Health and Safety Executive and the Environment Agency under COMAH (Ref 9.2) and has an emergency plan in place to deal with major accidents. The Local Authority has also drawn up an external emergency plan to deal with any external consequences as a result of a major accident (Ref 9.3).
- 9.11 In addition to the above, the Site is located 750m north of the Inovyn ChlorVinyls Limited Upper Tier COMAH site. This site stores a number of hazardous substances that may be flammable and hazardous to the aquatic environment. Main accident scenarios are explosion, fire and liquid release causing environmental pollution and contamination of drinking supplies.
- 9.12 The facility is also highly regulated by the Health and Safety Executive and the Environment Agency under the COMAH Regulations 2015 and has an emergency plan in place to deal with major accidents. The local authority has also drawn up an external emergency plan to deal with any external consequences as a result of a major accident.

Earthquake / Fracking Related Earth Tremors

- 9.13 The Site is not located in an area prone to high magnitude earthquakes. There are no active fracking sites in the area and there are no bedrock faults or other linear features identified onsite or within 1km. Furthermore, the closest and most recent earthquake occurred in 2018 and reached a

magnitude of 3.1, with the epicentre located approximately 5.5 km to the southwest of the Site at a depth of 24 km. This caused no damage at the surface.

Ground Stability

9.14 British Geological Society (BGS) records indicate the following relating to the Site:

- Shrink swell clay risk is very low;
- Running Sands risk is very low;
- Compressible deposits risk is very low (risk relates to Made Ground onsite, otherwise the risk is negligible);
- Collapsible Deposits risk is very low;
- Landslide risk is very low (function of geology and topography); and
- Ground dissolution risk is very low.

9.15 The underlying dolostone bedrock is a highly soluble rock, as such, ground solubility features are potentially likely on-site. However, significant thicknesses of cohesive superficial deposits cover the bedrock, therefore solubility issues are considered unlikely onsite. Furthermore, the Site is not located in an area affected by coal mining or other mineral mining.

Flooding

9.16 The Environment Agency's flood risk map indicates that the Site lies within Flood Zone 1; an area where there is a low risk of flooding from rivers and the sea. This is land assessed as having a chance of flooding of less than 1 in 1000 (0.1%) each year.

9.17 The Site is located in an area at low risk of flooding from groundwater sources, significant thicknesses of cohesive superficial deposits with limited discontinuous groundwater within them further lower this risk.

9.18 The Site is located in an area at negligible risk of pluvial flooding from extreme rainfall events.

Forest Fire

9.19 The Site is located approximately 1.5 km distant from the nearest woodland area and is located within an industrial setting. Local meteorological conditions present a very low risk of forest fire.

Extreme Weather Events (Winter Storms)

9.20 The UK is subject to winter storms which include heavy rain and high wind speeds.

'Without Development' Baseline Scenario

9.21 In the 'without development' scenario, it is judged that the aforementioned baseline conditions are unlikely to change, with the possible exception of increased flood risk due to climate change.

However, the Environment Agency's flood risk data includes an appropriate allowance for future climate change. Hence, this is already built into the baseline conditions.

- 9.22 With regard to the baseline of the Site itself, it is important to note that the Environmental Statement assesses the Site in its current undeveloped state. If the Site remains undeveloped, this state will effectively be maintained. However, given that the Site is allocated employment land, in the event the Proposed Development is not built out, it is highly likely to be subject to new build employment related development of some kind, which may or may not have similarities with the current scheme. Given the Site's allocation, land value and need to ensure the efficient use of land, it is very likely to be developed as intensively as is now proposed.

DESIGN OF THE PROPOSED DEVELOPMENT

- 9.23 Good sustainable design proactively considers resilience, requiring the integration of hazard identification, risk evaluation and risk management into the design process. Furthermore, if risk is significant, it is likely to have a major consequence and is therefore covered by specific legislation e.g. regulations on the control of major accident hazards or regulations on the secondary containment of pollutants such as the oil storage regulations. The facility has been designed proactively and will adhere to all relevant legislation.
- 9.24 Whilst the development handles hazardous wastes and uses both gas and oil as additional fuels on the Site, all these materials are held in relatively small quantities, such that were the Site subject to accident or wider disaster, the consequential impacts would be of a low order.
- 9.25 The Proposed Development will be subject to an Environmental Permit, without which it is not able to operate. This Permit will require the operator to have in place a comprehensive Environmental Management System and plans for the containment of all materials and substances which have the potential for causing pollution or harm in the event of accident. It will also be required to have a Fire Prevention Plan.

FIRE RISK AT THE PROPOSED DEVELOPMENT

- 9.26 Incinerator facilities can present fire hazards and associated toxic gas release. These areas of the plant / process are well-understood and the design of the facility will incorporate measures to remove or significantly reduce such risks in accordance with the applicable legislation and standards, including the aforementioned Fire Prevention Plan. The operation of incineration plants is subject to a number of regulatory regimes and monitored on a continuous basis.

- 9.27 If an incident occurs that could endanger life, the facility or the environment, an emergency shutdown procedure would be implemented. The emergency shutdown would stop waste feed, shut off combustion air fans and the burner essentially shutting down the operation of the plant.
- 9.28 In the unlikely event of a fire onsite, potentially contaminated fire water runoff would be managed principally by containment within the building and basement. This can accommodate the firewater produced by the sprinkler system. Additionally, any surface water run-off or external firefighting waters will be captured and contained onsite in the drainage and attenuation systems, which will be fitted with an automated penstock valve, thus removing the risk of uncontrolled contaminated runoff entering the surface water network. Potentially contaminated firewater will then be tankered offsite for treatment or disposal.

MITIGATION AND RESIDUAL RISK

- 9.29 Table 9.1 below outlines the potential risk events, with identified hazard sources, pathways and consequences. The table assesses likelihood of an event and incorporates mitigation measures in place to reduce the residual risk of an event occurrence.

Table 9.1: Accidents / Natural Disaster Events					
Accident Scenario	Probability	Magnitude of Potential Impact	Risk Rating before mitigation	Risk Management Techniques	Residual Risk (following mitigation)
Natural Disaster					
Earthquake / Fracking Related Earth Tremors	Very low	Severe Risks to site users posed by damage to infrastructure as a result including fire, gas explosions, building collapse etc.	Very Low	<p>The Site is not located in an area prone to high magnitude earthquakes.</p> <p>There are no active fracking sites in the area.</p> <p>There are no bedrock faults or other linear features identified onsite or within 1 km.</p> <p>The closest and most recent earthquakes occurred in 2018 and reached magnitude 3.1 with the epicentre located approximately 5.5 km to the</p>	Very Low

				southwest at a depth of 24 km. This caused no damage at the surface.	
Ground Stability	Very Low	Moderate to Severe	Very Low	<p>BGS records indicate the following:</p> <ul style="list-style-type: none"> • Shrink swell clay risk is very low; • Running Sands risk is very low; • Compressible deposits risk is very low (risk relates to Made Ground onsite, otherwise the risk is negligible); • Collapsible Deposits risk is very low; • Landslide risk is very low (function of geology and topography); and • Ground dissolution risk is very low. <p>The underlying dolostone bedrock is a highly soluble rock, as such ground solubility features are potentially likely onsite. However, significant thicknesses of cohesive superficial deposits cover the bedrock, therefore solubility issues are considered unlikely onsite.</p> <p>The Site is not located in area affected by coal mining or other mineral mining.</p>	Very Low
<ul style="list-style-type: none"> • Shrink-swell clays • Running Sands • Compressible Deposits • Collapsible Deposits • Landslip • Mining Risk 		Impacts could range from minor subsidence to catastrophic collapse			
Flooding	Very Low	Moderate	Very low	The Environment Agency's flood risk map indicates that the Site lies within Flood Zone 1; an area where there is a low risk of flooding from rivers and the sea. This is land assessed as having a	Very Low
		Damage to buildings, pollution of waters due to mixing with waste			

				<p>chance of flooding of less than 1 in 1000 (0.1%) each year.</p> <p>The Site is located in an area at low risk of flooding from groundwater sources, significant thicknesses of cohesive superficial deposits with limited discontinuous groundwater within them further lower this risk.</p> <p>The Site is located in area at negligible risk of pluvial flooding from extreme rainfall events. Drainage networks onsite are designed to include an attenuation pond designed for all events up to and including the 100 year plus climate change allowance (20%).</p> <p>In the highly unlikely event of flooding, the Sites buildings will be bunded which will prevent ingress of water into waste storage areas.</p>	
Forest Fire	Negligible	Negligible	Negligible	<p>The Site is located approximately 1.5 km distant from the nearest woodland area and is located within an industrial setting.</p> <p>Local meteorological conditions present a very low risk of forest fire, with arson the most likely potential cause.</p>	Very Low

Extreme Weather Events (Winter Storms)	Low	Moderate Damage to buildings from high wind speeds	Low	The UK is subject to winter storms which include heavy rain and high wind speeds. The building is designed to construction standards to limit damage in the event of high wind and subject to preventative maintenance to ensure damage limitation.	Low
Accidents					
Acceptance of dangerous wastes e.g. radioactive or explosive	Low	Moderate Risk to site users if radioactive or explosive material is accepted onto site and processed	Low	The Site employs stringent pre-acceptance and acceptance criteria ensuring the rejection of any non-conforming waste materials. Radiation detectors are fitted to the entrance gate and monitor every incoming load to ensure any radioactively contaminated material is identified and dealt with appropriately.	Low
Uncontrolled onsite fire / explosion Plant malfunction or arson, combustible materials are stored onsite	Medium	Severe Human health and release of atmospheric pollutants	Medium	The Site will be highly regulated under an Environmental Permit issued by the Environment Agency which requires fire risk to be assessed regarding the storage and management of wastes onsite. The Proposed Development is designed to meet DSEAR and ATEX standards. The Site has an automated detection and suppression system. All plant is subject to a planned preventative maintenance schedule. All plant has been specified to be intrinsically safe and	Low

				<p>earthed in accordance to best practice.</p> <p>All aspects of the plant are constructed of non-combustible materials.</p> <p>All combustible materials are segregated from any potential sources i.e. waste is stored in depicted areas away from flammable process consumables.</p> <p>In the unlikely event of a fire there is a plentiful supply of water onsite, which will be contained via the Sites attenuation ponds, which are fitted with automated penstock valves.</p>	
Pipeline Failure – Water Mains	Low	Moderate to Severe	Very Low	<p>The Site will be entirely newly constructed to all the relevant standards, minimising risk of pipe failure.</p> <p>All tanks / vessels / pipework onsite will be fitted within industry standard leak detection systems and automated shut off valves.</p>	Very Low
Pipeline Failure – Gas Mains	Low	Severe	Very Low	<p>The Site will be entirely newly constructed to all the relevant standards, minimising risk of pipe failure.</p> <p>Easements will be maintained and effective demarcation of pipelines will be undertaken during any future construction works.</p>	Very Low
COMAH Facility Accident – Prefere Resins UK Limited	Low	Severe	Medium	The Prefere Resins UK Limited Upper Tier COMAH	Low

		<p>Major fire, incident or accident at the Prefere Resins UK facility could endanger human health and release pollutants to atmosphere, ground and waters.</p>	<p>Site is located 70m to the north of the Site.</p> <p>The Site stores a number of hazardous substances that may be flammable, toxic and hazardous to the aquatic environment, outlining main accident scenarios as explosion, fire and accidental release of dangerous substances including toxic gas or smoke.</p> <p>The facility is highly regulated by the Health and Safety Executive and the Environmental Agency under the Control of Major Accident Hazard Regulations 2015 (COMAH) and has an emergency plan in place to deal with major accidents. The local authority has also drawn up an external emergency plan to deal with any external consequences as a result of a major accident.</p> <p>In the event of a release at the COMAH site, albeit very low probability, there may be potential impacts at the HTI facility necessitating a controlled shut down and evacuation of the site. A controlled shutdown is a standard operating procedure and is primarily automated one instigated. Hence, the residual risk to the plant is low.</p>	
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COMAH Facility Accident – Inovyn ChlorVinyls Limited	Low	Severe Major fire, incident or accident at the Inovyn ChlorVinyls facility could endanger human health and release pollutants to atmosphere, ground and waters.	Medium	<p>The Inovyn ChlorVinyls Limited Upper Tier COMAH site is located 750m north of the Site.</p> <p>The site stores a number of hazardous substances that may be flammable and hazardous to the aquatic environment, outlining main accident scenarios as explosion, fire and liquid release causing environmental pollution and contamination of drinking supplies.</p> <p>The facility is highly regulated by the Health and Safety Executive and the Environmental Agency under the Control of Major Accident Hazard Regulations 2015 (COMAH) and has an emergency plan in place to deal with major accidents. The local authority has also drawn up an external emergency plan to deal with any external consequences as a result of a major accident.</p> <p>In the event of a release at the COMAH site, albeit very low probability, there may be potential impacts at the HTI facility necessitating a controlled shut down and evacuation of the site. A controlled shutdown is a standard operating procedure and is primarily automated one instigated. Hence, the residual risk to the plant is low.</p>	Low
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Major Road / Rail Incident	Low	Moderate to Severe Incident associated with delivery / collection vehicles on local roads could cause injury / fatality to public or spillage of pollutants	Low	Operational traffic will be controlled and regulated in accordance with the traffic management plan for the facility. Contracted parties are responsible for the health and safety of their drivers ensuring appropriate shift hours and safety practices are in place.	Low
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9.30 Based on the foregoing, it is judged that the vulnerability of the Proposed Development to risks of major accidents and / or disasters that could potentially result in likely significant effects on the environment is, with the embedded mitigation outlined, very low to low. No further mitigation is considered to be required and the residual risks remain very low to low.

ASSESSMENT OF CUMULATIVE EFFECTS

9.31 The assessment has considered the vulnerability of the Proposed Development to risks of major accidents and / or disasters that could potentially result in likely significant effects on the environment both in isolation and cumulatively in relation to external events. No significant effects on the environment are considered likely to occur. In fact the residual risks fall between very low and low.

9.32 The Proposed Development is a type of development and technology that has been successfully deployed within the UK and around Europe for many decades without, to the Applicant's best knowledge, any major accidents and / or disasters that have led to significant effects on the environment.

CONCLUSIONS

9.33 The Site is not at material risk from earthquakes, ground instability, flooding or extreme weather events.

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- 9.34 In the unlikely event of any on-site incidents, the volumes of substances (i.e. fuel, waste etc) are small and the nature of materials are not highly toxic. As such, they are not highly vulnerable to a major disaster.
- 9.35 There are no further anticipated significant risks associated with the development in regard to accidents and natural disasters.
- 9.36 It is therefore concluded that the Proposed Development is not particularly vulnerable to accident or disaster, and that day to day management measures, enforced by the Environmental Permit issued by the Environment Agency will ensure that these are effective.

REFERENCES

Ref 9.1: Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the '2017 Regulations') UK statutory Instrument 2017 No.571

Ref 9.2: The Control of Major Accident Hazards Regulations 2015: UK Statutory Instrument 2015 No. 483

Ref 9.3: Durham County Council's Civil Contingencies Unit

10 AIR QUALITY

INTRODUCTION

- 10.1 This chapter presents the findings of an assessment of local air quality impacts associated with the Proposed Development and has been carried out by Gair Consulting Ltd.
- 10.2 The potential impacts of the Proposed Development on local air quality during both the construction and operational phases have been assessed. For both phases, the type, source and significance of potential impacts are identified and the measures that should be employed to minimise these impacts are described.
- 10.3 The potential air quality impacts arising from the proposed development are as follows:
- construction impacts including construction dust and emissions from on-site construction plant;
 - traffic-related air quality impacts from vehicles accessing the proposed development during construction and operation; and
 - emissions to air from the incineration plant.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Scope of the Assessment

- 10.4 The scope of the assessment has been determined in the following way:
- review of air quality data for the area surrounding the site, including data from the Defra Air Quality Information Resource (UK-AIR);
 - desk study to confirm the location of nearby areas that may be sensitive to changes in local air quality; and
 - review and modelling of emissions data which have been used as input to the Breeze AERMOD dispersion modelling assessment.
- 10.5 Guidance is provided by the IAQM and Environmental Protection UK (EPUK) on indicative criteria for requiring a detailed traffic-related air quality assessment in their Land-use Planning Development Control: Planning for Air Quality (January 2017) (Ref: 10.1). For sites that are not located within an air quality management area (AQMA), these are 500 LDVs AADT (annual average

daily traffic) and/or 100 HDVs AADT. Within an AQMA, these are reduced to 100 LDV and/or 25 HDV. The site is not located within an AQMA. During construction, traffic accessing the site will be very variable but very unlikely to exceed the IAQM criteria for requiring a detailed assessment. During operation, the site activities are expected to generate up to 12 HDV deliveries per day (24 movements) plus 2 HDV vehicles (4 movements) per day for pallet collection and other miscellaneous deliveries and collections. In addition, there would be 1 HDV delivery of lime per week (2 movements) and 3 HDV skip collections per week (6 movements) for ash and general waste. The number of LDV movements would be less than 50 movements and would comprise staff (40 movements) and miscellaneous visitors (less than 10 movements). On this basis, it is concluded that HDV movements would be around 30 as the AADT and LDV movements would be around 50 AADT. Therefore, a detailed assessment of traffic-related air quality impacts for the operation of the proposed development is not required.

- 10.6 Therefore, the air quality assessment has considered on-site construction impacts associated with the Proposed Development and emissions to air from the incineration plant during operation.
- 10.7 Impacts associated with the construction of the proposed development have been assessed using the Institute of Air Quality Management (IAQM) construction dust methodology.
- 10.8 Operational impacts associated with the incineration plant have been assessed using a dispersion model to predict the impact at ground level utilising five years of meteorological data from Tees Valley Airport (2015 to 2019). This has considered the impact on human health and sensitive habitat sites.
- 10.9 Emissions to air from the combustion unit will be governed by the Industrial Emissions Directive (IED) (Ref: 10.2) which requires adherence to emission limits for the following pollutants:
- Nitrogen oxides (NO_x as NO₂);
 - Carbon monoxide;
 - Total dust (as PM₁₀ and PM_{2.5});
 - Gaseous and vaporous organic substances, expressed as total organic carbon;
 - Sulphur dioxide;
 - Hydrogen chloride and Hydrogen fluoride;
 - Twelve trace metals; and
 - Dioxins and furans.

- 10.10 The assessment has also considered emissions of Polycyclic aromatic hydrocarbons (PAH, as Benzo[a]pyrene) and polychlorinated biphenyls (PCBs). It is assumed that NO_x emissions will be controlled via the injection of ammonia or urea and will result in emissions of ammonia from ammonia slip. Therefore, ammonia emissions have also been included in the assessment.
- 10.11 The assessment for the Proposed Development comprises a review of emission parameters for the development and dispersion modelling to predict ground-level concentrations of pollutants at sensitive human and habitat receptor locations.
- 10.12 Predicted ground level concentrations are compared with relevant air quality objectives for the protection of health and critical levels/ loads for the protection of sensitive ecosystems and vegetation.

Construction Dust Impacts

Overview

- 10.13 To assess the potential impacts associated with dust and PM₁₀ releases during the construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM has been undertaken. Full details of the methodology used are presented in Appendix 10 Volume 2 of the ES.
- 10.14 This approach divides construction activities into the following dust emission sources:
- demolition;
 - earthworks;
 - construction; and
 - track out.
- 10.15 The risk of dust effects (negligible, low, medium or high) is determined by the scale (magnitude) and nature of the works and the proximity of sensitive human and ecological receptors.
- 10.16 The IAQM guidance recommends that an assessment be undertaken where there are sensitive human receptors:
- within 350 m of the site boundary; or
 - within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

10.17 An assessment should also be carried out where there are dust-sensitive ecological receptors:

- within 50 m of the site boundary;
- or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

10.18 The significance of the dust effects is based on professional judgement, taking into account the sensitivity of receptors and existing air quality.

Dust Emission Magnitude

10.19 The magnitude of the dust emissions for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 10.1 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

Table 10.1 Dust Emission Magnitude Criteria			
Source	Large	Medium	Small
Demolition	<ul style="list-style-type: none"> • Total building volume >50,000m³ • Potentially dusty material (e.g. concrete) • Onsite crushing and screening • Demolition activities >20m above ground level. 	<ul style="list-style-type: none"> • Total building volume 20,000 - 50,000m³ • Potentially dusty material • Demolition activities 10 - 20m above ground level. 	<ul style="list-style-type: none"> • Total building volume <20,000m³ • Construction material with low potential for dust release • Demolition activities <10m above ground level • Demolition during wetter months
Earthworks	<ul style="list-style-type: none"> • Total site area >10,000m² • Potentially dusty soil type (e.g. clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8m in height • Total material moved >100,000 tonnes 	<ul style="list-style-type: none"> • Total site area 2,500 - 10,000m² • Moderately dusty soil type (e.g. silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 - 8m in height • Total material moved 20,000 - 100,000 tonnes 	<ul style="list-style-type: none"> • Total site area <2,500m² • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4m in height • Total material moved <20,000 tonnes • Earthworks during wetter months
Construction	<ul style="list-style-type: none"> • Total building volume >100,000m³ • On site, concrete batching • Sandblasting 	<ul style="list-style-type: none"> • Total building volume 25,000 - 100,000m³ • Potentially dusty construction material (e.g. concrete) 	<ul style="list-style-type: none"> • Total building volume <25,000m³ • Material with low potential for dust release (e.g. metal cladding or timber)

		<ul style="list-style-type: none"> On site, concrete batching 	
Track out	<ul style="list-style-type: none"> >50 HGV movements in any one day (a) Potentially dusty surface material (e.g. high clay content) Unpaved road length >100m 	<ul style="list-style-type: none"> 10 - 50 HGV movements in any one day (a) Moderately dusty surface material (e.g. silt) Unpaved road length 50 - 100m 	<ul style="list-style-type: none"> <10 HGV movements in any one day (a) Surface material with low potential for dust release Unpaved road length <50m

(a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes.

Receptor Sensitivity

10.20 Factors defining the sensitivity of a receptor are presented in Table 10.2.

10.21 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Table 10.2 Factors Defining the Sensitivity of a Receptor			
Sensitivity	Human Health	Dust Soiling	Ecological
High	<ul style="list-style-type: none"> Locations where members of the public are exposed over a time period relevant to the air quality objectives for PM₁₀ (a) Examples include residential dwellings, hospitals, schools and residential care homes. 	<ul style="list-style-type: none"> Regular exposure High level of amenity expected. Appearance, aesthetics or value of the property would be affected by dust soiling. Examples include residential dwellings, museums, medium and long-term car parks and car showrooms. 	<ul style="list-style-type: none"> Nationally or Internationally designated site with dust sensitive features (b) Locations with vascular species (c)
Medium	<ul style="list-style-type: none"> Locations where workers are exposed over a time period relevant to the air quality objectives for PM₁₀ (a) Examples include office and shop workers (d) 	<ul style="list-style-type: none"> Short-term exposure Moderate level of amenity expected Possible diminished appearance or aesthetics of property due to dust soiling Examples include parks and places of work 	<ul style="list-style-type: none"> Nationally designated site with dust sensitive features (b) Nationally designated site with a particularly important plant species where dust sensitivity is unknown

Low	<ul style="list-style-type: none"> • Transient human exposure • Examples include public footpaths, playing fields, parks and shopping streets 	<ul style="list-style-type: none"> • Transient exposure • Enjoyment of amenity not expected. • Appearance and aesthetics of property unaffected • Examples include playing fields, farmland, footpaths, short-term car parks and roads 	<ul style="list-style-type: none"> • Locally designated site with dust sensitive features (b)
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- (a) In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.
- (b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).
- (c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.
- (d) Does not include worker exposure to PM₁₀ as protection is covered by Health and Safety at Work legislation. Except commercially sensitive horticulture.

Area Sensitivity

- 10.22 The sensitivity of the area to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing PM₁₀ concentrations in the area. Tables 4.2 and 4.3 in Appendix 10 Volume 2 of the ES summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts, respectively.
- 10.23 For each dust emission source (demolition, construction, earthworks and track out), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

- 10.24 The risk of dust impacts prior to mitigation for each emission source is determined based on the dust emission magnitude and the area sensitivity. The assessment matrices for these are presented in Tables 10.3, 10.4 and 10.5 for demolition, construction and earthworks, and track out, respectively.

Table 10.3: Risk of Dust Impacts – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 10.4: Risk of Dust Impacts – Earthworks and Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table 10.5: Risk of Dust Impacts - Track out

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Operational Impacts

Dispersion Modelling Parameters

10.25 Detailed air quality modelling using the AERMOD 10 (US EPA Version 21112) dispersion model has been undertaken to predict the impacts associated with emissions from the Proposed Development. The plant will be required to comply with the IED.

10.26 The European Union Best Available Techniques (BAT) Reference Document (BREF) for Waste Incineration was adopted in December 2019. The proposed facility does not currently have an

Environmental Permit. Therefore, it will be classed as a new plant. The BREF provides BAT Associated Emission Limits (AEL) for new plants and existing plants. For the purposes of this assessment, it is assumed that the plant will need to comply with the requirements for new plant. These ELVs are provided as a range of concentrations for each pollutant. Therefore, for the purposes of this assessment it is assumed that the plant will comply with the upper range of emissions as provided in Table 3.5 in Appendix 10 Volume 2 of the ES.

- 10.27 An emission limit of $9 \times 10^{-5} \text{ mg/Nm}^3$ has been assumed for PAH (benzo(a)pyrene) based on the Defra (WR0608) report on emissions from waste management facilities (Ref: 10.3). Information on PCB emissions has also been obtained from the Defra report WR0608. Based on the information provided, a maximum emission concentration of $3.6 \times 10^{-9} \text{ mg/m}^3$ is assumed for PCBs.
- 10.28 For the Group III trace metal predictions, it has been assumed in accordance with the Environment Agency's (EA) metals guidance (Ref: 10.4), that each of the metals is emitted at the maximum ELV (assumed to be 0.3 mg/Nm^3) as a worst case. The same approach has also been adopted for the Group I and II metals.
- 10.29 Where the screening criteria set out in the guidance are not met, typical emission concentrations for energy from waste plants have been used, as specified in the guidance. The plant will be equipped with air pollution control equipment specifically designed to control emissions from energy from waste facilities. Therefore, it is not unreasonable to assume that emissions from the facility will be no worse than the maximum measured at municipal waste incinerators.
- 10.30 For the purposes of the modelling assessment, the plant is assumed to be operating at full load, continually throughout the year, ensuring that a worst-case assessment of impacts is presented. Stack emission parameters (flow rate, temperature etc.) have been provided by the technology supplier. A summary of the input parameters used in the dispersion model are summarised in Table 10.6.

Table 10.6: Stack Emission Parameters	
Parameter	Emission Parameters
Stack height (m)	30
Flue exit diameter (m)	0.7
Temperature of release (°C)	200
Moisture content (%v/v)	8.4
Oxygen content (%v/v dry)	11.0
Actual flow rate (Am^3/s)	6.94
Normalised flow rate (Nm^3/s) (a)	3.67

Emission velocity at flue exit (m/s)	18.0	
Emission Concentration (mg/Nm ³) (a)	Emission Concentration (mg/Nm ³) (a)	Emission Rate (g/s)
PM ₁₀	5	0.018
TOC	10	0.037
HCl	6	0.022
HF	1	0.0037
CO	50	0.18
SO ₂	30	0.11
NO _x	120	0.44
NH ₃	10	0.037
Group I (Cd, Tl)	0.02	7.3 x 10 ⁻⁵
Group II (Hg)	0.02	7.3 x 10 ⁻⁵
Group III (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)	0.3	1.1 x 10 ⁻³
Dioxins and Furans	0.06 ng/Nm ³	1 x 10 ⁻⁷
PAHs (as B[a]P)	9 x 10 ⁻⁵	3.3 x 10 ⁻⁷
PCBs	3.6 x 10 ⁻⁹	1.3 x 10 ⁻¹¹
(a) Normalised to 273K, 1 atmosphere, dry and 11% O ₂		

Meteorological Data

- 10.31 Dispersion modelling has been undertaken using five years (2015 to 2019) of hourly sequential meteorological data in order to take account of inter-annual variability and reduce the effect of any atypical conditions. Data from a meteorological station at Tees Valley Airport (approximately 15 km southeast of the development site) have been used for the assessment. This is the most representative data currently available for the area.

Building Downwash

- 10.32 The presence of buildings close to emission sources can significantly affect the dispersion of pollutants by leading to a phenomenon called building downwash. This occurs when a building distorts the wind flow, creating zones of increased turbulence. Increased turbulence causes the plume to come to ground earlier than otherwise would be the case and results in higher ground level concentrations closer to the stack.
- 10.33 Downwash effects are only significant where building heights are greater than 30 to 40% of the emission release height. The downwash structures also need to be sufficiently close for their influence to be significant. All potential downwash structures have been included in the model as detailed in Table 3.4 in Appendix 10 Volume 2 of the ES.

Topography

- 10.34 The presence of elevated terrain can significantly affect the dispersion of pollutants by increasing turbulence and reducing the distance between the plume centre line and the ground level. Terrain data set has been included in the model to ensure that the impact of terrain features on the dispersion of emissions from the facility is taken into account.

Nitric Oxide to NO₂ Conversion

- 10.35 Oxides of nitrogen (NO_x) emitted to atmosphere as a result of combustion will consist largely of nitric oxide (NO), a relatively innocuous substance. Once released into the atmosphere, NO is oxidised to NO₂. The proportion of NO converted to NO₂ depends on a number of factors including wind speed, distance from the source, solar irradiation and the availability of oxidants, such as ozone (O₃).
- 10.36 A conversion ratio of 70% NO_x:NO₂ has been assumed for comparison of predicted concentrations with the long-term objectives for NO₂. A conversion ratio of 35% has been utilised for the assessment of short-term impacts, as recommended by the Environment Agency's risk assessment guidance.

Sensitive Human Receptors

- 10.37 LAQM.TG(16) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.
- 10.38 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.
- 10.39 The locations of the discrete sensitive receptors selected for the assessment are presented in Table 10.7 and Figure 10.1. In addition to the seventeen receptors considered, the air intake vents located on the roof (at a height of around 14 m) of the western building at the Hitachi Rail facility have been included. The location of these is provided in Figure 10.2.

Table 10.7: Human Health Receptors				
ID	Receptor	Type	Easting	Northing
D1	Magnolia Close	Residential	426306	523424
D2	West Cemetery	Community	426307	523891
D3	North Cottages	Residential	426239	523806
D4	Sports Ground	Leisure	426697	523979
D5	Cumby Road	Residential	427037	524352
D6	Finchale Road	Residential	427645	524291
D7	Durham Road	Residential	428443	523200
D8	Heighington Lane	Residential	427904	522516
D9	East Field Farm	Residential	425930	522696
D10	Cherry Tree Drive	Residential	426052	523161
D11	Kieran Maxwell Lane	Residential	425211	522549
D12	Industrial	Commercial/Industrial	426818	522628
D13	College	Educational	427269	522205
D14/G1	Hitachi Rail (ground level)	Commercial/Industrial	426637	522195
D15	Dene Bridge Farm	Farm/residential	425352	521443
D16	Brakkes Farm	Farm/residential	426076	521477
D17	Clay Pigeon Shoot	Leisure	426431	521913
V1 to V16	Hitachi Rail Intake Vents (14 m above ground level)	Commercial/industrial	Various	

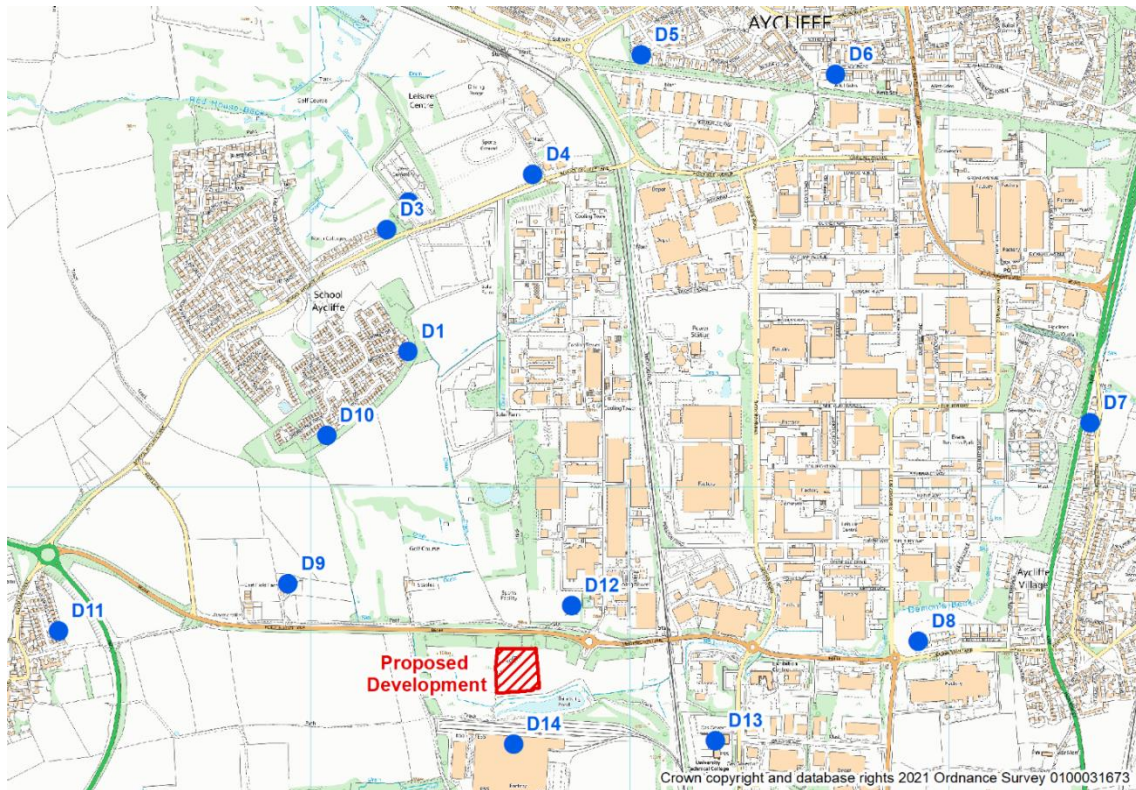


Figure 10.1: Sensitive Human Health Receptor Locations

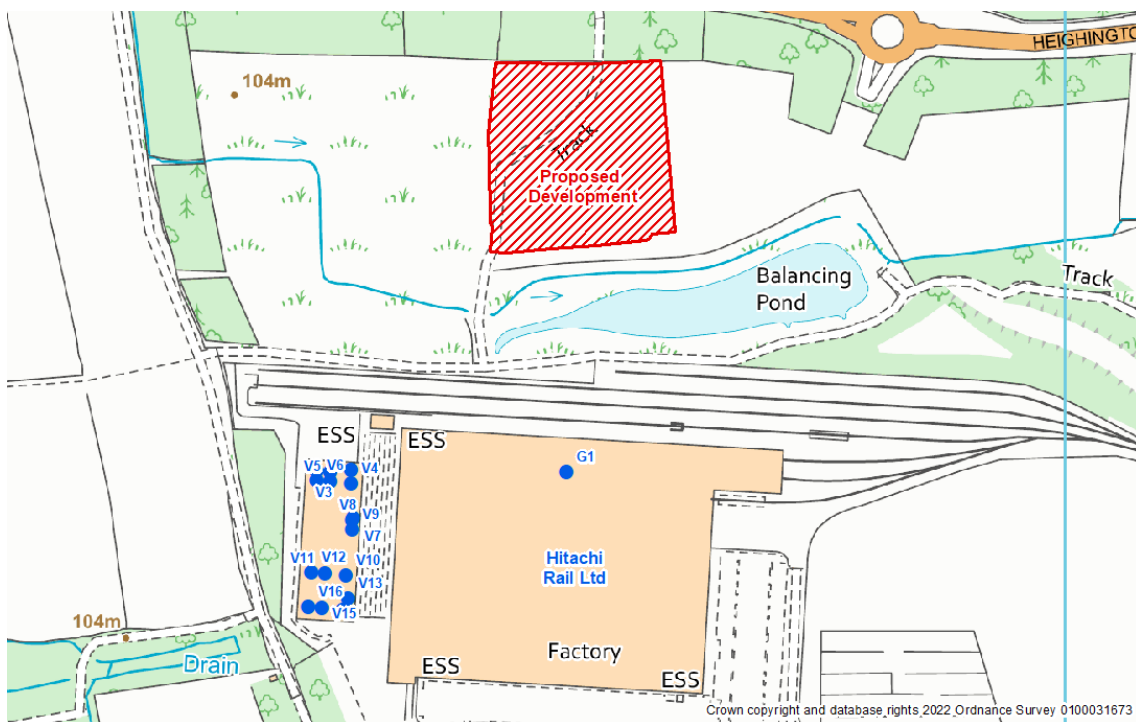


Figure 10.2: Hitachi Rail Receptors Considered for the Assessment

10.40 Pollutant concentrations have been predicted at both discrete receptor locations and the maximum predicted concentration over a 4 km by 4 km Cartesian grid of 50 m grid resolution.

Sensitive Habitat Receptors

10.41 The Environment Agency's risk assessment guidance (Ref: 10.5) states that the impact of emissions to air on vegetation and ecosystems should be assessed for the following habitat sites within 10 km of the source:

- Special Areas of Conservation (SACs) and candidate SACs (cSACs) designated under the EC Habitats Directive;
- Special Protection Areas (SPAs) and potential SPAs designated under the EC Birds Directive; and
- Ramsar Sites designated under the Convention on Wetlands of International Importance.

10.42 Within 2 km of the source:

- Sites of Special Scientific Interest (SSSI) established by the 1981 Wildlife and Countryside Act;
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- local wildlife sites (Sites of Interest for Nature Conservation, SINC and Sites of Local Interest for Nature Conservation, SLINC); and
- Ancient Woodland (AW).

10.43 Habitat receptor designations and locations relevant to the assessment are presented in Table 10.8 and the location of each is presented in Figure 10.3.

Table 10.8: Sensitive Habitat Receptors		
Receptor	Primary Habitat	Approx. Location (Relative to the Site)
H1. Cumby Pond LWS	Ponds and habitats for Great crested newt	0.5 km south
H2. School Aycliffe LWS	Large pond in an area of fen/willow scrub	1.7 km north-northwest
H3. Aycliffe Nature Park LWS	Mosaic of scrub and grassland and wetland calcareous habitats	2.0 km northeast
H4. Aycliffe Quarry LWS	Assumed to be grassland and shrub	1.4 km east-southeast

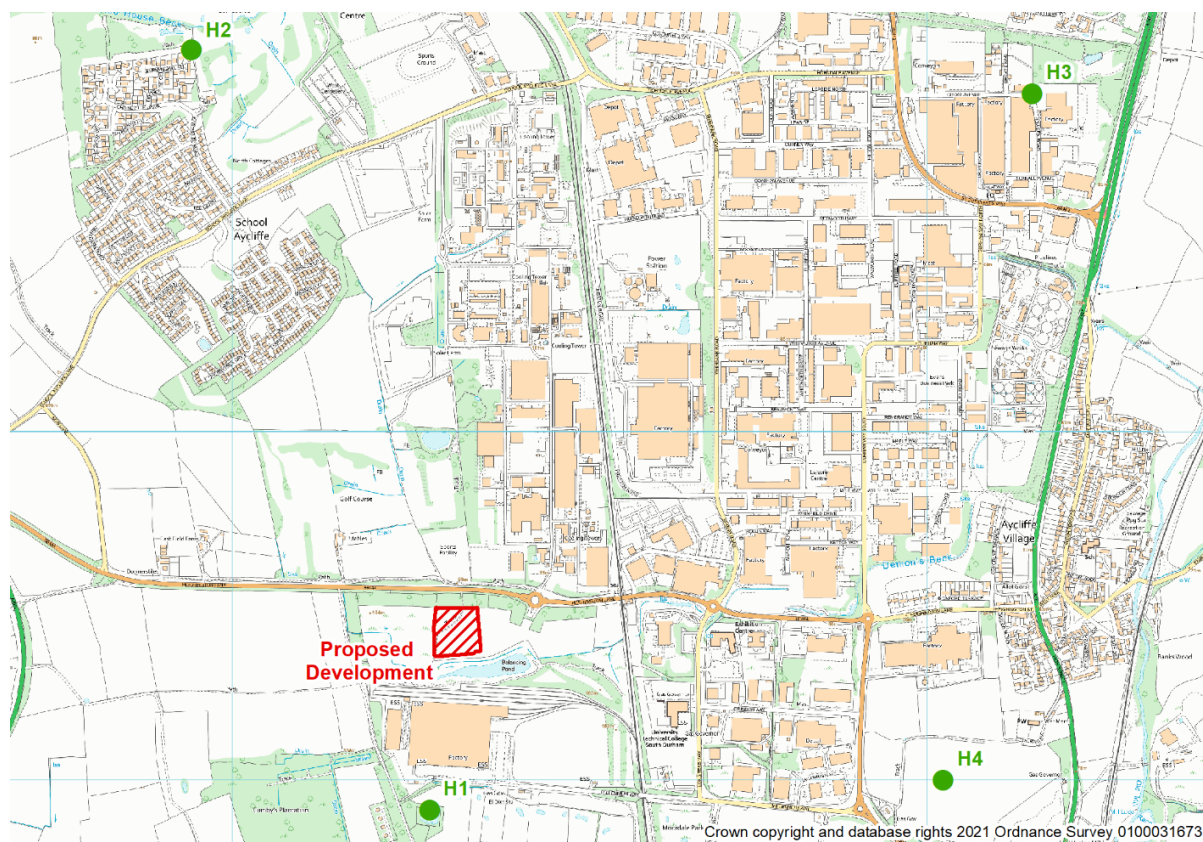


Figure 10.3: Sensitive Habitat Receptor Locations

10.44 Where appropriate, the modelled ground level pollutant concentrations are used to predict deposition rates, using typical deposition velocities. A summary of typical NO₂, NH₃, SO₂ and HCl dry deposition velocities is presented in Table 6.6 in Appendix 10 Volume 2 of the ES.

10.45 Predicted ground level concentrations and acidification / deposition rates are compared with relevant critical levels and critical loads for the protection of sensitive ecosystems and vegetation (see Section 6.1 in Appendix 10 Volume 2 of the ES).

Significance Criteria

IAQM Planning Guidance

10.46 The significance of the predicted impacts is determined in accordance with the EPUK/IAQM planning guidance, in combination with professional judgement. The guidance recommends that the impact at individual receptors is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the air quality assessment level (AQAL) and examining this change in the context of the new total concentration and its relationship with the assessment criterion as summarised in Table 10.9.

- 10.47 The EPUK/IAQM guidance notes that the criteria in Table 10.9 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for.

Table 10.9: Impact Descriptors for Individual Receptors.				
Long Term Average Concentration at Receptor in Assessment Year	Change in concentration relative to AQAL (a)			
	1%	2%-5%	5%-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight adverse	Moderate adverse
76-94% of AQAL	Negligible	Slight adverse	Moderate adverse	Moderate adverse
95-102% of AQAL	Slight adverse	Moderate adverse	Moderate adverse	Substantial adverse
103-109% of AQAL	Moderate adverse	Moderate adverse	Substantial adverse	Substantial adverse
110% or more of AQAL	Moderate adverse	Substantial adverse	Substantial adverse	Substantial adverse
(a) A change in concentration of less than 0.5% of the AQAL is considered insignificant, however changes between 0.5% and 1% are rounded up to 1%.				

- 10.48 The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:
- The existing and future air quality in the absence of the development;
 - The extent of current and future population exposure to the impacts; and
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

- 10.49 The EPUK/IAQM guidance also advises that short-term impacts of 10% or less of the AQAL are described as negligible, regardless of existing air quality. Where the short-term process concentrations are 11-20% of the AQAL the severity of the impact is described as slight adverse. Impacts of 21-50% and over 50% are described as moderate and substantial adverse, respectively.

Trace Metals

- 10.50 For the Group III metals the significance of emissions is determined following the EA guidance on releases from waste Incinerators, which recommends a two step approach to screening group III metal emissions, which is as follows:

- Step One – predict metal concentrations assuming each metal is being emitted at 100% of the group ELV. The results are compared against the following criteria:
 - Where the PC of any metal exceeds 1% of the long-term or 10% of the short-term AQAL, then the PEC should be compared to the AQAL.
 - Where the PEC exceeds 100% of the AQAL, then the assessment should proceed to Step Two.
- Step Two – make predictions for the metals exceeding the criteria in Step One, using emission factors provided in the guidance. Where the PC of any metal exceeds 1% of the long-term or 10% of the short-term AQAL, then the PEC should be compared to the AQAL. Where the PEC exceeds 100% of the AQAL, then the impact of the metal can be considered to be significant.

Habitat Sites

- 10.51 The Environment Agency has developed criteria for assessing at SPAs, SACs, Ramsar sites and SSSIs, compared with the relevant EAL and background air quality. The criteria are designed to ensure that there is a substantial safety margin to protect the environment.

Stage 1

- 10.52 A process concentration (PC) is considered potentially insignificant if:

- The long term PC < 1% of the long-term EAL.
- The short term PC < 10% of the short-term EAL.

Stage 2

- 10.53 If the Stage 1 screening criteria are not met, the PC should be considered in combination with relevant ambient background pollutant concentrations. The air quality standards are likely to be met if:

- The long term PC + background concentration < 70% of the EAL.
- The short term PC < 20% of the (EAL - short term background concentration).

- 10.54 For local nature sites (SINCs, SLINC's, NNRs, LNRs and ancient woodland), a process contribution (PC) is considered not significant if:

- The long term PC < 100% of the long-term EAL.
- The short term PC < 100% of the short-term EAL.

- 10.55 The IAQM has recently issued guidance on the assessment of air quality impacts on designated nature conservation sites (Ref 10.6). It is the IAQM's opinion that the Environment Agency's 1% and 10% screening criteria should not be used rigidly and '*not to a numerical precision greater than the expression of the criteria themselves*'. Furthermore, the IAQM guidance suggests that LWS should be treated in the same manner as SSSIs and European sites '*although the determination of the significance of an effect may be different*'.

LEGISLATION, PLANNING POLICY AND GUIDANCE

The European Directive on Ambient Air and Cleaner Air for Europe

- 10.56 European Directive 2008/50/EC of the European Parliament and of the Council of 21st May 2008, sets legally-binding Europe-wide limit values for the protection of public health and sensitive habitats. The Directive streamlines the European Union's air quality legislation by replacing four of the five existing Air Quality Directives within a single, integrated instrument.
- 10.57 The pollutants included are sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter of less than 10 micrometres (µm) in aerodynamic diameter (PM₁₀), particulate matter of less than 2.5 µm in aerodynamic diameter (PM_{2.5}), lead (Pb), carbon monoxide (CO), benzene (C₆H₆), ozone (O₃), polycyclic aromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni) and mercury (Hg).

Air Quality Strategy for England, Scotland, Wales and Northern Ireland

- 10.58 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007 (Ref: 10.7), pursuant to the requirements of Part IV of the Environment Act 1995. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.
- 10.59 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems.
- 10.60 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

- 10.61 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.
- 10.62 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of nitrogen dioxide (NO₂), the short-term standard is for a 1-hour averaging period, whereas for fine particulates (PM₁₀) it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

Air Quality (England) Regulations

- 10.63 Many of the objectives in the AQS were made statutory in England with the Air Quality (England) Regulations 2000 (Ref: 10.8) and the Air Quality (England) (Amendment) Regulations 2002 (the Regulations) (Ref 10.9) for the purpose of Local Air Quality Management (LAQM).
- 10.64 The Air Quality Standards Regulations 2010 (Ref 10.10) have adopted into UK law the limit values required by EU Directive 2008/50/EC and came into force on the 10th June 2010. These regulations prescribe the ‘relevant period’ (referred to in Part I2V of the Environment Act 1995) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the ‘relevant period’.
- 10.65 Ozone is not included in the Regulations as, due to its trans-boundary nature, mitigation measures must be implemented at a national level rather than at a local authority level.

Environment Act 2021

- 10.66 The Environment Act 2021 ⁸ establishes a legally binding duty on the government to bring forward new air quality targets by 31 October 2022 for PM_{2.5}.
- 10.67 The proposed air quality targets currently under consultation (consultation closes on 27th June 2022) are:
- an Annual Mean Concentration Target - a maximum concentration of 10 µg/m³ to be met across England by 2040; and

⁸ Environment Act 2021, 2021 Chapter 30

- a Population Exposure Reduction Target ('exposure target') - a 35% reduction in population exposure by 2040 (compared to a base year of 2018).

10.68 Schedule 11 of the Environment Act 2021 also strengthens the Local Air Quality Management (LAQM) framework which was introduced by the Environment Act 1995. Schedule 11 requires the LAQM framework to be reviewed and where appropriate modified within 12 months of the Environment Act coming into force and every 5 years following the initial review. Schedule 11 also places a duty on the local authority to have regard to the LAQM framework when exercising a function which could affect air quality (i.e. determining a planning application with air quality implications).

Local Air Quality Management (LAQM)

10.69 Part IV of the Environment Act 1995 also requires local authorities to periodically review and assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

10.70 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

10.71 For each AQMA, the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

10.72 The Department of Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their Review and Assessment work (Ref: 10.11). This guidance, referred to in this chapter as LAQM.TG(16), has been used where appropriate in the assessment.

National Planning Policy Framework

10.73 The National Planning Policy Framework (NPPF) (Ref 10.12) sets out the Government's planning policies for England and how these are expected to be applied.

10.74 In conserving and enhancing the natural environment, the NPPF states that (Paragraph 170) *'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality.'*

- 10.75 The NPPF also states that (Paragraph 181) *‘planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.’*
- 10.76 Paragraph 183 of the NPPF states that *‘the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.’*

EPUK & IAQM Land Use Planning and Development Control

- 10.77 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017 (Ref: 10.1) to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.
- 10.78 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts. This guidance has been used within this assessment.

Durham County Council Review and Assessment of Air Quality

- 10.79 The site is located within the administrative area of Durham County Council (DCC) but within 100 m of the administrative area of Darlington Borough Council (DBC).
- 10.80 DCC and DBC carry out frequent review and assessments of air quality within their areas and produce Annual Status Reports in accordance with the requirements of Defra.

10.81 Durham County Council has declared two areas as Air Quality Management Areas (AQMA). One of these is located within Durham City 20 km to the north of the site and the other within Chester-le-Street, 27 km to the north. These are both declared due to exceedances of the annual mean air quality objective for NO₂. Darlington Borough Council has not been required to declare any AQMA within their administrative area. Therefore, the proposed development site is not located within or close to an AQMA.

Industrial Emissions Directive

10.82 The Industrial Emissions Directive (2010/75/EU) came into force on the 6th January 2011, replacing the seven existing Directives, including the Waste Incineration Directive (WID) and Large Combustion Plant Directive (LCPD), implemented through the Environmental Permitting Regulations (EPR).

10.83 The aim of the new Directive is to simplify the existing legislation and reduce administrative costs, whilst maintaining a high level of protection for the environment and human health. Permits will still be issued under EPR; however existing and new sites will be required to comply with the requirements of the IED, which places greater emphasis on new plant best available technology (BAT).

10.84 The IED has been transposed into UK law via the Environmental Permitting (England and Wales) (Amendment) Regulations 2013 (SI 2013 No, 390), which came into force on 27 February 2013.

10.85 The design and operation of all new waste incinerations facilities must ensure compliance with emission limit values (ELVs) set out in the IED.

10.86 The European Union Best Available Techniques (BAT) Reference Document (BREF) for Waste Incineration has recently been issued (December 2019). The BREF provides BAT Associated Emission Limits (AEL) for new plants and existing plants. Therefore, the emission limits provided by the BREF for new plant are assumed for this assessment.

BASELINE CONDITIONS

Introduction

10.87 This section provides an assessment of baseline conditions for the proposed development site. The assessment of impacts requires an analysis of the change in pollutant concentrations with the relevant air quality standard taking into account background concentrations of the pollutant.

Background monitoring data is not always available locally, particularly in areas that have good air quality. However, it is normal practice to obtain data from a comparable location to describe the air quality at the development site. Therefore, air quality at the development site has been characterised based on monitoring data and modelled data obtained from national and local sources.

Local Monitoring

- 10.88 Durham County Council carried out automatic ambient air quality monitoring of NO₂ at one site in 2018. This automatic monitoring site is located within the declared Durham City Centre AQMA. The council also has an extensive network of diffusion tube locations within the county.
- 10.89 The majority of the monitoring sites are located at roadside locations within the AQMAs where air quality is poor due to heavily trafficked roads. There are no monitoring sites within Newton Aycliffe. Monitoring carried out by Darlington Borough Council is limited to areas within and around Darlington. Therefore, monitoring data obtained by DCC and DBC would not be appropriate for characterising air quality at the development site.

Source of Monitoring Data

- 10.90 Appropriate monitoring data has been obtained from a number of national monitoring networks and from the Defra UK Background Air Pollution Maps for 2020.
- 10.91 The most recent mapped data were published in August 2020 and are based on 2018 monitoring data. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emission inventories and measurements of ambient air pollution from both automated and non-automated sites. The recent background maps have been used to estimate background concentrations of NO₂, PM₁₀ and PM_{2.5}. For CO, SO₂ and benzene earlier mapped data have been used as these pollutants are not included in the recent mapped data.
- 10.92 Other monitoring networks that have been accessed to assess background pollutant concentrations include the following.
- Defra Acid Gases & Aerosol Network;
 - UK Urban and Rural Heavy Metals Monitoring Network;
 - National Ammonia Monitoring Network; and
 - Toxic Organic Micropollutants Network.
- 10.93 Full details of the baseline assessment for the Proposed Development are provided in Section 2.5 of Appendix 10 Volume 2 of the ES.

Summary of Background Concentrations

10.94 A summary of the annual mean and short-term background concentrations assumed for the assessment is presented in Table 10.10. The current background concentrations are assumed to be representative of future year concentrations. Since pollutant concentrations are expected to decline in the future, this methodology ensures that the worst-case impacts are determined (i.e. future impacts combined with existing air quality).

Table 10.10: Summary of Background Concentrations		
Pollutant	Annual Mean	Short-Term
Particles (PM ₁₀)	11.2 µg/m ³	13.2 µg/m ³ (a)(b)
Particles (PM _{2.5})	6.8 µg/m ³	n/a
Nitrogen Dioxide (NO ₂)	12.1 µg/m ³	24.2 µg/m ³ (a)
Sulphur Dioxide (SO ₂)	2.9 µg/m ³	24- hour 3.4 µg/m ³ (a)(b) 1-hour 5.8 µg/m ³ (a) 15- minute 7.8 µg/m ³ (a)(d)
Carbon Monoxide (CO)	118 µg/m ³	8 – hour 165 µg/m ³ (a)(c) 1 – hour 236 µg/m ³ (a)
Hydrogen Fluoride (HF)	0.5 µg/m ³	1.0 µg/m ³ (a)
Hydrogen Chloride (HCl)	0.21 µg/m ³	0.42 µg/m ³ (a)
Ammonia (NH ₃)	8.5 µg/m ³	17.0 µg/m ³ (a)
Benzene	0.30 µg/m ³	0.35 µg/m ³ (a)(b)
Dioxins and Furans (PCDD/Fs)	7.3 fg/m ³	n/a
Antimony (Sb)	No data available	No data available
Arsenic (As)	0.50 ng/m ³	1.0 ng/m ³ (a)
Cadmium (Cd)	0.28 ng/m ³	n/a
Chromium (Cr)	1.9 ng/m ³	3.8 ng/m ³ (a)
Cobalt (Co)	0.088 ng/m ³	0.18 ng/m ³ (a)
Copper (Cu)	2.9 ng/m ³	5.8 ng/m ³
Lead (Pb)	7.9 ng/m ³	n/a
Manganese (Mn)	25.0 ng/m ³	50.0 ng/m ³ (a)
Mercury (Hg)	No data available	No data available
Nickel (Ni)	0.68 ng/m ³	n/a
Thallium (Tl)	No data available	n/a
Vanadium (V)	2.5 ng/m ³	3.0 ng/m ³ (a)(b)
Polycyclic Aromatic Hydrocarbons (PAH, as BaP)	0.18 ng/m ³	n/a
Polychlorinated biphenyls (PCBs)	0.106 ng/m ³	0.212 ng/m ³ (a)

- (a) 1-hour mean background concentration estimated by multiplying the annual mean by a factor of 2 in accordance with the EA Guidance.
- (b) 24-hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.59 in accordance with the EA Guidance.
- (c) 8-hour mean background concentration estimated by multiplying the 1-hour mean by a factor of 0.70 in accordance with the EA Guidance.
- (d) 15-minute mean background concentration estimated by multiplying the 1-hour mean by a factor of 1.34 in accordance with the EA Guidance.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

Construction Phase Effects

Screening of Impacts

10.95 Buffer distances (20 m, 50 m, 100 m and 200 m) from the site boundary are provided in Figure 10.4. In addition, this provides a 50 m buffer distance for construction traffic for a distance of 500 m from the site. This assumes traffic will access the site from the north along Heighington Lane.

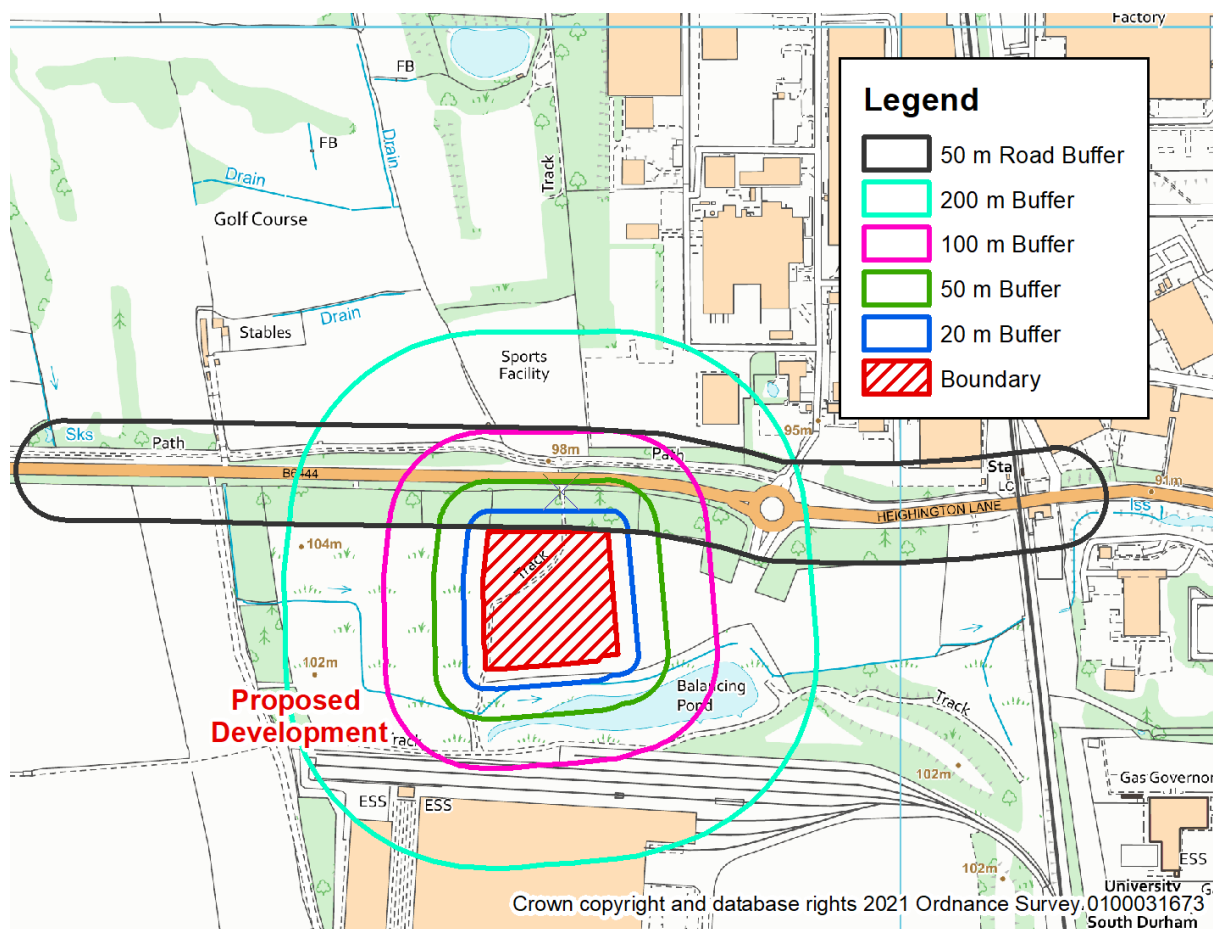


Figure 10.4: Buffer Distances for the Consideration of Construction Dust Impacts

- 10.96 Based on the IAQM Guidance there are sensitive receptors within 350 m of the construction site boundary and within 50 m of a road used by construction traffic. Therefore, a more detailed assessment of construction dust impacts is required to assess the impact on dust soiling and human health, and this is provided in the remainder of this section.
- 10.97 The nearest habitat site to the proposed development is the Aycliffe Nature Park LWS which is located in excess of 1 km from the site. Therefore, the impact of construction activities on habitats can be screened out of the assessment (i.e. greater than 50 m from construction activities).
- 10.98 Activities at the site will include earthworks, construction and there will be vehicles accessing the site for the delivery of materials and for the removal of excess soil and waste material. There are no substantial structures on site requiring demolition. Therefore, the assessment has considered the following:
- the impact of earthworks on human receptors;
 - the impact of construction on human receptors; and
 - the impact of track out on human receptors.
- 10.99 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.
- 10.100 Wind roses for the years 2015 to 2019 from Tees Valley Airport are provided in Appendix D of Appendix 10 Volume 2 of the ES, which shows that the prevailing wind is from the south, therefore receptors to the north of the development site are the most likely to experience dust impacts from construction activities.

Dust Emission Magnitude

- 10.101 The assessment has considered the overall construction of the development such that any mitigation measures can be focussed where required for each activity.
- 10.102 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the site and landscaping. The area of the site is approximately 2.02 hectares. During earthworks, there is likely to be less than five heavy duty vehicles working on site at any given time and materials are likely to be stored in bunds less than 4 m in height. However, given

the size of the site and to ensure a precautionary assessment, the magnitude of the potential dust emission for the earthworks phase is considered to be 'medium'.

10.103 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of the build. The completed development will likely have a volume of between 25,000 and 100,000 m³ although construction materials will comprise principally of a steel portal building with cladding and this will have a low dust emission potential. Therefore, based on the overall size of the development and the construction methodology, the construction dust emission magnitude is considered to be 'medium'.

10.104 Factors influencing the degree of track out and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Construction traffic will access the site via Heighington Lane. The number of HGV movements (leaving the site) is likely to be less than ten per day. Therefore, the dust emission magnitude due to track out is considered to be 'small'.

10.105 For demolition earthworks, construction and track out the assessment of the potential dust emission magnitude is summarised in Table 10.11.

Table 10.11: Summary of Dust Emission Magnitude			
Demolition	Earthworks	Construction	Track out
None	Medium	Medium	Small

Area Sensitivity

10.106 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary. There are no residential or high sensitivity receptors within 350 m of the proposed development site. The nearest receptors are industrial receptors and would be described as being of low sensitivity. There are no industrial/commercial receptors within 100 m of the site, the nearest being to the south at a distance of 140 m. Based on the proximity of receptors and the criteria provided in Table 4.2 in Appendix 10 Volume 2 of the ES, it is concluded that the sensitivity of the area to dust soiling is 'low'.

10.107 The sensitivity of the area to human health impacts is assessed on the distance of receptors from the various activities and the existing background PM₁₀ concentration. Background PM₁₀ for the local area has been obtained from the Defra background maps which indicated that background concentrations for the area are around 11.2 µg/m³. Therefore, the sensitivity of the area to human health impacts is determined based on the IAQM guidance as presented in Table 4.3 in Appendix 10 for background PM₁₀ concentrations of less than 24 µg/m³. Based on the proximity of receptors

and the criteria provided in Table 4.3 in Appendix 10, it is concluded that the sensitivity of the area to human health impacts is 'low'.

10.108 A summary of the area sensitivity to demolition, earthworks, construction and track out are provided in Table 10.12.

Table 10.12: Summary of the Sensitivity of the Area to Construction Impacts				
Impact	Demolition	Earthworks	Construction	Track out
Dust soiling	None	Low	Low	Low
Human health	None	Low	Low	Low

Dust Risk Affects

10.109 The dust emission magnitude and sensitivity of the area are combined to determine the risk of impacts using Table 10.3 (demolition), Table 10.4 (earthworks and construction) and Table 10.5 (track out). A summary of the risks is presented in Table 10.13. These are defined on the basis of no mitigation beyond that required by legislation. Where the risk is assessed as 'negligible' no additional mitigation is considered necessary.

Table 10.13: Summary of Risk of Dust Impacts Prior to Mitigation				
Impact	Demolition	Earthworks	Construction	Track out
Dust soiling	None	Low risk	Low risk	Negligible risk
Human health	None	Low risk	Low risk	Negligible risk

10.110 For earthworks and construction, the risk of dust impacts was assessed as low risk. Therefore, additional mitigation measures may be required to minimise off-site impacts during construction.

Mitigation Measures

10.111 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, construction operations have been successfully undertaken without impacts to nearby properties.

10.112 Overall, the site is considered to be a low or negligible risk of dust soiling and a low or negligible risk to human health from particulate matter emissions from construction activities at the site. Appropriate mitigation measures for the proposed development have been identified following the IAQM guidance and based on the risk effects presented in Table 10.13. It is recommended that the measures set out in Appendix A in Appendix 10 Volume 2 of the ES are incorporated into a

Construction Environment Management Plan (CEMP) and approved by the council prior to commencement of any work on site.

10.113 Following implementation of the measures recommended for inclusion within the CEMP, the impact of emissions during construction of the proposed development would be negligible.

Operational Phase Effects - Human Health Impact

Introduction

10.114 Predicted process contributions (PC) for the five years of meteorological data are presented as the maximum concentration for each of the discrete receptors identified in Table 10.7. Emissions from the facility are assumed to be at the BREF emission limits for new plant.

10.115 The maximum PC is added to the estimated background concentration for the area (see Table 10.10) to give the total predicted environmental concentration (PEC) for comparison with the relevant air quality objectives. The significance of the impacts has been assessed in accordance with the IAQM planning guidance.

Nitrogen Dioxide (NO₂)

10.116 The maximum predicted annual mean and 99.8th percentile of 1-hour mean ground level NO₂ concentrations are presented in Table 10.14.

Table 10.14: Predicted Concentrations of NO ₂			
Receptor	Annual Mean		99.8 th Percentile of 1-hour Means (ug/m ³)
	PC (µg/m ³)	PC (% AQO)	PC
Maximum Predicted	0.98	2%	3.1
D1 Magnolia Close	0.078	0%	0.70
D2 West Cemetery	0.050	0%	0.51
D3 North Cottages	0.050	0%	0.51
D4 Sports Ground	0.060	0%	0.49
D5 Cumby Road	0.048	0%	0.44
D6 Finchale Road	0.041	0%	0.39
D7 Durham Road	0.034	0%	0.35
D8 Heighington Lane	0.058	0%	0.50
D9 East Field Farm	0.035	0%	0.80
D10 Cherry Tree Drive	0.049	0%	0.77
D11 Kieran Maxwell Lane	0.014	0%	0.41
D12 Industrial	0.75	2%	2.4
D13 College	0.12	0%	0.92

D14/Vents Maximum Hitachi	0.33	1%	2.5
D15. Dene Bridge Farm	0.016	0%	0.29
D16. Brakkes Farm	0.016	0%	0.33
D17. Clay Pigeon Shoot	0.023	0%	0.50
AQO ($\mu\text{g}/\text{m}^3$)	40		200
Background ($\mu\text{g}/\text{m}^3$)	12.1		24.2
Maximum PC as %age of AQO	2%		2%
Maximum PEC as %age of AQO	33%		14%

- 10.117 At residential properties where there is relevant public exposure, the maximum predicted annual mean NO_2 concentrations are assessed as not significant (0% for the AQO). For the maximum predicted anywhere within the model domain the impact would be assessed as ‘negligible’ as the PC is 2% of the AQO and the PEC is 75% or less of the AQO. The location of the predicted maximum occurs to the north of the facility (refer Figure 10.4) where there is no relevant public exposure. In addition, predicted concentrations as the PEC are well below the AQO. Therefore, it is concluded that the long-term impact of emissions of NO_x from the proposed development would be ‘not significant’.
- 10.118 The hourly-mean predicted concentrations are less than 10% of the AQO at all locations including the maximum predicted and the impact would be described as ‘negligible’ according the IAQM planning guidance. Therefore, it is concluded that the short-term impact of NO_x emissions from the proposed development would be ‘not significant’.
- 10.119 Predicted annual mean and 99.8th percentile of hourly mean NO_2 concentrations for the most recent meteorological year (2019), are presented as contour plots in Figures 10.5 and 10.6, respectively.

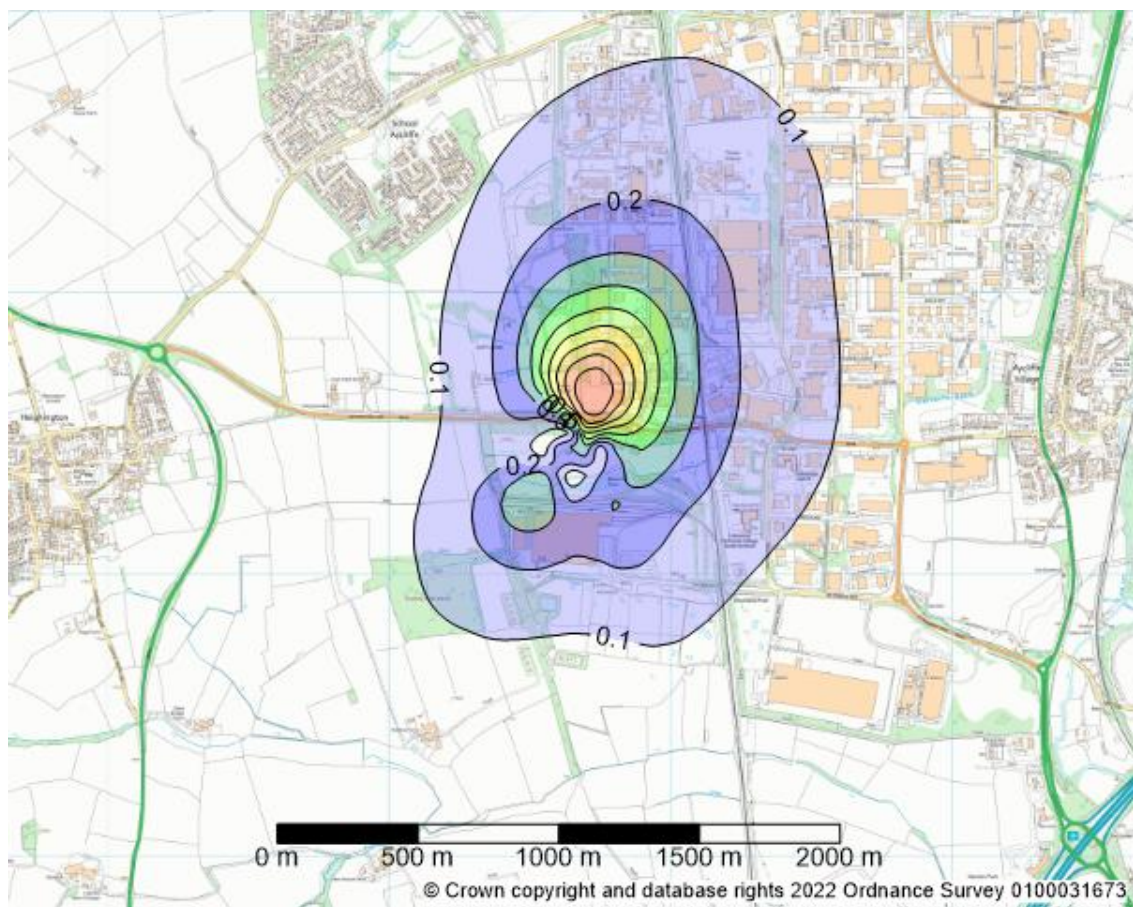


Figure 10.5: Predicted Annual Mean NO₂ Concentrations (µg/m³)

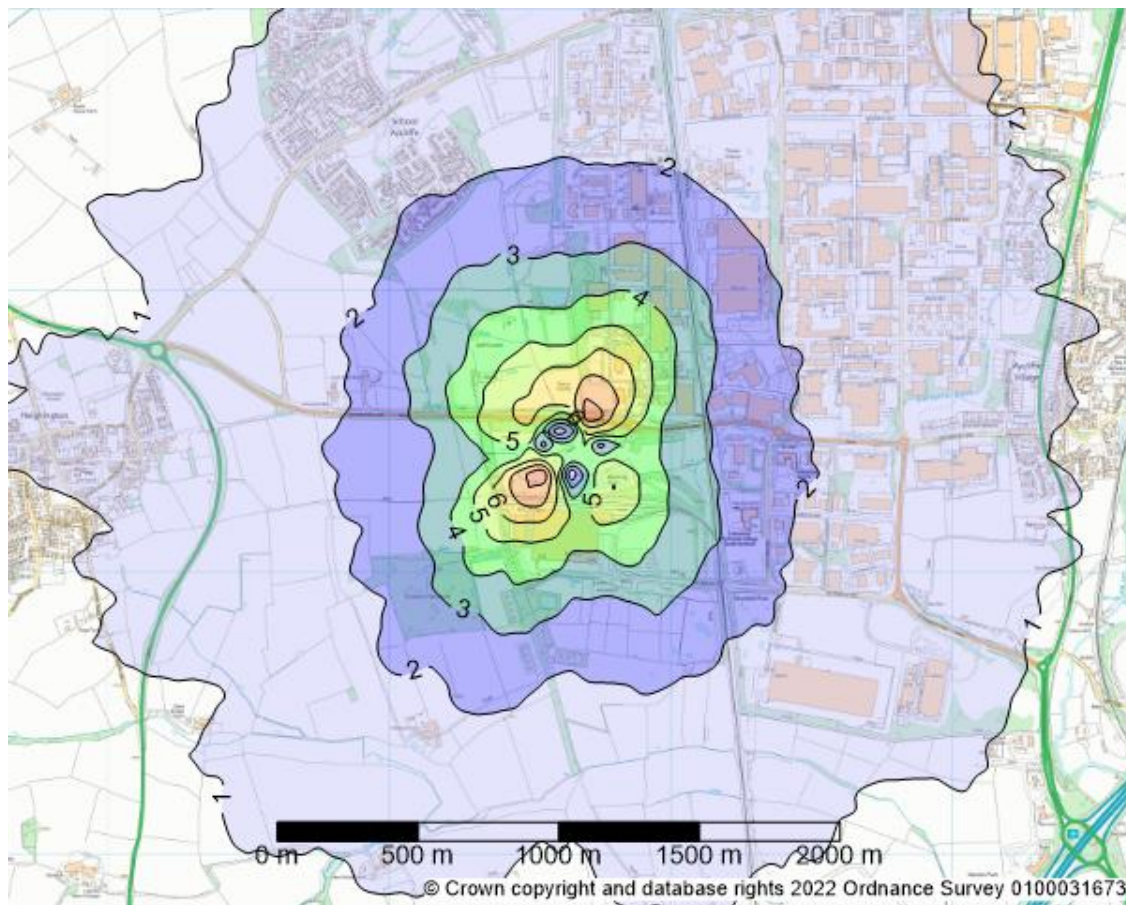


Figure 10.6: Predicted 99.8th Percentile of 1-Hour Mean NO₂ Concentrations (µg/m³)

Carbon Monoxide (CO)

10.120 Maximum predicted 8-hour and 1-hour mean ground level CO concentrations are compared to the relevant AQO in Table 10.15.

Table 10.15: Predicted CO Concentrations		
Receptor	8-Hour Mean PC (µg/m ³)	1-Hour Mean PC (µg/m ³)
Maximum Predicted	3.2	3.9
D1 Magnolia Close	0.61	0.93
D2 West Cemetery	0.41	0.71
D3 North Cottages	0.45	0.74
D4 Sports Ground	0.36	0.70
D5 Cumby Road	0.40	0.62
D6 Finchale Road	0.33	0.55
D7 Durham Road	0.30	0.54
D8 Heighington Lane	0.43	0.68
D9 East Field Farm	0.76	1.2

D10 Cherry Tree Drive	0.57	1.1
D11 Kieran Maxwell Lane	0.39	0.72
D12 Industrial	2.6	3.3
D13 College	0.99	1.3
D14/Vents Maximum Hitachi	2.7	3.2
D15. Dene Bridge Farm	0.23	0.46
D16. Brakkes Farm	0.37	0.63
D17. Clay Pigeon Shoot	0.49	0.75
AQO / EAL ($\mu\text{g}/\text{m}^3$)	10,000	30,000
Background ($\mu\text{g}/\text{m}^3$)	165	236
Maximum PC as %age of AQO	0%	0%
Maximum PEC as %age of AQO	2%	1%

10.121 The maximum 8-hour and 1-hour concentrations are all less than 10% of the AQO and the impact at all receptors would be described as ‘negligible’ in accordance with the IAQM planning guidance. Therefore, the impact of CO emissions from the proposed development on local air quality is considered ‘*not significant*’.

Sulphur Dioxide (SO_2)

10.122 The predicted SO_2 concentrations (PC) at identified sensitive receptor locations are compared to the relevant AQO in Table 10.16. A contour plot of the 99.2nd percentile of 24-hour means is also presented in Figure 10.7.

Table 10.16: Predicted SO ₂ Concentrations			
Receptor	99.2 nd Percentile of 24-Hour Means	99.7 th Percentile of 1-Hour Means	99.9 th Percentile of 15-Minute Means
	PC (µg/m ³)	PC (µg/m ³)	PC (µg/m ³)
Maximum predicted	1.3	2.2	3.0
D1 Magnolia Close	0.14	0.49	0.70
D2 West Cemetery	0.088	0.35	0.53
D3 North Cottages	0.086	0.36	0.55
D4 Sports Ground	0.099	0.34	0.52
D5 Cumby Road	0.079	0.29	0.45
D6 Finchale Road	0.071	0.28	0.41
D7 Durham Road	0.061	0.24	0.39
D8 Heighington Lane	0.11	0.35	0.50
D9 East Field Farm	0.14	0.53	0.87
D10 Cherry Tree Drive	0.17	0.52	0.76
D11 Kieran Maxwell Lane	0.076	0.27	0.46
D12 Industrial	0.87	1.7	2.4
D13 College	0.25	0.64	0.90
D14/Vents Maximum Hitachi	0.98	1.8	2.5
D15. Dene Bridge Farm	0.043	0.19	0.32
D16. Brakkes Farm	0.054	0.22	0.39
D17. Clay Pigeon Shoot	0.10	0.33	0.51
AQO (µg/m ³)	125	350	266
Background (µg/m ³)	3.4	5.8	7.8
Maximum PC as %age of AQO	1%	1%	1%
Maximum PEC as %age of AQO	4%	2%	4%

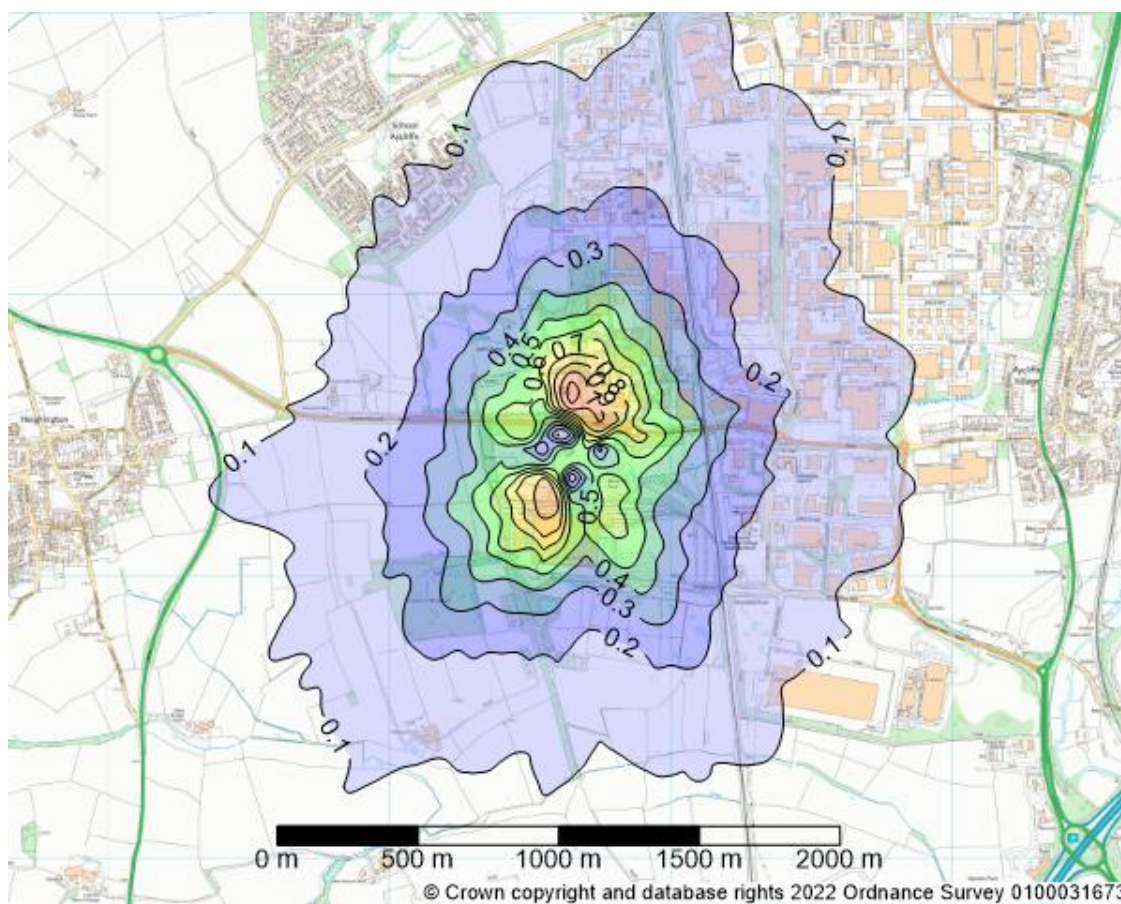


Figure 10.7: Predicted 99.2nd Percentile of 24-Hour Mean SO₂ Concentrations (µg/m³)

10.123 The contribution from the proposed development (PC) is less than 10% of the AQOs at all locations and the impact at all locations would be described as ‘negligible’ in accordance with the IAQM planning guidance. Therefore, it is concluded that the impact of SO₂ emissions on local air quality is ‘not significant’.

Particulate Matter (as PM₁₀)

10.124 Predicted annual mean and 90.4th percentile of 24-hour mean PM₁₀ concentrations at the selected receptor locations are presented in Table 10.17. The predictions assume that 100% of the particulate matter emitted from the stack is PM₁₀. A contour plot of the 90.4th percentile of 24-hour means is also presented in Figure 10.8.

Table 10.17: Predicted PM ₁₀ Concentrations			
Receptor	Annual Mean		90.4 th Percentile of 24-Hour Means
	PC (µg/m ³)	PC (% of AQO)	PC (µg/m ³)
Maximum predicted	0.058	0%	0.13
D1 Magnolia Close	0.005	0%	0.013

D2 West Cemetery	0.003	0%	0.008
D3 North Cottages	0.003	0%	0.009
D4 Sports Ground	0.004	0%	0.009
D5 Cumby Road	0.003	0%	0.007
D6 Finchale Road	0.002	0%	0.006
D7 Durham Road	0.002	0%	0.005
D8 Heighington Lane	0.003	0%	0.009
D9 East Field Farm	0.002	0%	0.005
D10 Cherry Tree Drive	0.003	0%	0.008
D11 Kieran Maxwell Lane	0.001	0%	0.002
D12 Industrial	0.044	0%	0.093
D13 College	0.007	0%	0.022
D14/Vents Maximum Hitachi	0.020	0%	0.077
D15. Dene Bridge Farm	0.001	0%	0.003
D16. Brakkes Farm	0.001	0%	0.003
D17. Clay Pigeon Shoot	0.001	0%	0.004
AQO ($\mu\text{g}/\text{m}^3$)	40		50
Background ($\mu\text{g}/\text{m}^3$)	11.2		13.2
Maximum PC as %age of AQO	0%		0%
Maximum PEC as %age of AQO	28%		27%

10.125 The maximum predicted PM_{10} concentrations are less than 1% and 10% of the relevant long and short-term AQOs, respectively. Therefore, the impacts would be described as '*negligible*' in accordance with the IAQM planning guidance and it is concluded that the impacts are '*not significant*'.

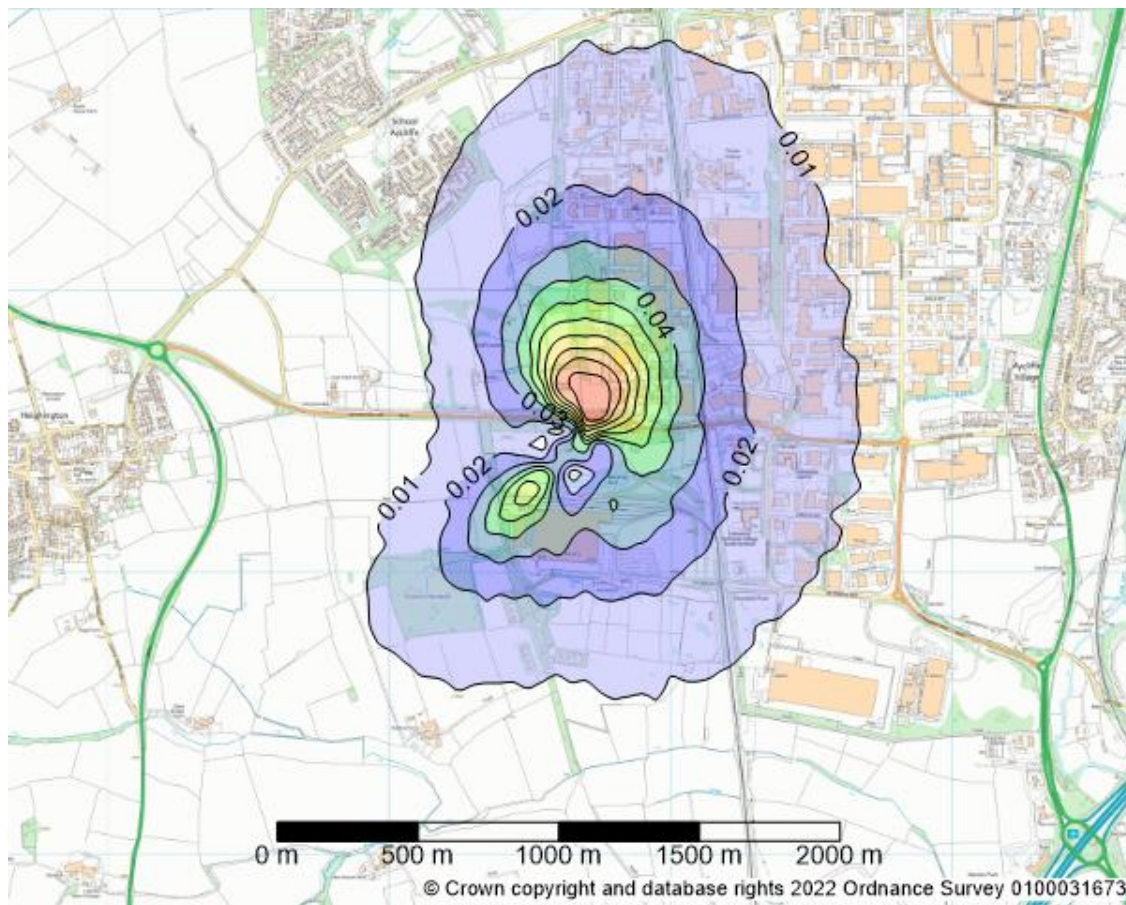


Figure 10.8: Predicted 90.4th Percentile of 24-Hour Mean PM₁₀ Concentrations (µg/m³)

Particulate Matter (as PM_{2.5})

10.126 Predicted annual mean PM_{2.5} concentrations at the selected receptor locations are presented in Table 10.18. The predictions assume that 100% of the particulate matter emitted from the stacks is PM_{2.5}. A contour plot of annual mean PM_{2.5} (and PM₁₀) is presented in Figure 10.98.

Table 10.18: Predicted PM _{2.5} Concentrations		
Receptor	Annual Mean	
	PC (µg/m ³)	PC (% of AQO)
Maximum predicted	0.058	0%
D1 Magnolia Close	0.005	0%
D2 West Cemetery	0.003	0%
D3 North Cottages	0.003	0%
D4 Sports Ground	0.004	0%
D5 Cumby Road	0.003	0%
D6 Finchale Road	0.002	0%
D7 Durham Road	0.002	0%
D8 Heighington Lane	0.003	0%
D9 East Field Farm	0.002	0%
D10 Cherry Tree Drive	0.003	0%
D11 Kieran Maxwell Lane	0.001	0%
D12 Industrial	0.044	0%
D13 College	0.007	0%
D14/Vents Maximum Hitachi	0.020	0%
D15. Dene Bridge Farm	0.001	0%
D16. Brakkes Farm	0.001	0%
D17. Clay Pigeon Shoot	0.001	0%
Limit Value (µg/m ³)	20	
Background (µg/m ³)	6.8	
Maximum PC as %age of AQO	0%	
Maximum PEC as %age of AQO	34%	

10.127 The maximum predicted PM_{2.5} concentration is less than 1% of EU limit value and the impact would be described as '*negligible*' in accordance with the IAQM planning guidance. Therefore, it is concluded that the impact of PM_{2.5} emissions on local air quality would be '*not significant*'.

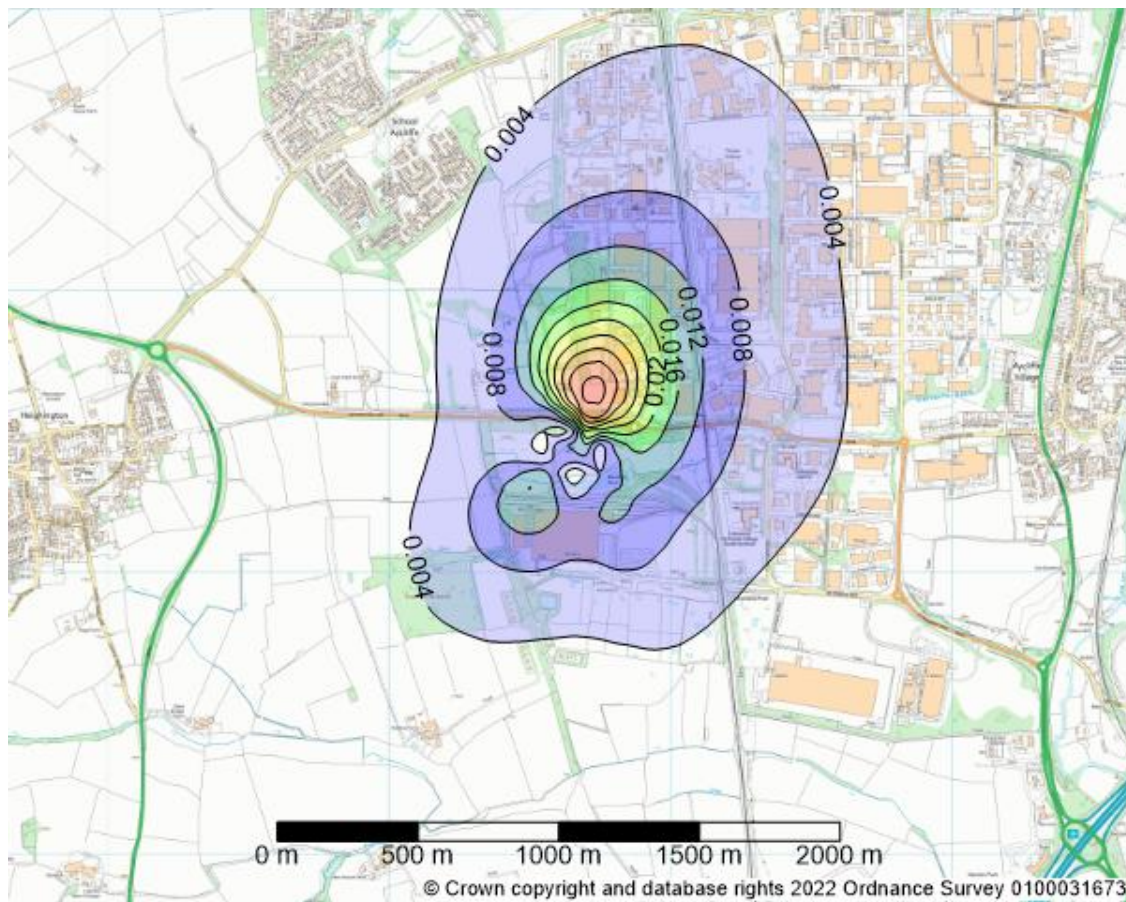


Figure 10.9: Predicted Annual Mean PM_{2.5} and PM₁₀ Concentrations (µg/m³)

10.128 The Environment Act 2021 establishes a legally binding duty on the government to bring forward new air quality targets by 31 October 2022 for PM_{2.5}. The proposed annual mean concentration target of 10 µg/m³, to be met across England by 2040, is currently under consultation (consultation closes on 27th June 2022).

10.129 On the worst-case assumption that background air quality has not improved in 2040 compared to the present day, the maximum predicted PC would be 1% and the PEC would be 69% of the proposed 2040 air quality target. In accordance with the IAQM planning guidance, the impact would be described as negligible.

Total Organic Carbon (as Benzene)

10.130 Predicted annual mean and maximum one hour mean ground-level benzene concentrations are presented in Table 10.19.

Table 10.19: Predicted Benzene Concentrations			
Receptor	Annual Mean		Maximum 24-Hour Mean
	PC (µg/m³)	PC (% of AQO)	PC (µg/m³)
Maximum predicted	0.12	2%	0.47
D1 Magnolia Close	0.009	0%	0.07
D2 West Cemetery	0.006	0%	0.05
D3 North Cottages	0.006	0%	0.05
D4 Sports Ground	0.007	0%	0.04
D5 Cumby Road	0.006	0%	0.03
D6 Finchale Road	0.005	0%	0.03
D7 Durham Road	0.004	0%	0.02
D8 Heighington Lane	0.007	0%	0.06
D9 East Field Farm	0.004	0%	0.07
D10 Cherry Tree Drive	0.006	0%	0.07
D11 Kieran Maxwell Lane	0.002	0%	0.05
D12 Industrial	0.089	2%	0.32
D13 College	0.014	0%	0.10
D14/Vents Maximum Hitachi	0.039	1%	0.38
D15. Dene Bridge Farm	0.002	0%	0.02
D16. Brakkes Farm	0.002	0%	0.04
D17. Clay Pigeon Shoot	0.003	0%	0.06
Limit Value/EAL (µg/m³)	5		30
Background (µg/m³)	0.30		0.35
Maximum PC as %age of AQO	2%		2%
Maximum PEC as %age of AQO	8%		4%

10.131 Maximum predicted annual mean ground level benzene concentrations are 2% of the EU limit value and the PEC is 8% of the limit value. Therefore, the impact would be described as ‘negligible’ in accordance with the IAQM planning guidance. Maximum 24-hour mean concentrations are well below 10% of the EAL and the impact on short term benzene concentrations would be described as ‘negligible’.

10.132 Therefore, it is concluded that the impact on air quality of benzene emissions from the proposed development would be ‘not significant’.

Hydrogen Chloride (HCl)

10.133 The predicted maximum 1-hour mean ground-level hydrogen chloride concentrations at identified sensitive receptor locations are presented in Table 10.20.

Table 10.20: Predicted HCl Concentrations	
Receptor	Maximum 1-Hour Mean
	PC ($\mu\text{g}/\text{m}^3$)
Maximum predicted	0.47
D1 Magnolia Close	0.11
D2 West Cemetery	0.085
D3 North Cottages	0.089
D4 Sports Ground	0.084
D5 Cumby Road	0.075
D6 Finchale Road	0.066
D7 Durham Road	0.064
D8 Heighington Lane	0.082
D9 East Field Farm	0.15
D10 Cherry Tree Drive	0.13
D11 Kieran Maxwell Lane	0.086
D12 Industrial	0.39
D13 College	0.15
D14/Vents Maximum Hitachi	0.39
D15. Dene Bridge Farm	0.056
D16. Brakkes Farm	0.075
D17. Clay Pigeon Shoot	0.090
EPAQS Guideline Value ($\mu\text{g}/\text{m}^3$)	750
Background ($\mu\text{g}/\text{m}^3$)	0.21
Maximum PC as %age of AQO	0%
Maximum PEC as %age of AQO	0%

10.134 The maximum predicted hourly mean concentrations are less than 10% of the EPAQS Guideline Value and would be described as ‘negligible’ in accordance with the IAQM planning guidance. Therefore, it is concluded that the impact of HCl emissions from the proposed development would be ‘not significant’.

Hydrogen Fluoride (HF)

10.135 The predicted maximum annual mean and 1-hour mean ground-level hydrogen fluoride concentrations at identified sensitive receptor locations are presented in Table 10.21.

Table 10.21: Predicted HF Concentrations		
Receptor	Annual Mean	Maximum 1-Hour Mean
	PC (µg/m ³)	PC (µg/m ³)
Maximum predicted	0.012	0.078
D1 Magnolia Close	0.0009	0.019
D2 West Cemetery	0.0006	0.014
D3 North Cottages	0.0006	0.015
D4 Sports Ground	0.0007	0.014
D5 Cumby Road	0.0006	0.012
D6 Finchale Road	0.0005	0.011
D7 Durham Road	0.0004	0.011
D8 Heighington Lane	0.0007	0.014
D9 East Field Farm	0.0004	0.025
D10 Cherry Tree Drive	0.0006	0.021
D11 Kieran Maxwell Lane	0.0002	0.014
D12 Industrial	0.0089	0.066
D13 College	0.0014	0.025
D14/Vents Maximum Hitachi	0.0039	0.065
D15. Dene Bridge Farm	0.0002	0.0093
D16. Brakkes Farm	0.0002	0.013
D17. Clay Pigeon Shoot	0.0003	0.015
EPAQS Guideline Value (µg/m ³)	16	160
Background (µg/m ³)	0.5	1.0
Maximum PC as %age of AQO	0%	0%
Maximum PEC as %age of AQO	3%	1%

10.136 The maximum predicted HF concentrations are less than 1% and 10% of the EPAQS long and short-term Guideline Values, respectively. In accordance with the IAQM planning guidance the impacts would be described as ‘negligible and it is concluded that the impact of emissions would be ‘not significant’.

Trace Metals

10.137 The predicted maximum long and short-term trace metal concentrations for emissions at maximum BREF limits for new plant are presented in Tables 10.22 and 10.23 respectively.

10.138 For the Step 1 screening it is assumed that for chromium VI the predicted PC and background concentrations are apportioned 20% of the total chromium concentration.

Table 10.22: Maximum Long-Term Trace Metal Concentrations, Step 1

Pollutant	EAL (ng/m ³)	PC (% of EAL)	PEC (% of EAL)	Further Assessment Required?
Cd	5	4.7%	10.3%	No
Tl	1,000	0.0%	0.0%	No
Hg	250	0.1%	0.1%	No
Sb	5,000	0.1%	0.1%	No
As	6	58.4%	66.8%	No
Cr	5,000	0.1%	0.1%	No
Cr (VI) (a)	0.2	351%	541%	Yes
Co	1,000	0.4%	0.4%	No
Cu	10,000	0.0%	0.1%	No
Mn	150	2.3%	19.0%	No
Ni	20	17.5%	20.9%	No
Pb	250	1.4%	4.6%	No
V	5,000	0.1%	0.1%	No

(a) The predicted and background concentrations are apportioned 20% Cr(VI) in accordance with the Environment Agency's guidance.

Table 10.23: Maximum Short-Term Trace Metal Concentrations, Step 1

Pollutant	EAL (ng/m ³)	PC (% of EAL)	Further Assessment Required?
Tl	30,000	0.0%	No
Hg	7,500	0.0%	No
Sb	150,000	0.0%	No
As	15,000	0.1%	No
Cr (III)	150,000	0.0%	No
Co	30,000	0.1%	No
Cu	200,000	0.0%	No
Mn	150,000	0.0%	No
V	1,000	1.4%	No

10.139 For the Group III metals, on the basis of the Step 1 screening advice provided by the Environment Agency, further assessment is required for long term chromium VI. Emissions of all the remaining trace metals are considered to be not significant or the air quality assessment level unlikely to be exceeded.

10.140 The EA guidance note for the assessment of Group III metals provides measured concentrations of emissions of metals from waste Incinerators. In accordance with the guidance note, revised concentrations for CrVI have been predicted using the maximum measured emission concentration (0.00015 mg/Nm³ for CrVI). For this typical emission concentration, maximum predicted ground level concentrations are presented in Table 10.24.

Table 10.24: Maximum Long-Term Trace Metal Concentrations – Typical Emissions

Pollutant	EAL (ng/m ³)	PC (% of EAL)	PEC (% of EAL)	Further Assessment Required?
Cr (VI) (a)	0.2	0.9%	191%	No

(a) The background concentrations is apportioned 20% Cr(VI) in accordance with the Environment Agency's guidance.

- 10.141 On the basis of Step 2 of the assessment, no further assessment is required for CrVI. The PEC exceeds the target value but due to the assumed background concentration that is almost twice the target value. However, the proposed development contributes less than 1% and would be assessed as not significant.

Dioxins and Furans

- 10.142 The predicted annual mean ground level dioxin and furan concentrations (PC) at identified sensitive receptor locations are presented in Table 10.25.

Table 10.25: Predicted PCDD/Fs Concentrations

Receptor	Annual Mean PC (fg/m ³)
Maximum predicted	0.70
D1 Magnolia Close	0.056
D2 West Cemetery	0.036
D3 North Cottages	0.036
D4 Sports Ground	0.043
D5 Cumby Road	0.034
D6 Finchale Road	0.030
D7 Durham Road	0.024
D8 Heighington Lane	0.041
D9 East Field Farm	0.025
D10 Cherry Tree Drive	0.035
D11 Kieran Maxwell Lane	0.010
D12 Industrial	0.53
D13 College	0.084
D14/Vents Maximum Hitachi	0.24
D15. Dene Bridge Farm	0.012
D16. Brakkes Farm	0.012
D17. Clay Pigeon Shoot	0.016
Background (fg/m ³)	7.3
PC as a %age of background Concentrations	8%

10.143 There are no assessment criteria for dioxins and furans. Compared with the average background concentration measured at urban monitoring sites in the UK, the predicted impact of the proposed development represents 9.6% of the background concentration.

10.144 Furthermore, it should be noted that health impacts from exposure to dioxins and furans can arise via inhalation and ingestion exposure. Therefore, the health impacts of the emissions of dioxins and furans and dioxin-like PCBs have been assessed in the Human Health Risk Assessment which is detailed within Chapter 8 – Population and Human Health and provided within Appendix 8 Volume 2 of the ES.

PAH (as Benzo(a)pyrene)

10.145 Predicted annual mean ground-level benzo(a)pyrene concentrations are presented in Table 10.26.

Table 10.26: Predicted Benzo(a)pyrene Concentrations		
Receptor	Annual Mean	
	PC (ng/m ³)	PC (% of AQO)
Maximum predicted	0.0011	0%
D1 Magnolia Close	0.000084	0%
D2 West Cemetery	0.000054	0%
D3 North Cottages	0.000054	0%
D4 Sports Ground	0.000064	0%
D5 Cumby Road	0.000051	0%
D6 Finchale Road	0.000044	0%
D7 Durham Road	0.000036	0%
D8 Heighington Lane	0.000062	0%
D9 East Field Farm	0.000038	0%
D10 Cherry Tree Drive	0.000052	0%
D11 Kieran Maxwell Lane	0.000015	0%
D12 Industrial	0.00080	0%
D13 College	0.00013	0%
D14/Vents Maximum Hitachi	0.00035	0%
D15. Dene Bridge Farm	0.000018	0%
D16. Brakkes Farm	0.000018	0%
D17. Clay Pigeon Shoot	0.000025	0%
Limit Value (ng/m ³)	1	
Background (ng/m ³)	0.18	
Maximum PC as %age of AQO	0%	
Maximum PEC as %age of AQO	18%	

10.146 Predicted ground level benzo(a)pyrene concentrations would be described as ‘negligible’ according to the IAQM planning guidance for all receptors. Therefore, the impact of PAH emissions on local air quality is considered to be ‘not significant’.

Polychlorinated Biphenyls

10.147 The predicted maximum annual and 1-hour mean ground-level PCB concentrations at the identified sensitive receptor locations are presented in Table 10.27.

Table 10.27: Predicted PCB Concentrations			
Receptor	Annual Mean		Maximum 1-Hour Mean
	PC (ng/m ³)	PC (% of AQO)	PC (ng/m ³)
Maximum predicted	4.2 x 10 ⁻⁸	0%	2.8 x 10 ⁻⁷
D1 Magnolia Close	3.4 x 10 ⁻⁹	0%	6.7 x 10 ⁻⁸
D2 West Cemetery	2.1 x 10 ⁻⁹	0%	5.1 x 10 ⁻⁸
D3 North Cottages	2.2 x 10 ⁻⁹	0%	5.3 x 10 ⁻⁸
D4 Sports Ground	2.6 x 10 ⁻⁹	0%	5.0 x 10 ⁻⁸
D5 Cumby Road	2.0 x 10 ⁻⁹	0%	4.5 x 10 ⁻⁸
D6 Finchale Road	1.8 x 10 ⁻⁹	0%	4.0 x 10 ⁻⁸
D7 Durham Road	1.4 x 10 ⁻⁹	0%	3.9 x 10 ⁻⁸
D8 Heighington Lane	2.5 x 10 ⁻⁹	0%	4.9 x 10 ⁻⁸
D9 East Field Farm	1.5 x 10 ⁻⁹	0%	8.8 x 10 ⁻⁸
D10 Cherry Tree Drive	2.1 x 10 ⁻⁹	0%	7.6 x 10 ⁻⁸
D11 Kieran Maxwell Lane	6.0 x 10 ⁻¹⁰	0%	5.2 x 10 ⁻⁸
D12 Industrial	3.2 x 10 ⁻⁸	0%	2.4 x 10 ⁻⁷
D13 College	5.0 x 10 ⁻⁹	0%	9.0 x 10 ⁻⁸
D14/Vents Maximum Hitachi	1.4 x 10 ⁻⁸	0%	2.3 x 10 ⁻⁷
D15. Dene Bridge Farm	7.0 x 10 ⁻¹⁰	0%	3.3 x 10 ⁻⁸
D16. Brakkes Farm	7.0 x 10 ⁻¹⁰	0%	4.5 x 10 ⁻⁸
D17. Clay Pigeon Shoot	9.8 x 10 ⁻¹⁰	0%	5.4 x 10 ⁻⁸
EAL (µg/m ³)	200		6,000
Background (ng/m ³)	0.106		0.212
Maximum PC as %age of AQO	0%		0%
Maximum PEC as %age of AQO	0%		0%

10.148 The maximum predicted PCB concentrations are less than 1% and 10% of the long and short-term EALs, respectively. In accordance with the IAQM planning guidance the impact at all receptors would be described as ‘negligible’. Therefore, it is concluded that the impact of PCB emissions would be ‘not significant’.

Ammonia

10.149 The predicted maximum annual mean and 1-hour mean ground level ammonia concentrations at identified sensitive receptor locations are presented as a percentage of the EAL in Table 10.28.

Table 10.28: Predicted NH ₃ Concentrations (µg/m ³)			
Receptor	Annual Mean		1-Hour Mean
	PC	PC (%)	PC
Maximum Off-Site	0.12	0%	0.78
D1 Magnolia Close	0.009	0%	0.19
D2 West Cemetery	0.006	0%	0.14
D3 North Cottages	0.006	0%	0.15
D4 Sports Ground	0.007	0%	0.14
D5 Cumby Road	0.006	0%	0.12
D6 Finchale Road	0.005	0%	0.11
D7 Durham Road	0.004	0%	0.11
D8 Heighington Lane	0.007	0%	0.14
D9 East Field Farm	0.004	0%	0.25
D10 Cherry Tree Drive	0.006	0%	0.21
D11 Kieran Maxwell Lane	0.002	0%	0.14
D12 Industrial	0.089	0%	0.66
D13 College	0.014	0%	0.25
D14/Vents Maximum Hitachi	0.039	0%	0.65
D15. Dene Bridge Farm	0.002	0%	0.09
D16. Brakkes Farm	0.002	0%	0.13
D17. Clay Pigeon Shoot	0.003	0%	0.15
AQS	180		2500
Background	8.5		17.0
Maximum PC (% AQS)	0%		0%
Maximum PEC (% AQS)	5%		1%

10.150 The maximum predicted NH₃ concentrations are less than 1% and 10% of the long and short-term EALs, respectively. In accordance with the IAQM planning guidance the impact at all receptors would be described as ‘negligible’. Therefore, it is concluded that the impact of NH₃ emissions would be ‘not significant’.

Operational Phase Effects - Habitat Impact

Airborne Concentrations of NO_x, SO₂, NH₃ and HF

10.151 Predicted maximum ground level concentrations of NO_x, SO₂, NH₃ and HF at the identified habitat sites are compared with the relevant critical levels in Tables 10.29 to 10.31. The dispersion model

is not able to produce weekly mean averages. Therefore, the monthly mean HF concentrations have been compared with the critical level.

Table 10.29: Predicted Maximum NO _x Concentrations (µg/m ³)				
Habitat Site	Annual Mean		24-Hour Mean	
	PC (µg/m ³)	PC (% of CL)	PC (µg/m ³)	PC (% of CL)
Cumby Pond LWS	0.22	0.7%	2.2	2.9%
School Aycliffe LWS	0.043	0.1%	0.40	0.5%
Aycliffe Nature Park LWS	0.046	0.2%	0.31	0.4%
Aycliffe Quarry LWS	0.050	0.2%	0.40	0.5%
Critical Level (µg/m ³)	30		75	

10.152 For the locally designated sites, predicted annual mean and 24-hour mean concentrations of NO_x are less than 100% of the critical levels and would be assessed as 'not significant'. Furthermore, the PCs for the locally designated sites are less than 1% and 10% of the critical levels.

10.153 For sulphur dioxide, there are two critical levels depending on the presence of lichens. For the LWS, there is little information available on the likely presence of lichens and the more stringent critical level of 10 µg/m³ has been adopted for these habitats.

Table 10.30: Predicted Maximum SO ₂ Concentrations (µg/m ³)		
Habitat Site	Annual Mean	
	PC (µg/m ³)	PC (% of CL)
Cumby Pond LWS	0.054	0.5%
School Aycliffe LWS	0.011	0.1%
Aycliffe Nature Park LWS	0.011	0.1%
Aycliffe Quarry LWS	0.012	0.1%
Critical Level (µg/m ³)	10 - 20	

10.154 For the LWS, the PCs are all less than 100% of the critical level. Furthermore, the PCs for the locally designated sites are less than 1% of the critical level. Therefore, it is concluded that the impact of emissions of SO₂ at habitat sites would be 'not significant'.

10.155 For ammonia, there are also two critical levels depending on the presence of bryophytes and lichens. In the absence of information for the LWS the more stringent critical level is applied to these habitat sites.

Table 10.31: Predicted Maximum NH ₃ Concentrations (µg/m ³)		
Habitat Site	Annual Mean	
	PC (µg/m ³)	PC (% of CL)
Cumby Pond LWS	0.018	1.8%
School Aycliffe LWS	0.0036	0.4%
Aycliffe Nature Park LWS	0.0038	0.4%
Aycliffe Quarry LWS	0.0041	0.4%
Critical Level (µg/m ³)	1 - 3	

10.156 For the LWS, the PCs are all less than 100% of the critical level. Furthermore, except for Cumby Pond LWS, the PCs for the locally designated sites are less than 1% of the critical level. Therefore, it is concluded that the impact of emissions of NH₃ at habitat sites would be 'not significant'.

Table 10.32: Predicted Maximum HF Concentrations (µg/m ³)				
Habitat Site	Monthly Mean		24-Hour Mean	
	PC (µg/m ³)	PC (% of CL)	PC (µg/m ³)	PC (% of CL)
Cumby Pond LWS	0.0018	0.4%	0.018	0.4%
School Aycliffe LWS	0.00036	0.1%	0.0033	0.1%
Aycliffe Nature Park LWS	0.00038	0.1%	0.0026	0.1%
Aycliffe Quarry LWS	0.00041	0.1%	0.0034	0.1%
Critical Level (µg/m ³)	0.5		5	

10.157 The predicted concentrations of HF are not significant compared with the critical levels at all of the identified habitat sites.

Eutrophication

10.158 Predicted maximum nutrient nitrogen deposition rates arising from emissions of NO_x and NH₃ from the facility are presented in Table 10.33. The process contributions (PC) are compared with the relevant critical loads (CL) and combined with the relevant background concentrations.

Table 10.33: Predicted Eutrophication Rates (kg N/ha/a)				
Habitat Site	PC	Total Deposition (PEC)	Lowest CL	PC (% CL)
Cumby Pond LWS	0.12	17.92	15	0.8%
School Aycliffe LWS	0.025	17.92	15	0.2%
Aycliffe Nature Park LWS	0.026	17.92	15	0.2%
Aycliffe Quarry LWS	0.029	17.92	10	0.3%

10.159 The maximum PC nutrient nitrogen deposition rate arising from the facility is low in comparison to the critical loads and the background deposition rates and the PC is less than 1% of the lowest critical load for all habitat sites. Therefore, it is considered that the impact of nutrient nitrogen deposition on surrounding habitats is ‘not significant’.

Acidification

10.160 Predicted maximum acid deposition rates predicted over the five years of meteorological data are presented in Table 10.34. The contribution from HCl has been included with 50% assigned to sulphur and 50% to nitrogen. The process contributions (PC) are compared with the relevant critical loads provided in Appendix E in Appendix 10 Volume 2 of the ES. The percentage of the critical load has been calculated using the Critical Function Tool on the APIS website. The assumed habitat types present within Cumby Pond LWS and School Aycliffe Park LWS are not sensitive to acidification impacts.

Table 10.34: Predicted Acid Deposition Rates (kg/ha/yr)				
Habitat Site	PC (N)	PC (S)	PC (% CL)	PEC (% CL)
Cumby Pond LWS	Not sensitive to acidification			
School Aycliffe LWS	Not sensitive to acidification			
Aycliffe Nature Park LWS	0.0035	0.0018	0.1%	29.3%
Aycliffe Quarry LWS	0.0039	0.0020	0.2%	62.6%

10.161 The maximum PC acid deposition rates arising from the facility are low in comparison to the critical loads and the background deposition rates. For all habitats, the PC is 1% or less of the respective critical load. Therefore, it is considered that acidification impacts are ‘not significant’.

ASSESSMENT OF CUMULATIVE EFFECTS

10.162 Cumulative effects can potentially be experienced during both the construction and operational phases. During the construction phase, cumulative effects of dust and particulate matter generated from on-site activities may be experienced in locations in close proximity to two or more development sites and when the timing of the construction phases overlap. There may also be an effect due to the increased construction traffic on local roads if construction vehicles are to use the same routes to access the sites. During the operational phase, cumulative effects may be

experienced due to the additional road vehicles generated by one or more schemes if the traffic is likely to affect the same local roads.

Construction Phase Effects

10.163 Guidance provided by the IAQM suggests that effects of dust and particulate matter generated from a construction site may be experienced up to 350 m from the site. The site sits between plots of land allocated for development, however, it is not clear when these sites would be constructed but the potential exists for the developments to be constructed at the same time. However, all construction sites would be the subject of mitigation measures appropriate to the construction activities taking place. Furthermore, as an industrial estate, the location is of low sensitivity to construction activities. Therefore, the cumulative impact of the Proposed Development with other committed developments is considered to remain negligible following the implementation of the relevant site specific CEMP.

Operational Phase Effects

10.164 Background concentrations will take into account other emission sources that have been well established. However, new or proposed facilities will not be included within the background data although it is recognised that peaks in concentrations will be smoothed within the mapping data.

10.165 It is understood that there are no new proposed or planned significant emissions to air in the immediate area that would need to be considered as part of a cumulative assessment. A discussion of cumulative impacts was also provided in the Committee Report for the proposed development⁹. Paragraph 339 of the Committee Report states:

Cumulative impacts from proposed or committed developments in the vicinity of the proposed development have been considered within the technical chapters of the ES. The ES states that there are no identified already constructed and established waste management or other technically similar facilities within close proximity to the site for which cumulative effects have been considered. In addition, the applicant has investigated the details of any other projects which could in combination with the proposed development, give rise to cumulative significant effects and no such other schemes have been identified. The assessment of cumulative impact concludes that no unacceptable successive or simultaneous effects are likely to occur as a result of the proposed development. In terms of the assessment of the combined and the cumulative effects from the proposed development on the site on the surrounding areas, the ES considers it has been determined that there are no likely significant such effects on these areas. Given that none of the individual environmental areas reach

⁹ Durham County Council Planning Services, Committee Report for Planning Application DM/21/01500/WAS

the threshold of unacceptable, the totality of these effects would not result in them being cumulatively unacceptable nor in combination.

10.166 Therefore, it is concluded that the potential for cumulative air quality impacts has been adequately addressed.

ENHANCEMENT, MITIGATION AND RESIDUAL EFFECTS

Mitigation

Construction Phase

10.167 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, construction operations have been successfully undertaken without impacts to nearby properties.

10.168 Overall, the site is considered to be a low or negligible risk of dust soiling and a low or negligible risk to human health from particulate matter emissions from construction activities at the site. Appropriate mitigation measures for the proposed development have been identified following the IAQM guidance and based on the risk effects presented in Table 10.13. It is recommended that the measures set out in Appendix A in Appendix 10 Volume 2 of the ES are incorporated into a Construction Environment Management Plan (CEMP) and approved by the council prior to commencement of any work on site.

Operational Phase

10.169 The Proposed Development is predicted to have a negligible impact on local air quality during operation. Therefore, mitigation measures are not considered necessary.

Residual Effects

Construction Phase

10.170 Following implementation of the measures recommended for inclusion within the CEMP, the impact of emissions during construction of the proposed development would be negligible.

Operational Phase

10.171 Emissions from the Proposed Development are predicted to have a negligible impact on local air quality during operation. Therefore, the residual effects are considered to be negligible.

SUMMARY

- 10.172 An assessment has been carried out to determine the local air quality impacts associated with the operation of the Hazardous Waste Incinerator.
- 10.173 The site is situated in an existing industrial location, with no immediate nearby sensitive (residential) receptors. The construction works on site would represent a negligible or low risk to dust soiling and human health effects. However, with the proposed mitigation measures incorporated into a Construction Environmental Management Plan (CEMP), the residual impact would be negligible.
- 10.174 Traffic generated by the Proposed Development during the construction and operational phases of the development will be well below the number required to undertake a detailed air quality assessment according to the IAQM planning guidance. Therefore, it is concluded that the impact of traffic generated by the Proposed Development would be negligible.
- 10.175 Detailed air quality modelling using the AERMOD 10 dispersion model has been undertaken to predict the impacts associated with stack emissions from the Proposed Development. The process contributions are assessed as negligible at all receptor locations and for all pollutants.
- 10.176 At the identified sensitive habitat sites the predicted process contributions are assessed as not significant compared with the critical levels for airborne pollutants and critical loads for nutrient nitrogen deposition and acidification.
- 10.177 A summary of the air quality significance and residual effects for the Proposed Development is presented in Table 10.35.

Table 10.35 – Air Quality Effects Summary Table				
Potential Effect	Nature of Effect (Permanent or Temporary)	Significance	Mitigation/ Enhancement Measures	Residual Effects
Dust generated during demolition/ construction phases	Temporary	Potentially significant	Measures for minimising impacts to be incorporated into CEMP	Negligible
Emissions from construction traffic	Temporary	Not significant	None	Negligible
Emissions from incinerator	Permanent	Not significant	None	Negligible
Emissions from development traffic	Permanent	Not significant	None	Negligible

REFERENCES

Ref 10.1: EPUK & IAQM. Land-use Planning and Development Control: Planning for Air Quality, January 2017

Ref 10.2: Industrial Emissions Directive, 2010/75/EU.

Ref 10.3: WR 0608 Emissions from Waste Management Facilities, ERM Report on Behalf of Defra (July 2011)

Ref 10.4: Releases from waste incinerators, Guidance on assessing group 3 metal stack emissions from incinerators – Version 4

Ref 10.5: Environment Agency Risk Assessment Guidance (<https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit>)

Ref 10.6: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, IAQM (June 2019)

Ref 10.7: Department for Environment, Food and Rural Affairs (2007), The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Ref 10.8: The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

Ref 10.9: The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

Ref 10.10 The Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

Ref 10.11: Department for Environment, Food and Rural Affairs (Defra), (2016): Part IV The Environment Act 1995 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(16)

Ref 10.12: Communities and Local Government: National Planning Policy Framework (February 2019)

11 WATER QUALITY, WATER RESOURCES AND FLOOD RISK

INTRODUCTION

- 11.1 This Chapter assesses the likely significant effects of the Proposed Development on the environment with regard to water quality, water resources and flood risk. It describes the methods used to assess the effects; the baseline conditions currently existing at the Site and the surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted. This Chapter assesses the impact of the construction and operational phases of the Proposed Development on surface and groundwater quantity and quality and it also considers the impacts with regard to the risk of flooding, drainage and infrastructure capacity.
- 11.2 This Water Quality, Water Resources and Flood Risk chapter has been prepared by Dr Rob Murdock BSc (Hons) PhD who has over 25 years of experience and by Melissa Seymour BSc (Hons) who has over 5 years' experience in flood risk, water quality and hydrological impact assessment.

POLICY AND LEGISLATIVE CONTEXT

National Planning Policy

- 11.3 The National Planning Policy Framework (NPPF; 2019) sets out the Government's planning policies for England and how these are expected to be applied. The principles of policy relevant to water resources, drainage and flood risk are provided in Section 14 '*Meeting the challenge of climate change, flooding and coastal change*' and Section 15 '*Conserving and enhancing the natural environment*' and, combined with the associated Planning Practice Guidance (PPG) , from the current policy at the national level.

Local Planning Policy

- 11.4 The County Durham Plan (2020) provides the following policies that are considered relevant to water resources and flood risk for this development:

- *“Policy 29: Sustainable Design: All development proposals will be required to achieve well designed buildings and places having regard to supplementary planning documents and other local guidance documents where relevant, and...(d) minimise the use of non-renewable and unsustainable resources, including energy, water and materials, during both construction and use by encouraging waste reduction and appropriate reuse and recycling of materials, including appropriate storage space and segregation facilities for recyclable and non-recyclable waste and prioritising the use of local materials...;”*
- *Policy 35 Water Management: Flood Risk and Sustainable Drainage System: All development proposals will be required to consider the effect of the proposed development on flood risk, both on-site and off-site, commensurate with the scale and impact of the development and taking into account the predicted impacts of climate change for the lifetime of the proposal...; and*
- *Policy 36: Water Infrastructure: In the consideration of development proposals, the hierarchy of drainage options that must be considered and discounted for foul water are (in the following order): (1) connection to the public sewer; (2) package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption(133); and (3) septic tank (which must drain into an appropriate soak away and not discharge directly into a watercourse)...”*

Legislation

11.5 A summary of key relevant UK water legislation is provided below:

- Environmental Protection Act (1990): sets out a range of provisions for environmental protection, including integrated pollution control for dangerous substances;
- Water Resources Act (1991): consolidated previous water legislation with regard to both the quality and quantity of water resources;
- Environment Act (1995): established a new body (the Environment Agency (EA) with responsibility for environmental protection and enforcement of legislation. This Act introduced measures to enhance protection of the environment including further powers for the prevention of water pollution;
- Water Industry Act (1999): consolidated previous legislation relating to water supply and the provision of sewerage services;

- Water Act (2003): extends the provisions of the Water Resources Act (1991) and the Environment Act (1995) with regard to abstractions and discharges, water conservation and pollution control;
- Anti-Pollution Works Regulations (1999): provides powers to the EA to stop any activity (e.g. construction) that is giving or is likely to give rise to environmental pollution or to adequately enforce pollution control measures;
- Control of Pollution (Oil Storage) (England) Regulations (2001): Imposes general requirements for preventing pollution of controlled waters from oil storage, particularly fixed tanks or mobile bowsers. Makes contravention a criminal offence;
- Water Environment (Water Framework Directive) (WFD) (England and Wales) Regulations (2003): requires the development and implementation of a new strategic framework for the management of the water environment and establishes a common approach to protecting and settling environmental objectives for groundwater and surface waters; and
- Flood and Water Management Act (2010): makes provisions about the management of risks in connection with flooding and coastal erosion.
- Contaminated Land (England) Regulations (2006): The regulations elaborate on various details of the Part 2A regime, such as dealing with issues like what qualifies as a “special site”; public registers; remediation notices; and the rules for how appeals can be made against decisions taken under the Part 2A regime.
- The Contaminated Land (England) (Amendment) Regulations (2012): amends the circumstances set out in regulation 3 (pollution of controlled waters) of the 2006 Regulations in which contaminated land affecting controlled waters is required to be designated as a special site; and
- Environment Agency Land Contamination Risk Management (LCRM) Guidance: In June 2019, the Environment Agency (EA) published an update to the Model procedures for the management of land contamination (CLR11). Following the feedback, the EA republished the revised Land contamination: risk management (LCRM) in early 2020.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

Baseline Data

- 11.6 The study area is defined as that generally within a 2km radius of the site, although a number of issues are considered at a greater distance or at the river catchment level, where necessary. The assessment of effects encompasses surface water and groundwater quality and quantity, drainage and flood risk.
- 11.7 This assessment has been undertaken in accordance with national Planning Practice Guidance (PPG) on EIA and has involved review of the following sources of baseline data:
- review of the up-to-date Groundsure Enviro-Insight and Mapping data for the site received on 9th April 2021 and included as Appendix 11.1 of this report. This provides baseline environmental data for the site and up to a 2km radius, including information on surface water and groundwater abstractions, baseline hydrogeology and groundwater vulnerability;
 - review of the Geoenvironmental Appraisal (Sirius; 2008) included within Appendix 11.2 of this ES Chapter;
 - review of Environment Agency (EA) data records on groundwater Source Protection Zones (SPZs), groundwater quality/quantity and the location of flood zones;
 - review of the planning frameworks to identify specific plans and policies relating to water resources, drainage and flood risk;
 - review of the Durham County Council Level 1 Strategic Flood Risk Assessment (SFRA) 2018 and accompanying reports; and
 - review of the accompanying Flood Risk Assessment (FRA) and Drainage Management Strategy prepared by Burrows Graham for the Proposed Development (refer to Appendix 11.3).

Assessment and Evaluation of Effects

- 11.8 The assessment of effects has involved the following general approach:
- the sensitivity or importance of aquatic receptors has been established on the basis of their use, proximity to the site and existing resource value (refer to Table 11.1);

- evaluation of the magnitude of the potential changes in water resources and flood risk and assessment of the sensitivity of the resource to the predicted changes (refer to Table 11.2);
- the potential effects have been given a significance of Negligible or Minor, Moderate or Major Adverse or Beneficial based on the matrix in Table 11.3; and
- where any predicted effects are Minor, Moderate or Major Adverse, these are considered significant and, therefore, mitigation measures have been incorporated to eliminate or reduce the impacts to an acceptable level. The residual effects (post mitigation) are discussed in the final subsection of this chapter.

Table 11.1: Definition of Receptor Sensitivity		
Receptor Sensitivity	Receptor Type	Sensitivity Detail
High	Surface Water	WFD catchment classification of 'High' or 'Good' No pathway constraints to this receptor
	Groundwater	Principal Aquifer Groundwater Source Protection Zone (SPZ) Zone I
	Flood Risk	Flood Zone 3a or b
	Surface Water Drainage	Critical Drainage Area
	Water Supply and Infrastructure	Area of major known water stress
	Water Resources	Abstractions located within ≤ 250 m of the site
Medium	Surface Water	WFD catchment classification of 'Moderate'
	Groundwater	Secondary A or B Aquifer Groundwater SPZs Zone II or III Areas of potential historic contamination
	Flood Risk	Flood Zone 2
	Surface Water Drainage	Medium to High surface water flood risk
	Water Supply and Infrastructure	Area of known water stress
	Water Resources	Abstractions located within 1 km of the site
Low	Surface Water	WFD catchment classification of 'Poor' or 'Bad'
	Groundwater	Unproductive Strata, i.e. Non-Aquifer Not located on groundwater SPZ
	Flood Risk	Flood Zone 1
	Surface Water Drainage	Low or no surface water flood risk
	Water Supply and Infrastructure	Area of no known water stress
	Water Resources	No Abstractions located within ≥ 1 km of the site

Table 11.2: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for Assessing Impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post-development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post-development character/composition/attributes of the baseline will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Table 11.3: Effect Significance Matrix

Magnitude	Sensitivity		
	High	Medium	Low
Major	Major	Moderate to Major	Minor to Moderate
Moderate	Moderate to Major	Minor to Moderate	Minor
Minor	Minor to Moderate	Minor	Negligible to Minor
Negligible	Negligible	Negligible	Negligible

Limitations and Assumptions

- 11.9 When referring to data from web-based data searches and the Groundsure Enviro-Insight within this ES Chapter, the distances and directions are quoted directly. It is possible that some of the data locations are at a different distance and/or direction from the closest part of the site boundary.
- 11.10 The Proposed Development is assumed to have an operational lifetime of 50 years.
- 11.11 The assessment of construction phase effects is based on the indicative construction methodology and development phasing as described in Chapter 6: Development Programme and Construction.
- 11.12 The assessment of operational phase effects is based on the maximum parameters of the detailed elements of the Proposed Development as described in *Chapter 5: The Proposed Development*.

BASELINE CONDITIONS

Surface Water

Hydrological Features

- 11.13 There is a planted embankment and balancing pond located adjacent to the southern boundary of the site and this forms part of a sustainable urban drainage system (SUDs) associated with Demon's Beck which runs in an approximate easterly direction.
- 11.14 The nearest 'main river'¹⁰ is the River Skerne which is located 1.8 km east of the site. Dene Beck, an ordinary watercourse, is located 2 km south of the site and is a tributary of the River Skerne.

Surface Water Quality

- 11.15 Since the introduction of the WFD, the EA assigns a classification for water bodies on the basis of their '*ecological status*', which encompasses chemical, biological and ecological assessment parameters. For catchment purposes, the Site lies within the '*Skerne from Demons Beck to Tees*' surface water operational catchment which was classified as having a '*Moderate*' ecological status in 2019 with the objective of '*Good*' by 2027.

Sensitivity

- 11.16 In accordance with Table 11.1, the hydrology of the Site is considered to be of High Sensitivity. The Site falls within the '*Skerne from Demons Beck to Tees*' which has a '*good*' ecological status objective for 2027.

Groundwater

Hydrogeological Features

- 11.17 When reviewing the British Geological Survey (BGS) online viewer, the site is underlain by the superficial geology of Devensian Till (comprising diamicton). Beneath this, lies the bedrock geology of the Ford Formation (comprising Dolostone, also referred to as Magnesian Limestone), the Lambeth Group (comprising clay, silt and sand) and the Thanet Formation (comprising solely of

¹⁰ Main rivers are defined as any watercourses that contribute significantly to the hydrology of a catchment

sand). The Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation underlie the Thanet Formation and the Lambeth Group.

- 11.18 A site Investigation was undertaken by Sirius in March 2008 (refer to Appendix 11.2); this included excavation of trial pits, drilling of cable percussion boreholes and the installation of groundwater monitoring wells. The site investigation found that made ground (non-natural soils placed by anthropogenic means) was encountered in only three of the 92 exploratory holes excavated. Elsewhere, topsoil was encountered at ground level across the site. Glacial Till (Boulder Clay) was found to underlie the topsoil and made ground to depths of between 1.75 m and >10.0 mbgl, beneath which was limestone.
- 11.19 The EA classify the superficial geology of Devensian Till as a Secondary Undifferentiated Aquifer; this rock type is defined *“in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type”*.
- 11.20 The bedrock geology of the Ford Formation (Magnesian Limestone) is classified by the EA as a Principal Aquifer; these are *“rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer”*.
- 11.21 Groundwater monitoring was undertaken as part of the site investigation included within the Sirius 2008 report (Appendix 11.2). The report concludes that isolated perched groundwaters are present within granular horizons in the glacial till and that a main groundwater table is present within the glacial till/bedrock at depth of approximately 5 m bgl. Groundwater monitoring included within the Sirius Report was undertaken in February and March and therefore this is considered a fair estimate of the ‘winter peak’ groundwater levels.

Groundwater Quality

- 11.22 The EA assigns a WFD classification to groundwater bodies based on their overall chemical status; the site is shown to lie within the ‘Skerne Magnesian Limestone’ WFD groundwater operational catchment with a current overall chemical classification of ‘poor’ (for 2019) but with an overall objection of ‘good’ for 2027.

11.23 A Geoenvironmental Report was prepared by Sirius in 2008 for the site and this is included as Appendix 11.2 of this report. Part of this investigation included determining the extent and nature of near surface ground and groundwater contamination. The report reviews previous investigative reports at the site and this includes the preliminary environmental risk assessment report by Wardell Armstrong (2007). This identified the following potential sources of contamination on site:

- Organic contaminants, including fuels, lubricating oils, PAHs and pesticides associated with both past farming activities and the adjacent railway line;
- Inorganic contaminants, primarily sulphates from adjacent railway activities;
- Metals, including lead, copper, chromium, zinc etc. from possible waste transfer activities;
- Asbestos from demolition of the two former farmsteads; and
- Munitions from war-time activities or from firing and testing ranges.

11.24 As part of the Sirius site investigation works, chemical testing was undertaken on selected samples of the made ground, topsoil and other natural soils for a range of potential contaminants. The potential contaminants of concern were those identified in the Wardell Armstrong desk study and these were selected as the analyses for the soil samples collected at the site. As part of the Sirius investigation, a total of eighteen soil samples and four soil leachate samples were analysed for a range of determinands.

11.25 None of the twelve samples analysed for metals recorded elevated concentrations. Similarly, none of the twelve samples analysed for inorganic contaminants recorded elevated concentrations and none of the twelve samples analysed for phenols recorded elevated concentrations.

11.26 None of the four samples analysed for explosive residue recorded elevated concentrations, all of which were below the laboratory's limit of detection. None of the six samples analysed for pesticides recorded elevated concentrations, all of which were below the laboratory's limit of detection.

11.27 Of the four samples tested for asbestos fibres, one sample of fragmented roof tiles identified within the made ground in TP 52 which is located approximately 300 m south of the proposed site ((which is now covered by the Hitachi Railway site) and therefore is not considered to have an impact on the Application Site.

11.28 The investigation concluded an absence of any identified leachable contamination.

Groundwater Designations

11.29 The site is shown to be located within a groundwater Source Protection Zone (SPZ). These zones are defined around large and public potable groundwater abstractions. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon the quality of a drinking water abstraction. They are split into various subdivisions:

- Zone 1: (Inner Protection Zone) - This zone is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table;
- Zone 2: (Outer Protection Zone) - This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction; and
- Zone 3: (Total catchment) - This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

11.30 The site is located within a Zone 3 (Total Catchment Zone); however, Zone 2 (Outer Protection Zone) is located 580 m north of the site and Zone 1 (Inner Protection Zone) is located approximately 850 m north of the site. The SPZ is associated with the Ford Formation (Magnesian Limestone) Principal Aquifer that underlies the site.

Sensitivity

11.31 The Site is located on a Principal Aquifer; therefore, the hydrogeology is considered to be of High Sensitivity.

Water Resources

Surface Water Resources

11.32 When reviewing the Groundsure report (Appendix 11.1), there is only one active surface water abstraction location within a 2 km radius of the site. This is located 1.95 km north of the site and is associated with Aycliffe Angling Club with a maximum daily volume of 225 m³.

Groundwater Resources

- 11.33 When reviewing the Groundsure Report, there is one recorded active groundwater abstraction located within a 2 km radius of the site. This is located 982 m north of the site and is used for ‘general use’; and has a reported maximum daily volume of 600 m³.

Sensitivity

- 11.34 In accordance with Table 11.1, as groundwater abstractions are located within 1 km of the site, water resources are considered to be of Medium Sensitivity.

Flood Risk

- 11.35 A Flood Risk Assessment has been undertaken by Burrows Graham and is included within Appendix 11.3 of this ES chapter. This confirms that the site is not located near the sea or a tidally influenced watercourse, therefore the risk of tidal flooding is low.
- 11.36 When reviewing the EA’s flood map for planning, the site is located entirely within Flood Zone 1 (land defined as having less than a 1 in 1000 annual probability of flooding from river or sea water) and is located over 1.5 km from land located within Flood Zone 2 and therefore the risk of fluvial flooding as a result of climate change is considered to be low.
- 11.37 A review of the EA’s surface water flood maps shows that the site is classified entirely as ‘low risk’ with some areas of ‘medium risk’ located in the area surrounding the site.
- 11.38 As reported above, the groundwater table is expected at approximately 5 m bgl within the glacial till. The FRA states that given the Proposed Development at the site, groundwater flood risk is considered to be low and this is discussed further within the assessment section of this chapter.
- 11.39 The SFRA has also been reviewed and Figure B12 identifies that the site is located within an area that less than 25% susceptible to groundwater flooding. There are no recorded groundwater incidents associated with the site.
- 11.40 When reviewing the SFRA for the site, Figure B13 identifies that the site is within an area with no records of sewer flooding. As such, the risk of flooding to the development from sewer flooding is therefore considered to be low.

11.41 The site is not located within an area at risk of reservoir flooding according to the EA flood maps.

Sensitivity

11.42 In accordance with Table 11.1, flood risk is considered to be of Low Sensitivity.

Surface Water Drainage

11.43 A Critical Drainage Area (CDA) is defined as *“an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF). In these locations, there is a need for surface water to be managed to a higher standard than normal to ensure any new development will contribute to a reduction in flooding risks in line with NPPF. These higher standards are determined by the Environment Agency”*.

11.44 From reviewing the SFRA for the site, it is confirmed that the site is not located within a CDA.

11.45 The site is currently undeveloped and therefore considered to be greenfield. The existing topography generally falls gently to the south and the plot has been plateaued as part of the vendor works; however, there is permanent drainage in place

Sensitivity

11.46 The Application Site is not located within a CDA and, therefore, surface water drainage is considered to be of Low Sensitivity.

Water Supply and Infrastructure

Water Supply

11.47 The EA’s Water Stressed Areas-Final Classification Report (2013) identifies that the local potable water supplier, Northumbrian Water (NW), has a current and future scenario classification of *‘Medium stress’*.

Network Infrastructure

11.48 A Northumbrian Water foul sewer runs along Millennium Way to the south of the site. The land to the south of the site has recently been developed and this includes foul drainage which conveys

wastewater to a central pumping station, which discharges flow to the NW foul sewer on Millennium Way.

Sensitivity

11.49 In accordance with Table 11.1, water supply and infrastructure are classified as Medium Sensitivity.

Without Development Baseline Scenario

11.50 It is necessary to assess the baseline conditions for the site should the development not come forward. The principal factor with regard to the evolution or change to the current baseline conditions in relation to water quality, water resources and flood risk is climate change. Should the Proposed Development not come forward, an increase in rainfall intensity (based on UK Climate Change predictions) as a result of climate change is likely to alter the quality of controlled waters by increasing/altering pollutant pathways within groundwater and soil. This assessment has considered the existing baseline with regard to surface water and groundwater quality and the predicted water quality status or objectives for future years as defined by the Environment Agency (EA) for the relevant river or groundwater catchment.

11.51 In terms of flood risk and drainage, the current baseline has been assessed with regard to existing conditions (i.e. current flood zones, existing rainfall intensity) and with the predicted impacts of climate change taken into account. The latest guidance on climate change effects is provided in 'Flood risk assessments: climate change allowances' (EA, 2022¹¹).

11.52 This assessment has also considered the existing baseline with regard to surface water and groundwater resources and the predicted water resource status in future years as defined by the EA for the relevant river and/or groundwater catchment.

¹¹ Environment Agency (2020). Flood risk assessments: climate change allowances. [online]. Available from: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>.

CONSTRUCTION PHASE EFFECTS AND MITIGATION MEASURES

11.53 There are five potentially significant effects on water resources and flood risk during the construction phase of the Proposed Development, these are as follows:

- the control of surface water runoff during the construction phase of the Proposed Development;
- potential interruption of groundwater and/or surface water affecting local abstractions;
- external flood risk during construction (all sources);
- potential remobilisation of contamination that may already be present at the Application Site to controlled waters; and
- potential contamination of groundwater and/or surface water from general construction related activities.

The control of surface water runoff during the construction phase of the Proposed Development

11.54 During the construction phase of the Proposed Development, there will be an overall increase in impermeable area, as various areas of hardstanding (such as construction compounds and other associated infrastructure) are constructed on the site. As a result, there will also be a potential increase in surface water runoff from these areas which could lead to increased flooding elsewhere, if not managed appropriately.

11.55 The effect magnitude of the increase in surface water runoff during the construction phase of the Proposed Development is considered to be **Minor**. Prior to mitigation, the effect significance is considered to be **Negligible to Minor Adverse** for drainage.

Mitigation

11.56 During each phase of the Proposed Development, a construction compound will implement a drainage system designed and managed to comply with BS6031:198 'The British Standard Code of Practice for Earthworks', which details methods that should be considered for the general control of drainage on construction sites. Further advice is contained within the British Standard Code of Practice for Foundations (BS8004, 1986).

- 11.57 All necessary drainage works would be installed to ensure that the increase in surface water runoff as a result of the areas of hardstanding is controlled and discharged at the rates set out in the accompanying FRA (Appendix 11.3).
- 11.58 As each element of the Proposed Development is constructed, surface water attenuation measures will be implemented at the same time to ensure that there will be no uncontrolled increase in surface water discharge during construction.
- 11.59 With these mitigation measures in place, it is considered that the residual effect would be **Negligible**.

Potential interruption of groundwater and/or surface water affecting local abstractions

- 11.60 As detailed above, the closest licensed surface water abstraction is 1.95 km north of the site. Given the distance to this abstraction, it is considered that the Proposed Development would have no impact on surface water abstractions.
- 11.61 The site is located 982 m south of a licensed groundwater abstraction and abstracts groundwater from the magnesian limestone which underlies the site. It is important to consider the potential impact of construction of the building and its foundations on nearby groundwater abstractions, especially as the site is located within an SPZ. There is the potential for foundations and basements of buildings to interrupt and inhibit the flow of groundwater to existing active abstractions. It is understood that the borehole located 982 m south of the site abstracts groundwater from within the magnesian limestone which is located more than 10 m bgl (according to the Sirius report). The Proposed Development is for a purpose-built portal framed industrial building extending to approximately 14 m in height. A small basement is included within the scheme and this has a depth of 3.5 mbgl. Given the relatively small-scale of the building footprint, it is considered that the building foundations and basement would not encounter groundwater within the limestone and therefore will not have any impact on the licensed groundwater abstraction.
- 11.62 Based on the above, the effect magnitude of possible interruption of groundwater flow to local abstractions during the construction phase of the Proposed Development is considered to be Negligible. Prior to mitigation, the effect significance is considered to be **Negligible** for water resources and no mitigation measures are required.

External flood risk during construction (all sources)

- 11.63 As reported in the baseline section of this chapter and within the FRA included as Appendix 11.3, the impact of flood risk on the development is low. This is because the site is located entirely within Flood Zone 1 and will remain so for its operational lifetime (with the added impacts of climate change).
- 11.64 Furthermore, as reported in the FRA, the site is entirely classified as ‘low risk’ with some areas of ‘medium’ risk associated with Demons Beck and the attenuation pond to the south of the site. The areas of ‘medium risk’ are due to the existing topography and the development will mitigation against this risk by directing all areas into a new underground network and as such will not pose a significant flood risk to the development. The potential impact of increase in surface water runoff at the site as a result of the construction phase has been considered within the section above within this chapter.
- 11.65 The Proposed Development involves a small basement with a depth of 3.5 m bgl. As reported above, groundwater levels are expected to be around 5 mbgl and therefore there is the potential for groundwater to be encountered during construction. Groundwater monitoring included within the Sirius Report was undertaken in February and March and therefore this is considered a fair estimate of the ‘winter peak’ groundwater levels.
- 11.66 Given the potential risk of groundwater flooding during construction in relation to the foundation works and basement, the effect magnitude of flood risk during the construction phase is considered to be **Minor** on flooding (low sensitivity). Prior to mitigation, the effect significance is considered to be **Negligible to Minor Adverse** for groundwater flood risk.

Mitigation

- 11.67 Depending on meteorological conditions and groundwater depths, excavations may require dewatering (of accumulated rainfall or runoff) during construction. In such circumstances, care will need to be taken to ensure that the quality of this water is sufficiently high to allow discharge.
- 11.68 Poned water from excavations will be pumped into temporary (baffled) holding tanks within the site to remove suspended sediment before discharge to surface water or to ground. If oil is observed in the water from the excavation sites, it will be diverted through temporary oil

interceptors prior to being discharged. Dewatering activities may require a temporary abstraction licence and this would need to be discussed with the EA prior to commencement of construction works; however, given the underlying geology, excavations are not expected to require dewatering apart from accumulated rainfall.

- 11.69 With these mitigation measures in place, it is considered that the residual effects would be **Negligible**. The effect is not significant.

Potential Remobilisation of Contamination that may already be Present at the Site to Controlled Waters

- 11.70 Construction works would disturb the ground at the Site from activities such as site levelling, excavations for foundation and services and construction drainage routes, which could cause the remobilisation of any existing contaminants present in the shallow soils. However, it is considered that given the very minor significance of contaminants present, as reported in the baseline section above and within Sirius site investigation report (refer to Appendix 11.2) following intrusive investigation, the likelihood of remobilising existing contamination on site is considered to be negligible. As well as this, the EIA Scoping Opinion includes consultation from the Council's Environment, Health and Consumer Protection (Contaminated Land) Officers and this confirms that given that the site is a greenfield site and from review of historical maps and available information with respect to land contamination, the risks posed from land contamination are considered to be low. Officers agree that it is not expected that contaminated land poses a significant environmental impact.
- 11.71 The depth of groundwater is estimated at 5 m bgl and therefore it is likely that foundations and piling will enter into the groundwater (considered to be the winter peak groundwater level). However, given that their limited evidence of contamination on site from the intrusive investigation, the likelihood of remobilising existing contamination via activities such as piling into groundwater is considered to be Negligible.
- 11.72 The closest surface watercourse is Demons Beck which is located directly south of the site and is classified as being highly sensitive as a result of its WFD status. However, as reported above, surface water runoff will be controlled by suitable construction methods which would ensure that there is no adverse impact of contamination on the receptor.

- 11.73 Based on the above, the effect magnitude of remobilising contamination to controlled waters during construction is considered to be **Negligible**. Prior to mitigation, the effect significance of the remobilising of contaminants to controlled waters arising during construction-related activities is considered to be **Negligible** for groundwater and surface water and no mitigation measures are required.

Potential contamination of groundwater and/or surface water from general construction-related activities

- 11.74 The operation of construction vehicles and general construction activities could give rise to the potential for groundwater to become contaminated with hydrocarbons, silt and other construction materials.
- 11.75 The site overlies a groundwater Zone 3 SPZ and groundwater is located at around 5 m bgl and the piling depths are likely to encounter the groundwater. Therefore, there is the potential that contamination as a result of piling activities could migrate vertically and enter into the groundwater.
- 11.76 As well as this, should the Site drainage be allowed to enter existing drainage infrastructure or the ground untreated, this may lead to a contamination event.
- 11.77 Referring to Table 11.2, the effect magnitude of contamination arising from general construction activities is considered to be Minor on both groundwater (high sensitivity) and surface water (high sensitivity). Prior to mitigation, the effect significance of contamination arising from general construction activities is considered to be **Minor to Moderate Adverse** for groundwater and surface water.

Mitigation

- 11.78 Construction vehicles will be properly maintained to reduce the risk of hydrocarbon contamination and will only be active when required. Construction materials will be stored, handled and managed with regard to the sensitivity of the local aquatic environment and thus the risk of accidental spillage or release will be minimised.
- 11.79 The construction drainage system will be designed and managed to comply with BS6031:2009 'The British Standard Code of Practice for Earthworks', which details methods that should be considered for the general control of drainage on construction sites. Further advice is contained within the British Standard Code of Practice for Foundations (BS8004: 2015).

- 11.80 These mitigation measures have been incorporated into a Construction Environmental Management Plan (CEMP) as set out in Chapter 6: Development Programme and Construction, which sets out measures for the control of the Site drainage, reducing the risk of accidental spillages and the storage and handling of materials.
- 11.81 An appropriate foundation works risk assessment including a piling method statement would be prepared to inform the foundation design for the various elements of the Proposed Development and an appropriate quality assurance and control regime would be implemented. This would ensure that the contamination source or pathway (or both) would be removed. The piling method statement will ensure that all infrastructure, including below ground utility services, are considered within the piling method statement.
- 11.82 With these mitigation measures in place, it is considered that the residual effect would be **Negligible**.

OPERATIONAL PHASE EFFECTS AND MITIGATION MEASURES

- 11.83 There are five potentially significant effects on water resources and flood risk during the operational phase of the Proposed Development, these are as follows:
- external flood risk during the operational phase;
 - the control of surface water runoff taking climate change predictions into account;
 - potential contamination of local surface waters and/or groundwater from the routine Site drainage or accidental spills;
 - water demand and the effect on the availability of local water resources; and
 - increase in foul drainage demand.

External flood risk during the operational phase

- 11.84 As reported within the FRA (included as Appendix 11.3), the site is located entirely within fluvial Flood Zone 1 and, considering its distance and level change from land in Flood Zones 2 and 3, it will

be located within Flood Zone 1 for its operational lifetime (with the added impacts of climate change).

- 11.85 There is a small basement proposed on site (18 m x 38 m) and this will be 3.5 m bgl in depth. Groundwater is expected to be located around 5 mgl. It is therefore it is considered that the impact of the Proposed Development on groundwater flooding is low. In the unlikely event that the building foundations encounter the underlying groundwater, it is concluded that an increase in local groundwater flood risk is negligible as the footprint of the building is relatively small.
- 11.86 Surface water flood risk during the operational phase of the development is discussed in the subsection on the control of surface runoff below.
- 11.87 Considering that the site is located in Flood Zone 1 (low risk) and will remain so for its operational lifetime, it is concluded that the effect magnitude of flood risk during the operational phase is considered to be Negligible. Prior to mitigation, the effect significance is considered to be **Negligible** for flood risk and no mitigation measures are required.

The control of surface water runoff taking climate change predictions into account

- 11.88 The existing site is undeveloped and considered to be greenfield land. The Proposed Development is 100% impermeable and therefore there will be an increase in surface water runoff as a result of the development that, if not managed appropriately, would give rise to a significant increase in surface water runoff rates and volumes.
- 11.89 The effect magnitude of the increase in surface water runoff during the operational phase of the Proposed Development is considered to be **Moderate** on drainage. Prior to mitigation, the effect significance is considered to be **Minor Adverse** on surface water drainage.

Mitigation

- 11.90 A surface water drainage strategy for the proposal is included within Appendix 11.3 and has been included within the design of the scheme. This strategy confirms that the surface water generated from the development will be directed to the underground drainage network where it will be conveyed to the existing connection to the main site attenuation pond (as detailed on Appendix 11.3). Surface water from the site will ultimately discharge to Demons Beck at a controlled rate of 4.5 l/s/ha which mimics the existing greenfield (Q_{Bar}) runoff rates.

- 11.91 Attenuation will be provided on the wider site for all events up to and including the 100 year plus climate change allowance. The below ground drainage network within the site will be designed such that no surface flooding will occur during storm events up to the 1 in 30 year return period. Exceedance flooding for events up to the 1 in 100 year return period, including climate change allowance, will be stored on external surfaces within the site (away from buildings) and will drain into the surface water network as water levels recede.
- 11.92 A climate change factor of 20% is deemed appropriate for this development which is primarily low risk (industrial unit and car park) and has a design life of 50 years.
- 11.93 The preliminary drainage strategy drawing and hydraulic calculations are within the FRA included as Appendix 11.3 of this ES Chapter.
- 11.94 With the surface water drainage strategy in place, it is considered that the residual effect on surface water drainage would be **Negligible**.

Contamination of surface water and/or groundwater from the routine site drainage

- 11.95 The Proposed Development could have the potential to contaminate surface water and/or groundwater from a number of sources. The Site will be utilised as an industrial energy from waste plant and, as such, a range of potential contaminants could be present (i.e. hydrocarbons and vehicle-related oils and lubricants, as well as hazardous materials).
- 11.96 Given that groundwater depths are relatively shallow at around 5 m bgl there is the potential that should any accidental spillages occur that this would enter the groundwater, if suitable drainage infrastructure is not in place. The site also overlies a Zone 3 (Total Catchment Zone) SPZ associated with the limestone beneath the site (more than 10 m bgl). Similarly, the closest surface water feature is located along the southern boundary of the site and therefore contamination could potentially occur as a result of accidental spillage/leakage entering into the river.
- 11.97 Based on the above, the effect magnitude of contamination on both surface water and groundwater from routine site drainage is considered to be Moderate. Prior to mitigation and with the absence of a drainage strategy in place, the risk of contamination from the routine Site drainage is considered to **Major Adverse** for groundwater and surface water.

Mitigation

- 11.98 With the drainage strategy in place (refer to Appendix 11.3), the Proposed Development has a very limited potential to impact nearby controlled waters. Given that the site is underlain by an SPZ, infiltration is not a suitable means of discharge of runoff and therefore an attenuation-based strategy has been provided. Runoff from roofs is generally considered to be clean and will be discharged directly into the surface water network. Runoff from the car park and service yards will be directed via bypass and full retention separators, respectively. Separators will be selected and sized in accordance with the current guidance. Silt will be prevented from entering the drainage system by the use of trapped gullies, silt boxes and separators.
- 11.99 All wastes will be delivered, stored, processed and loaded inside the processing hall. Both the hall and the surrounding yard will have an impermeable ground surface, which will be provided with dedicated and sealed drainage systems with interceptors, prior to discharge to the SUDs. This will inhibit any risk of infiltration into the ground and underlying SPZ. There is no potential for any surface water to come into contact with any waste materials and give rise to contaminated run off to controlled waters.
- 11.100 The proposed attenuation basin proposed would meet the water quality requirements required for the Proposed Development and will be utilised in line with the CIRIA 753 guidance with the aim to minimise the developments impact on runoff quality and quantity.
- 11.101 With the implementation of the surface water drainage strategy, the residual effect of contamination risk from routine site drainage would be **Negligible** when compared to the existing site use.
- 11.102 It is important to note that the proposed hazardous and clinical waste incinerator on site will require an Environmental Permit under Schedule 5.1 Part A (1) (a) of the Environmental Permitting Regulations (England and Wales) 2016. This permit application will consider the management, operation and emissions associated with the incinerator and will include ensure that the impact on controlled waters is negligible. The permit application will consider the latest Waste Incineration Best Available Techniques Reference (BREF) document and inclusive BAT Conclusions (BATCs) published in 2019. As well as the Healthcare waste: appropriate measures for permitted facilities, July 2020 document which provides guidance for regulated facilities with an environmental permit to treat or transfer healthcare waste.

Water demand and the effect on the availability of local water resources

- 11.103 Given that the current site is undeveloped, there is no current water demand at the site. During operation, there would be an increase in water demand as a result of the inclusion of the Proposed Development. A 0.5 l/s metered water connection will be provided from the site boundary / public supply to serve the building requirements and a further minimum 3 bar pressure and 2.5 m³/h water supply is to be provided to the warehouse for the boiler/ incinerator installation. The site is a serviced site and water supply is being provided by the vendor via Northumbrian Water.
- 11.104 It should be noted that, where possible, any increase in water demand will be reduced as far as possible by the incorporation of appropriate water-saving devices. The buildings will be designed to maximise water efficiency through measures such as low water use sanitary appliances, optimising hot water use, the inclusion of dual flush toilets and low flow and aeration taps.
- 11.105 Based on the above, the effect magnitude of the increase in water demand as a result of the Proposed Development is considered to be Negligible. Prior to mitigation, the effect significance is considered to be **Negligible** for water supply and infrastructure and no mitigation measures are required.

Increase in wastewater flows

- 11.106 Wastewater flows are expected to increase as a result of the development on site when compared to existing undeveloped site. Foul flows will be collected by an independent network and connect to the existing infrastructure constructed as part of the site wide works at a maximum rate of 2.1 l/s. This is ultimately pumped to the Northumbrian Water sewer at an agreed rate of 10 l/s and is an approved strategy in line with the site wide FRA. Correspondence carried out with Northumbrian Water for the site with application confirms this and is included as Appendix 11.4.
- 11.107 Based on the above, the effect magnitude of an increase in wastewater flows during the operational phase of the Proposed Development is considered to be Negligible. Prior to mitigation, the effect significance is considered to be **Negligible** for water supply and infrastructure and no mitigation measures are required.

CLIMATE CHANGE

11.108 It is necessary to consider whether the effects of the Proposed Development on water quality, water resources and flood risk will alter due to the effects of climate change, most notably due to an increase in rainfall intensity and increased river flows and sea levels.

11.109 From reviewing the Met Offices UKCP18 future climate change projections for the 50% probability level for the 2080s, it is estimated that the winter average precipitation will increase by 21.46% and the summer average precipitation will decrease by -35.57 % when compared to the baseline period (climatic trends from 1961 to 1990). The predicted change for the 90% probability level from 1990s to the 2080s, the winter average precipitation will increase by 52.25% and the summer average will increase by 3.62%.

11.110 The receptors that have been identified within this assessment need to be considered in terms of their vulnerability (i.e. susceptibility or resilience to change) to the changes in the future climate. Table 11.4 below, gives a summary of the receptors, including their sensitivity classification and their vulnerability under these future climate conditions.

11.111 The vulnerability of a receptor is defined by the following classifications:

- High Vulnerability – the receptors directly dependent on existing and/or prevailing climatic factors, and reliant on these specific existing climate conditions continuing in the future; or only able to tolerate a very limited variation in climate conditions;
- Moderate Vulnerability – the receptor is dependent on some climatic factors, but able to tolerate a range of conditions; and
- Low Vulnerability – Climatic factors have little influence in receptors.

Table 11.4: Summary of Receptor Sensitivity and Vulnerability for Assessment

Receptor	Sensitivity	Vulnerability
Surface Water	High	High
Groundwater	High	High
Water Resources	Medium	Moderate
Surface Water Drainage	Low	High
Flood Risk	Low	High
Water Supply and Infrastructure	Medium	High

11.112 During operation of the Proposed Development, it is considered that all of the receptors identified within the assessment, apart from water resources, are considered to be highly vulnerable to climate change. Water resources are considered to have a medium vulnerability to climate change. However, current and future baseline conditions and the impacts identified within this assessment have already considered the predicted impacts of climate change.

11.113 The proposed mitigation measures include the future effects of climate change and, therefore, once these measures are implemented, the Proposed Development will be considered safe in terms of future climate effects. The climate change resilient measures include the following:

- The flood zones have been considered with the added effect of climate change; and
- When assessing the control of surface water runoff during operation of the Proposed Development, storage calculations have included climate change as reported in the Drainage Strategy.

11.114 Overall, with the proposed mitigation measures in place, there will be no change in the significance ratings of the assessment and the resulting residual effects would remain **Negligible to Minor Beneficial**.

CUMULATIVE EFFECTS

11.115 All committed major developments in the area surrounding the Proposed Development will have to satisfy the requirements for the control of surface runoff within the NPPF PPG, i.e. discharge at the current greenfield runoff rate or the provision of a betterment in runoff rates post-development. Therefore, the cumulative effect of other local developments should result in a net positive effect through reducing overall flood risk in the area.

11.116 In terms of water quality, new or committed developments will also have to incorporate appropriate pollution control measures to protect the underlying groundwater and/or local surface waters through planning conditions enforced by the Local Authority and/or discharge consents enforced by the EA.

11.117 The cumulative effects of new development on water supply and foul drainage infrastructure are managed at the regional level by the appropriate water companies in consultation with statutory

bodies such as the Local Planning Authorities and the EA. The cumulative effect of increases in mains water and foul drainage demand have to be offset by sustainable design and water efficiency measures and infrastructure contributions for sewage treatment works, where necessary. These measures should collectively ensure that the cumulative effects on regional water resources and treatment performance are controlled to an acceptable level during both the demolition and construction and the operation of the Proposed Development. This is in relation to both inter-relationship and intra-relationships on cumulative effects. These measures ensure that any inter or intra cumulative effects will not have an adverse impact on the receptors.

SUMMARY AND RESIDUAL EFFECTS

11.118 This assessment considers the potential effects of the Proposed Development on Water Quality, Water Resources and Flood Risk. The key considerations are the potential effects on water quality, water resources, water supply, infrastructure, flood risk and surface water drainage.

11.119 Table 11.5 gives an overview of the assessment and summarises the potential effects that have been identified for the construction and operational phases of the development as well as the associated classification, mitigation measures and residual effects.

11.120 The key potential effects during the construction phase is the potential for contamination from general construction related activities and the operational phase is the contamination of controlled waters from routine site drainage. However, with the recommended mitigation measures in place, the residual effects are considered to be **Negligible**.

11.121 In conclusion, given the location and nature of the receptors, the overall residual effects of the Proposed Development with regard to water quality, water resources and flood risk is considered to be **Negligible**.

Table 11.5: Summary and Residual Effects

Effect	Sensitivity of Receptor (receptor)	Magnitude of Effect	Effect Significance (pre-mitigation)	Mitigation Measure	Residual Effect Significance (post mitigation)
<i>Construction Phase</i>					
Control of surface water runoff	Low (surface water drainage)	Minor	Negligible to Minor Adverse	- Construction materials and vehicles properly maintained; - Compliance with BS6031:2009; and - Implementation of CEMP.	Negligible
Interruption of local abstractions	Medium (water resources)	Negligible	Negligible	- None required	Negligible
External flood risk	Low (flood risk)	Minor (groundwater flooding)	Negligible to Minor Adverse (groundwater flooding)	- Dewatering of excavations and pumping into temporary (holding tanks).	Negligible
Remobilisation of contamination to controlled water	High (groundwater and surface water)	Negligible (groundwater and surface water)	Negligible (groundwater and surface water)	- None required	Negligible
Contamination from general construction related activities	High (groundwater and surface water)	Minor (groundwater and surface water)	Minor to Moderate Adverse (groundwater and surface water)	- Construction vehicles properly maintained and appropriate storage/handling/management on construction material - Construction drainage system will be designed and managed to comply with BS6031:2009 - Piling method statement	Negligible
<i>Operational Phase</i>					
External flood risk	Low (flood risk)	Negligible	Negligible	- None required	Negligible
Control of surface water runoff	Low (surface water drainage)	Moderate	Minor Adverse	- Compliance with the Surface Water Drainage Strategy	Negligible
Contamination of controlled waters from routine site drainage	High (groundwater and surface water)	Moderate	Major Adverse (groundwater and surface water)	- Compliance with the Surface Water Drainage Strategy - Appropriate delivery/servicing and storage processes in place	Negligible
Water demand	Medium (water supply and infrastructure)	Negligible	Negligible	- None required	Negligible
Foul drainage demand	Medium (water supply and infrastructure)	Negligible	Negligible	- None required	Negligible

REFERENCES

None

12 LANDSCAPE AND VISUAL

INTRODUCTION

- 12.1 This chapter has been produced by Sightline Landscape Ltd to assess the significance of the impact of the visual changes arising from the Proposed Development, together with the effect on the landscape. The visual assessment identifies existing views to, across and from the Site, and identifies the visual receptors, such as nearby residents or users of public footpaths who might be affected and assesses the likely effect of the Proposed Development on their visual amenity.

GUIDANCE BEST PRACTICE

- 12.2 This LVIA has been undertaken with regards to the best practice guidelines within the Guidelines for Landscape and Visual Impact Assessment Edition 3 (hereafter referred to as GLVIA3). The GLVIA3 states in paragraph 1.1 that:

“...Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people’s views and visual amenity.”

- 12.3 GLVIA3 also states in paragraph 1.17 that when identifying landscape and visual effects there:

“...is a need for an approach that is in proportion to the scale of the project that is being assessed and the nature of the likely effects. Judgement needs to be exercised at all stages in terms of the scale of investigation that is appropriate and proportional.”

- 12.4 GLVIA3 also recognises in paragraph 2.23 that:

“...professional judgement is a very important part of LVIA. While there is some scope for quantitative measurement of some relatively objective matters much of the assessment must rely on qualitative judgements”

PREDICTING EFFECTS

- 12.5 To assess the impact of the Proposed Development on landscape, the sensitivity of a landscape is determined by identifying its quality (condition) and its ability to either absorb, or not, the type of

development proposed without significant harm (its susceptibility). Quality and susceptibility are combined to determine landscape sensitivity. The criteria to determine Landscape Quality are set out in Table 12.1. and for Susceptibility Table 12.2. The results are combined in Table 12.3 to determine Sensitivity. The magnitude of change resulting from the Proposed Development to elements within the landscape (such as trees and hedges) and landscape character is also assessed. The criteria to determine the Magnitude of Change to the landscape is set out in Table 12.4 and then combined with Sensitivity in Table 12.5 to determine the degree of significance of an impact (whether beneficial or adverse) ranging from Major to Negligible.

- 12.6 The level of visual impact is assessed in a similar way by combining the sensitivity of the person looking at the view (Table 12.6) with the magnitude in the change of the view (Tables 12.7 and 12.8). People's sensitivity to a change in a view can vary, for example workers within an industrial area are less sensitive than those people who choose to use the Public Right of Way (PRoW) network for the enjoyment of the countryside and the views. Viewers within an unattractive landscape are less sensitive than those in an acknowledged scenic landscape, such as an AONB or National Park.

Table 12.1: Criteria for determining Landscape Quality (Condition)	
Landscape Quality	Criteria
High	<p>Designated landscape including but not limited to World Heritage Sites, National Parks, Areas of Outstanding Natural Beauty considered to be an important component of the country's character experienced by a high number of people. Landscape character highly distinctive with very few features perceived as either detracting or intrusive.</p> <p>Landscape condition is good and components are generally maintained to a high standard. In terms of seclusion, enclosure by land use, traffic and movement, light pollution and presence/absence of major infrastructure, the landscape has an elevated level of tranquility. Often attracting visitors for the enjoyment of the landscape.</p> <p>Rare or distinctive landscape elements and features are key components that contribute to the landscape character of the area.</p> <p>High importance and rarity, national scale, and limited potential for substitution.</p>
Medium	<p>Undesignated landscape of Medium quality. Typical of many rural landscapes across the UK. Only occasional detracting or intrusive features. Countryside considered to be a distinctive component of the regional or local landscape character.</p> <p>Landscape condition is fair and components are generally well maintained. In terms of seclusion, enclosure by land use, traffic and movement, light pollution and presence/absence of major infrastructure, the landscape has a moderate level of tranquility.</p> <p>Some rare or distinctive landscape elements and features that contribute to the character of the area. Medium importance and rarity, regional scale, limited potential for substitution.</p>
Low	<p>Poor quality, degraded landscape with many detracting or intrusive elements and few positive attributes. Would benefit from comprehensive restoration. Very low importance and rarity, local scale.</p>
Negligible	<p>Poor quality, degraded landscape with many detracting or intrusive elements and few positive attributes. Would benefit from comprehensive restoration. Very low importance and rarity, local scale.</p>

12.7 Table 12.2, below, sets out the criteria for determining Landscape Susceptibility.

Table 12.2: Criteria for determining Landscape Susceptibility	
Susceptibility	Criteria
High	<p>Scale of enclosure – landscapes with a low capacity to accommodate the type of development being proposed owing to the interactions of topography, vegetation cover, built form, etc.</p> <p>Nature of land use – landscapes with no or little existing reference or context to the type of development being proposed.</p> <p>Nature of existing elements – landscapes with components that are not easily replaced or substituted (e.g. ancient woodland, mature trees, historic parkland, etc).</p> <p>Nature of existing features – landscapes where detracting features, major infrastructure or industry is not present or where present has a limited influence on landscape character.</p>
Medium	<p>Scale of enclosure – landscapes with a medium capacity to accommodate the type of development being proposed owing to the interactions of topography, vegetation cover, built form, etc.</p> <p>Nature of land use – landscapes with some existing reference or context to the type of development being proposed.</p> <p>Nature of existing elements – landscapes with components that are easily replaced or substituted.</p> <p>Nature of existing features – landscapes where detracting features, major infrastructure or industry is present and has a noticeable influence on landscape character.</p>
Low	<p>Scale of enclosure – landscapes with a high capacity to accommodate the type of development being proposed owing to the interactions of topography, vegetation cover, built form, etc.</p> <p>Nature of land use – landscapes with extensive existing reference or context to the type of development being proposed.</p> <p>Nature of existing features – landscapes where detracting features or major infrastructure is present and has a dominating influence on the landscape.</p>
Negligible	<p>The proposed development is entirely in keeping with the character of the existing landscape and the elements within it.</p>

12.8 Landscape Quality and Landscape Susceptibility values are combined using a matrix to determine Landscape Sensitivity (Table 12.3).

Table 12.3: Matrix for determining landscape sensitivity				
Landscape quality	Landscape Susceptibility			
	High	Medium	Low	Negligible
High	High	High	Medium	Low
Medium	High	Medium	Low	Negligible
Low	Medium	Low	Negligible	Negligible
Negligible	Low	Negligible	Negligible	Negligible

12.9 The magnitude of change to Landscape Character as a result of the Proposed Development is then determined using criteria set out in Table 12.4.

Table 12.4: Criteria for determining Magnitude of Change to Landscape Character

Magnitude of change	Criteria
High	<p>Introduction of major new elements into the landscape not currently present or some major change to the scale, landform, landcover or pattern of the landscape. Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).</p> <p>Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).</p>
Medium	<p>Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).</p> <p>Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).</p>
Low	<p>Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).</p> <p>Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).</p>
Negligible	<p>Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).</p> <p>Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).</p>
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

12.10 A matrix table is used to combine Magnitude of Change with Landscape Sensitivity to determine the impact of the Proposed Development on Landscape Character.

Table 12.5: Matrix for determining landscape Impact				
Magnitude of change within the landscape	Landscape Sensitivity			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

- 12.11 A similar process is undertaken to determine visual impacts by first determining visual sensitivity and then magnitude of change and combining them within a matrix.

Table 12.6 Criteria for determining the Sensitivity of a Visual receptor	
Landscape Quality	Criteria
High	<p>Receptors (tourists / visitors) within, or looking towards, internationally- or nationally- designated landscapes, areas and features such as World Heritage Sites, National Parks, Areas of Outstanding Natural Beauty, Registered Historic Parks and Gardens, Scheduled Ancient Monuments, Grade I and II* listed buildings and other places where the landscape / feature is the main reason for the visit.</p> <p>People using national trails and other designated routes where the view is likely to be the focus of attention.</p> <p>People living in residential properties.</p> <p>Communities where views contribute to the landscape setting enjoyed by residents in the area.</p> <p>People travelling through the landscape on roads, rail or other routes on recognised scenic routes or where there is a distinct awareness of views of their surroundings and their visual amenity.</p> <p>People walking on national long distant trails or promoted walks, well used rural routes close to urban areas, motorists on designated scenic routes, people walking in nationally designated landscapes. High importance and rarity, national scale, and limited potential for substitution.</p>
Medium	<p>Receptors within, or looking towards, undesignated landscapes, areas and features of local importance, and in places where the landscape / feature is not necessarily part of the reason for the visit.</p> <p>People engaged in outdoor recreation (such as walking local rural footpaths) whose attention is likely to be focused on the landscape and / or particular views, not on national trails or within designated landscapes.</p> <p>People staying in hotels and healthcare institutions who are likely to appreciate and / or benefit from views of their surroundings.</p> <p>Travellers on roads which have an attractive setting or scenic quality (rural or urban).</p> <p>People working in premises where the views are likely to make an important contribution to the setting, and / or to the quality of working life. High or medium importance and rarity, regional scale, limited potential for substitution.</p>
Low	<p>Receptors in commercial and industrial premises, schools, playing fields etc. where the view is not central to the use.</p> <p>People using main roads, infrequently used / inaccessible public rights of way and likely to be travelling for a purpose other than to enjoy the view.</p> <p>Low or medium importance and rarity, local scale.</p>
Negligible	<p>People moving past the view often at high speed (e.g. main roads, motorways and main line railways) and with little or no focus on or interest in the landscape through which they are travelling and significant roadside highway infrastructure (barriers, signs etc.). Very low importance.</p>

12.12 Table 12.7 sets out the criteria for determining the magnitude of change within the view.

Table 12.7: Criteria for determining Magnitude of Change within a view

Susceptibility	Criteria
High	<p>Substantial, obvious, loss or addition of features in the view.</p> <p>Major change in the composition of the view</p> <p>A major proportion of the view may be either blocked or occupied by the proposed development.</p> <p>The development introduces colours or forms which draw the eye and are not commonplace in the view.</p> <p>Views may be short-distance and direct.</p> <p>Prominent position within the landscape, such as on the skyline or open hillside or open floodplain or plateau.</p> <p>Changes in the view may be visible over a large proportion of the view. The proposed development is permanent and irreversible.</p> <p>Typically, this would be where a development would be obvious to the casual viewer, seen in close proximity with a large proportion of the view affected with little or no filtering or backgrounding and there would be a great scale of change from the present situation for the long or medium-term.</p>
Medium	<p>Medium Readily noticeable loss or addition of features in the view.</p> <p>Partial alteration to the existing view and/or the introduction of readily noticeable elements in the view.</p> <p>There is some screening or backgrounding by landform, woodland, and or built form</p> <p>The colours and forms are largely in keeping with the colours and forms within the surrounding landscape</p> <p>Views may be middle-distance, direct or oblique.</p> <p>Views may be filtered by vegetation.</p> <p>Partial loss of, or change to, sites visual function / contribution</p> <p>The duration of effect would be considered long-term / permanent but is potentially reversible</p> <p>Typically, this would be where a development would be seen in views for the long or medium-term where a moderate proportion of the views is affected. There may be some screening or backgrounding which minimise the scale of change from the present situation.</p>

Low	<p>The change in the view would not be readily noticeable.</p> <p>Development would form a minor constituent of the view, being partially-visible, or at a sufficient distance to be a limited component of a view</p> <p>The duration of effect may be considered long-term / permanent but is easily reversible; or, the duration may be medium-term</p> <p>A significant part of the development is screened</p> <p>It does not lie within a particularly prominent location within the landscape</p> <p>Introduction of features which may already be present in views.</p> <p>Typically, this would be where a moderate or low proportion of the view would be affected for the short-term or the development would be visible for the long-term in distant views; where only a small proportion of the view is affected in the medium-term or long-term; where the medium-term or long-term effect is reduced due to a high degree of filtering, screening or backgrounding or where there is a low scale of change from the existing view.</p>
Negligible	<p>A slight change in the view but barely noticeable to the casual observer/passers by. The change can only be perceived using equipment to enhance vision, such as binoculars or zoom lenses.</p>
No change	<p>No loss or alteration of characteristics, features or elements; no observable impact in either direction.</p>

12.13 A matrix is then used to determine visual impact by combining visual sensitivity with magnitude of change.

Table 12.8 Matrix for determining visual Impact				
Magnitude of change within the view	Sensitivity of the person observing the view			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

12.14 The weight that should be afforded to the effects in the decision making process, that is the level of Significance, is set out in Table 12.9.

Table 12.9: Criteria for determining Landscape Susceptibility

Effect	Significance
Major	Major beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process. They are Significant effects.
Moderate	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project. The identification of multiple Moderate effects may be a material consideration in the decision making process and so can become Significant.
Minor	Minor benefits or adverse effects are not considered to be important considerations and even multiple effects are not considered to be cumulatively material in the decision making process. Minor effects are not considered to be Significant.
Negligible	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

GEOGRAPHICAL SCOPE

12.15 The landscape and visual study area covers the land within a 5 kilometre radius of the Site, as illustrated in Figure 12.3: The Theoretical Zone of Visual Influence.

TEMPORAL SCOPE

12.16 The assessment considers the condition of the existing Site in 2021 and because no significant areas of landscape screening is required or proposed there is no requirement to assess the landscape and visual impacts over a longer time frame (typically undertaken to assess the mitigating effects of growing vegetation). The mature woodland adjacent to the Site is currently of a stature sufficient to screen the proposed building (but not the flue) and so it is not necessary to factor in additional growth although it is envisaged that the trees could eventually reach 20+ m in height over the next 10 years, providing further screening to the flue.

ASSUMPTION AND LIMITATIONS

- 12.17 The assessment was undertaken at a time of year when the deciduous vegetation was out of leaf on a clear, bright day and so represents a period of greatest visibility across the landscape. It is assumed that when the deciduous vegetation is in leaf the level of visibility across the landscape will be substantially less.

PLANNING FRAMEWORK

- 12.18 The statutory Development Plan consists of the following:

- County Durham Plan (CDP) adopted 2020.
- County Durham Waste Local Plan (CDWLP) adopted April 2005 and from which some policies are saved.
- the Great Aycliffe Neighbourhood Plan (which was made (adopted) in July 2017).

- 12.19 In relation to the CDP the following policies are relevant to this chapter:

- 39 (Landscape)
- 41 (Biodiversity and Geodiversity)
- 44 (Historic Environment).

- 12.20 The following policies within the Great Aycliffe Neighbourhood Plan are relevant:

- Policy GANP CH1 Landscape Character and Townscape
- Policy GANP CH4 Protecting Heritage Assets
- Policy GANP E4 Existing Tree Retention and Removal
- Policy GANP E5 Protection of existing trees within new development.

- 12.21 The Site does not lie within or adjacent to a valued landscape protected by a landscape designation. It lies within Merchant Park which is designated within the Local Plan as a Prestigious Business Park. Merchant Park has development plots remaining extending to 35 acres (14) hectares with outline planning permission already in place to provide up to 900,000sq ft 83,600 sq m of new buildings. Completed developments include the Hitachi Rail Europe train factory which occupies a large building immediately south of the Site.

- 12.22 An Environmental Statement was produced as part of the outline application and this included a landscape and visual impact assessment based on parameters for large warehouse type buildings.

CURRENT BASELINE

Topography

- 12.23 The Newton Aycliffe industrial estates to the east occupy relatively flat ground ranging from 83 – 95m Above Ordnance Datum (AOD). The Site comprises a prepared building platform at around 95 – 98m AOD, slightly lower than an adjacent woodland and A6444 which lie immediately to the north at around 100m AOD. The rural landscape to the north and west is gently undulating but gradually rises to a high point of 185 m AOD at Beacon Hill, 3.8 km to the northwest. There are no areas of high ground near the Site that might afford a view down into the Site over the screening tree belts. The land to the south is also gently undulating which limits views (the range between crests and valleys is between 86m and 108 m AOD).
- 12.24 Demon's Beck flows through the centre of Merchant Park in a west to east direction and Dene Beck flows in a similar direction within the countryside to the south of Merchant Park.

DESCRIPTION OF THE SITE AND ITS IMMEDIATE SURROUNDINGS

The Site

- 12.25 The Site comprises a vacant plot within Merchant Park, which has been levelled and cleared of vegetation. Bunds of stockpiled earth lie either side of the plot. Photographs of the Site are presented in Figure 12.2 and the locations where the photographs were taken are presented in Figure 12.1.

Land to the north

- 12.26 The Site is defined to the north by a 50 metre deep belt of mature trees which screens the Site and Merchant Park from the B6444 Heighington Lane. The trees have been surveyed by ACS Consulting (Land South of Heighington Lane, Arboricultural Report June 2021). The report records the trees at around 15 m high, in good physical and structural condition with 40+ years life span. The trees, a mix of conifers and broad leaves are rated A1/2. Similar tree belts lie on the north side of the lane and screen the chemical works such as Formica and Ineos. The land to the west of Ineos is rural although two of the fields are covered in ground mounted photovoltaics. The settlement of School

Aycliffe lies 860 m from the Site and is the nearest large residential area (where surrounding tree cover prevents views of the Site, even in winter).

Land to the West

- 12.27 A further plot awaiting development lies between the Site and a mature tree belt which defines the west boundary of Merchant Park. The landscape further west is rural. The nearest road, 1.2 km to the west, is the A6072, which skirts the village of Heighington. Mature tree belts along both sides of this bypass block any views towards the Site from within the village.

Land to the south

- 12.28 An area landscaped with native trees and shrubs lies within Merchant Park, to the south of the Site. It forms a landscaped corridor along a small water course, Demon's Beck, which includes a large pond. It also forms the setting to a Public Right of Way which crosses east to west through Merchant Park. The Hitachi train factory lies to the south of the landscape strip. It is a large building, over four times larger in footprint than the building proposed, but of a similar height, and includes railway sidings which lie between the Site and the Hitachi building. The Hitachi building and associated landscaped earth bunds will substantially screen the Proposed Development from the landscape to the south.

Land to the East

- 12.29 Vacant plots lie immediately to the east of the Site, extending as far as the railway line which defines the boundary of Merchant Park, 360 m to the east. Industrial areas lie to the east of the railway. Spoil is being temporarily stored on some of the plots.

LANDSCAPE FEATURES

- 12.30 There are no landscape features such as trees, shrubs, ponds or structures within the application area. At the time of the survey the Site comprised a bare platform of subsoil. The most significant landscape feature in the vicinity is the belt of mature mixed woodland which extends along the northern edge of Merchant Park and is 50m deep and 740 m long. At the northwest corner it heads south at a similar width for 880m. This tree belt is a substantial visual feature within the local landscape, but it substantially screens the Site from the wider landscape. A 10 hectare block of mature woodland lies 430 m southwest of the Site, known as Crumby's Plantation it is a local landscape feature and also provides a second layer of screening to the linear tree belts.

LANDSCAPE CHARACTER

12.31 An open rural landscape lies to the west of Merchant Park, it is part of the Tees Lowlands (National Character Area 23) which forms a broad, open plain dominated by the meandering lower reaches of the River Tees and its tributaries. The Site falls within an area defined by the Durham County Council landscape assessment and the characteristics are:

- open lowland plain;
- gently rolling or undulating topography with areas of flat or hummocky terrain;
- semi-regular patterns of old enclosures, often fragmented by amalgamation with large arable fields;
- low clipped hawthorn hedges;
- relics of rigg and furrow in older pastures;
- yew trees, thinly scattered hedgerow oak, ash and sycamore;
- nucleated pattern of small green villages connected by winding lanes, and
- field boundaries, farmsteads and watercourses are in relatively good condition, with telegraph lines and some fence boundaries the only signs of degradation.

12.32 Areas of the landscape are, however, visually influenced by the taller industrial structures to the east, such as the Ineos chemical works and so landscape quality is considered to be Medium.

LANDSCAPE/TOWNSCAPE CHARACTER AND QUALITY

12.33 Merchant Park is an extension to a large existing industrial and commercial area which lies to the north and east. The industrial areas within Newton Aycliffe are well maintained and there are few vacant plots. Overall the townscape quality is considered to be Medium but the townscape character of the partially developed Merchant Park is considered to be Low.

LANDSCAPE/TOWNSCAPE SUSCEPTIBILITY

12.34 The Site is ideally suited to absorb a development of this type without significant harm to the character of the Site itself and that of the wider landscape. The Site is a plot within an extensive, partially developed business park with certain key elements of infrastructure, such as access and drainage, installed. The Site benefits from substantial visual enclosure provided by mature

plantations and the Hitachi factory. The plot has already been partially prepared development. Industrial buildings, tall flues and large tanks are a feature of the local landscape. The landscape of the Site is considered to have Low to Medium susceptibility to the type of development proposed, that is, it can absorb the type of development proposed without significant harm to the character of the wider landscape.

LANDSCAPE/TOWNSCAPE SENSITIVITY

12.35 Landscape/townscape sensitivity is a combination of Landscape/Townscape Quality (which is Medium) and Townscape/Landscape Susceptibility (which is Low) resulting in a Low sensitivity.

HERITAGE ASSETS

12.36 The effect of the Proposed development on heritage assets in the area is assessed in Chapter 13.

IDENTIFICATION OF POTENTIAL VISUAL RECEPTORS

12.37 A Theoretical Zone of Visual Influence has been prepared to identify potential viewpoints and is presented in Figure 12.3. It was evident from visiting the Site and surrounding area that the actual extent of visibility is likely to be far less than indicated by the TZVI due to the screening effects of the high tree cover in the area and the large commercial and industrial buildings to the northeast and east. The likely extent of visibility has been indicated on the plan.

Residential Properties

12.38 The two main residential areas, School Aycliffe and Heighington benefit from screening tree belts on the peripheries and so are afforded no significant views towards the Site. The nearest dwelling is a single property on Heighington Lane, 685 m to the west but this is also screened by tree cover.

Roads

12.39 There are very few views towards the Site from the road network, due to intervening trees and hedges within the rural landscape and buildings within the industrial townscape. The road network within the countryside to the west and south is also very sparse. The only significant view will be from Heighington Lane. For a short section, furthest from the Site, travellers will be able to see the tip of the flue. On passing the Site, the woodland will screen the chimney from view due to the

woodland forcing the angle of viewing elevation above the flue. In winter you will be able to glimpse the building through the leafless branches but the impact will be fleeting and Negligible given that the woodland is 50 m deep and has an evergreen content. Views of the Site from the industrial estates to the east are blocked by warehouses and roadside trees.

Public Rights of Way

- 12.40 The most sensitive receptors with the greatest potential to be impacted by the proposed development are users of the extensive footpath network within the rural landscape to the north, west and south. Clear views towards the Site tend to be sporadic due to the gently undulating nature of the landscape and the reasonably strong network of hedges and woodland. The PRoW has been extensively walked for this assessment and the PRoW with the clearest views are PRoW 49 05 which passes through Merchant Park and two PRoW to the west. Tree cover blocks views from those passing through the Ineos Golf Club and farmland further north. Trees hedges, woodland, topography and the Hitachi factory block views of the Site from the countryside to the south.
- 12.41 Photographs have been taken from a series of viewpoints to illustrate the visibility of the proposed development and are presented in Figures 12.5.1 – 12.5.10.

‘WITHOUT DEVELOPMENT’ BASELINE SCENARIO

- 12.42 With regard to the baseline of the Site itself, it is important to note that the Environmental Statement assesses the Site in its current undeveloped state. If the Site remains undeveloped, this state will effectively be maintained. However, given that the Site is allocated employment land, in the event the Proposed Development is not built out, it is highly likely to be subject to new build employment related development of some kind, which may or may not have similarities with the current scheme. Given the Site’s allocation, land value and need to ensure the efficient use of land, it is very likely to be developed as intensively as is now proposed.
- 12.43 In addition, it is likely that other surrounding plots within Merchant Park will be built out in the future and if these are typical of the large warehouse/factory type buildings that the outline consent for Merchant Park envisaged, then they will provide further enclosure to the Site.
- 12.44 Finally, and as noted under the ‘Temporal Scope’ heading previously, it is noted that the Site benefits from screening from existing vegetation (woodland) which will continue to grow. Given that this would already provide screening for the proposed building (but not the stack), this does not need to be considered further.

MINIMISING IMPACTS THROUGH DESIGN

Primary or Inherent design mitigation

- 12.45 The main inherent design aspect in relation to landscape is locating the Proposed Development within an area afforded good visual enclosure by mature woodlands adjacent within a purposefully located and designed business Park. The main part of the building has been designed to be no higher than the adjacent woodland.
- 12.46 The flue will be the only noticeable element of the Proposed Development and this has been designed to be as short and thin as possible to minimise its visual impact. It will also be finished in a light grey colour so that it blends in with the sky. The building will also be finished in a mid-grey so that it will be visually recessive.

Secondary mitigation

- 12.47 Secondary mitigation seeks to reduce adverse effects which cannot be entirely removed through design and layout. In this instance the business park has been designed to accommodate large commercial buildings and some infrastructure planting has been undertaken. As a result there is no requirement for secondary mitigation, other than reducing the visual impact of the flue, but there are no practical measures to achieve this.

External Lighting

- 12.48 The Proposed Development would require external lighting for safe movement of vehicles and pedestrians, for any external amenity areas, and for the security of employees and visitors. The need to ensure safe working and operating conditions would be balanced against the requirement to reduce any unwanted visual prominence of the Proposed Development at night and to mitigate against general sky glow.
- 12.49 Once commissioned, the Proposed Development would operate on a continuous (24 hour / 7 day per week) basis. However, the deliveries and most staff / visitor movements would be made during the normal working day. In the winter months, some of these deliveries / visits are likely to be made when it is dark (e.g. late afternoon and early morning). During hours of darkness or low-level natural illumination, there would therefore be a need for lighting commensurate with health and safety requirements to ensure a safe working environment for operatives on Site.
- 12.50 The lighting design for the Proposed Development would seek to provide safe and well-lit external spaces and pedestrian walkways in accordance with the principles outlined in the best practice guidance above. Lighting levels would be designed to accord with best practice and to minimise the

generation of obtrusive light beyond the development area. It is suggested that the detailed design for the lighting scheme should be the subject of a suitably worded planning condition based upon the principles for lighting design identified within this sub-section of the ES.

12.51 There are a series of relevant documents and guidance that provide advice when developing internal and external lighting systems, including:

- *Lighting Guide 6: Lighting The Outside Environment*, CIBSE SLL 1992;
- *Guidance Notes for the Reduction of Obtrusive Light*, Institute of Lighting Engineers (ILE) 2000;
- *Lighting Guide 12: Emergency Lighting Design Guide*, CIBSE SLL 2004;
- *Lighting Guide 7: Office Lighting*, CIBSE SLL 2005 (with Addendum 2012);
- *Lighting Against Crime. A guide for crime reduction professionals*, Secured by Design 2011;
- *BS 5489 Code of practice for the design of road lighting. Lighting of roads and public amenity areas*, BSI 2013;
- *BS EN 12464-2 Light and Lighting. Lighting of work places. Outdoor work places*, BSI 2014; and
- *Commercial Developments 2015 version 2*, Secured by Design 2015.

4.1.1 The lighting design should demonstrate compliance with the various guidance documents and standards set out above.

4.1.2 Light sources would typically be LED, or other high efficiency sources. This would maximise both energy efficiency and longevity. Luminaires would be chosen in order to prevent light output above the horizontal, minimising light pollution.

4.1.3 The particular type of lighting columns and bollards would be chosen in accordance with the optimum height and spacing to ensure an even and efficient distribution of light that fulfils the design requirements in terms of security and minimal light pollution.

4.1.4 All non-essential external lighting would be turned off during hours of darkness outside of normal working hours. Lighting would be controlled via a timer system with photocell override (e.g. timer could be overridden if sufficient ambient light is available).

4.1.5 The lighting design would incorporate the following mitigation measures:

- *the use of low level lighting as far as possible to reduce night-time visibility;*
- *the use of carefully located directional lighting incorporating light shields / or full-cut off luminaires to avoid unwanted light spray / upward light and possible glare / sky glow effects;*

- *digital programmable switches including timers and / or movement sensors;*
- *avoid unnecessary or unplanned lighting of building façades; and*
- *lighting to be concentrated in locations essential to night-time operations; use of low-level lighting bollards with low energy fittings to reduce the impact of lighting around amenity areas and pedestrian routes.*

POTENTIAL ENVIRONMENTAL IMPACTS

CONSTRUCTION PHASE

Topography

12.52 A development platform has already been created within the Site, representing a change to the natural topography. The Proposed Development will require some localised changes to level the Site to the required finished ground level and the excavation of the basement and loading dock ramps, but these changes will become absorbed within the construction and will not be readily appreciated from the surrounding landscape. Overall, the proposed effect on the topography of the Site will be Negligible.

Landscape features

12.53 There are no landscape features on the Site and the fencing will protect the root protection areas of the adjacent mature woodland. The main ground levelling works have already been undertaken on the plot. The construction process will have no effect on landscape features (the root protection areas of the adjacent woodland will be respected).

Effect on landscape/townscape character

12.54 Merchant Park contains plots that have been prepared for development and so there is already a semi-constructed character to the land. The construction process will strengthen this character. The majority of the construction works and activities will, however be screened from the rural landscape to the west and south and so will have a Negligible effect. Any effects will be Temporary and Local. To a certain extent impact can be reduced by the implementation of a construction environmental management plan.

Effect on visual amenity

12.55 Construction processes are invariably more visually unappealing and intrusive than the completed project. In this instance the construction activities will be screened from the wider landscape by the

mature woodland, earth bunds within the business park, the maturing structure landscaping and the Hitachi factory. The access into Merchant Park has already been constructed and is accessed immediately from a main road. The upper section of tower cranes will be visible above the tree line but this will be a temporary impact only visible from a few locations. People using the PRow within the business park will be able to see the construction activities, but at a distance. Overall the impacts on visual amenity arising from the construction process will be adverse of Moderate significance to Views 2, 3 and 4. There will be Minor adverse effects to Views 5 and 6 if the jibs of cranes used in the construction process rise above tree line. Effects will be Temporary and Local. To a certain extent visual impact can be reduced by the implementation of a construction environmental management plan.

OPERATIONAL PHASE

Effect on land use

12.56 In landscape terms the Proposed Development is an entirely appropriate land use for the Site which lies within a purposefully built business park design to accommodate large industrial and commercial buildings. The effect on land use will be Negligible.

Effect on topography

12.57 This is covered under construction effects and will be Negligible.

Effect on landscape features

12.58 This is covered under construction effects and will be Negligible.

Effect on landscape/townscape character

12.59 The proposed development will increase the density of industrial development within this part of the town, but it is part of a wider planning strategy. The proposed development is a substantial, high-quality development which will complement the existing Hitachi development.

12.60 The tip of the flue will add another skyline element to the landscape, seen in conjunction with existing flues, chimneys, tall tanks and buildings on the western edge of the industrial area. These elements already signpost the industrial area from the rural landscape to the west. The visible part of the flue, which is narrow, only 700mm in diameter, will be a small element within a wider panorama and so the impact on the overall character of the landscape/townscape will be Negligible.

12.61 Due to the high temperature of the process, combined with the low moisture content of the waste, under normal operating conditions there will be no visible plume arising from the flue.

Effect on visual amenity

12.62 A series of representative photographs have been taken from the surrounding landscape and these are presented in Figures 12.5.1 to 12.5.10. For each view an assessment of the likely visual impact is made. The nature of the visual effects are direct, permanent, fleeting and local.

Viewpoint 1: Heighington Lane on the east side of the railway crossing

- Direction of view: West southwest
- Distance to nearest part of the site: 466 m
- Elevation: 92 m AOD
- Grid reference: NZ 27143 22524
- Date photo was taken: 18.04.2021

The existing view

12.63 This view shows the relationship of the Site and the setting of the historic signal box, station building (now a Public House) and the railway. The Site lies behind the band of trees that can be seen on the other side of the crossing. The historic setting of the station is adversely affected by the modern signs and lamp posts.

Predicted change to the view

12.64 The building will be screened by the woodland on the western boundary of Merchant Park, even in winter. Within this view approximately 190 m depth of woodland lies between the viewer and the proposed building and so the foreground trees elevate the angle of view above the building and flue. It may just be possible to glimpse the upper section of the flue when crossing the railway and from within the signal box, due to the line of sight down the lane, but as travellers head west the woodland will completely screen the flue from view. Where visible, the flue will appear as an inconsequential element compared with the foreground signs and lamp posts.

12.65 The sensitivity of the view is High (historic buildings and railway) and the magnitude of change Low resulting in a Moderate adverse impact on the visual amenity of travellers, but there will be no effect on the setting of the listed buildings in this view.

Proposed mitigation and residual impact

12.66 No mitigation practical, residual impact of Moderate significance, fleeting, permanent and Local.

Viewpoint 2: from PRoW 049 5 from the stile on the west side of the railway

- Direction of view: Southwest
- Distance to nearest part of the site: 434 m
- Elevation: 93 m AOD
- Grid reference: NZ 27136 22330
- Date photo was taken: 18.04.21

The existing view

12.67 The elevated railway stile affords a view along the ecological corridor which runs through the park and forms a setting to Demon's Beck. As a managed wetland it has the visual characteristics of a nature reserve. The mounds of spoil in the middle distance lie to the east of the Site and screen it from view.

Predicted change to the view

12.68 The building will be partly screened by the temporary spoil heaps, although when adjacent plots are developed the buildings which replace the spoil heaps will have a similar or greater screening effect. The flue will be visible, seen breaking the skyline. The sensitivity of the viewer is Medium and the magnitude of change Medium resulting in an adverse impact on visual amenity of Moderate significance (although seen in the context of a business park with an outline consent for development).

Proposed mitigation and residual impact

12.69 None proposed. The build out of the business park will reduce views of the proposed development or entirely screen it from view. The residual effect will be Negligible.

Viewpoint 3: from PRoW 049 5 as it reaches a high point within the ecological corridor

- Direction of view: Southwest
- Distance to nearest part of the site: 159 m
- Elevation: 95 m AOD
- Grid reference: NZ 26876 22330
- Date photo was taken: 18.04.2020

The existing view

12.70 This PRow climbs up an embankment and then runs between the lake and the Hitachi factory, which is visible on the left hand side of the image. The Site is visible on the far side of the lake, partly screened by the temporary spoil heaps.

Predicted change to the view

12.71 The building will be clearly visible and the taller section and flue will be seen breaking the skyline. Visibility will decrease as the trees around the lake gain stature.

12.72 The sensitivity of the viewer is Medium and the magnitude of change Medium resulting in a Moderate adverse impact on the visual amenity of walkers, although seen in the context of a business park with an outline consent for development.

Proposed mitigation and residual impact

12.73 No mitigation proposed, the existing tree planting will significantly reduce views of the building such that the residual impact will be Minor adverse in winter, Negligible in summer.

Viewpoint 4: from PRow 049 5 as it enters Merchant Park from the west

- Direction of view: Northeast
- Distance to nearest part of the site: 185 m
- Elevation: 101 m AOD
- Grid reference: NZ 26420 22289
- Date photo was taken: 18.04.2021

The existing view

12.74 As the PRow enters Merchant Park its setting is protected from future development by an earth bund, which is starting to be colonised by scrub. The Hitachi factory is visible on the right side of the image.

Predicted change to the view

12.75 The upper section of the proposed building will be visible above the bund and the flue will break the skyline.

12.76 The sensitivity of the viewer is Medium and the magnitude of change Medium, resulting in a Moderate adverse impact on the visual amenity of walkers (although seen in the context of a business park with an outline consent for development).

Proposed mitigation and residual impact

12.77 None proposed, the scrub colonising the bund will eventually protect the setting of the PRoW. Once a screen has established the residual impact will be Negligible in summer and Minor adverse in winter.

Viewpoint 5: from a PRoW which runs from Merchant Park to Heighington

- Direction of view: West
- Distance to nearest part of the site: 1.02 km
- Elevation: 115 m AOD
- Grid reference: NZ 25581 22215
- Date photo was taken: 18.04.2021

12.78 It is a rural view, marred only by the pole mounted electricity lines which cross the fields. The Site is screened by the woodland on the west perimeter of Merchant Park. When the trees are out of leaf it is possible to glimpse the Hitachi building and see the tops of the mast lighting within the sidings.

Predicted change to the view

12.79 The proposed building will be screened by the perimeter trees but the upper section of the flue will be visible above the tree line, but at 700 mm wide it will appear as a slender feature.

12.80 The sensitivity of the viewer is Medium and the magnitude of change Negligible/Low resulting in a Negligible to Minor adverse impact to walkers.

Proposed mitigation and residual impact

12.81 No mitigation is practical, residual impact adverse of Negligible/Minor significance.

Viewpoint 6: from a PRoW adjacent to A6072 close to the village of Heighington

- Direction of view: West
- Distance to nearest part of the site: 1.1km Elevation: 127 m AOD

- Grid reference: NZ 25436 22512
- Date photo was taken: 18.10.2020

The existing view

12.82 A rural view with Cumby's Plantation to the right, which substantially screens the Site from the landscape to the southwest. The majority of Merchant Park, including the Site, is screened by the perimeter woodlands. The Hitachi factory is visible due to a gap in the tree belt. A large warehouse on Moordale Road is also visible, behind it. The A6072 skirts the east side of Heighington, set within mature tree cover and so there are no views like this from the village or the A6072.

Predicted change to the view

- 12.83 The majority of the proposed building will be screened by the perimeter trees but the upper section of the taller part of the building will just be visible, although it will not break the skyline. The upper part of the flue will be visible and will break the skyline.
- 12.84 The sensitivity is Medium and the magnitude of change Low resulting in an adverse impact on the visual amenity of walkers of Minor significance.

Proposed mitigation and residual impact

- 12.85 No mitigation practical. Residual impact, adverse of Minor significance.

Viewpoint 7: from Heighington Lane on a pedestrian island crossing

- Direction of view: West
- Distance to nearest part of the site: 888 m
- Elevation: 117 m AOD
- Grid reference: NZ 25716 22572
- Date photo was taken: 18.04.2021

The existing view

12.86 This is a view looking down the lane towards the Site, which is screened by the tree cover which flanks the lane. The Site lies out of view, behind the trees.

Predicted change to the view

12.87 The building will be screened from view but it will be possible to glimpse the top part of the flue, although the view rapidly disappears as the lane drops downhill and the trees elevate the line of sight.

12.88 The sensitivity of the viewer is Low and the magnitude of change Medium resulting in an adverse impact on visual amenity of Minor significance.

Proposed mitigation and residual impact

12.89 No mitigation is practical, the residual impact will be adverse of Minor significance.

Viewpoint 8: from a PRoW which runs along the northern boundary of the Ineos Golf Club

- Direction of view: Southeast
- Distance to nearest part of the site: 616m Elevation: 109 m AOD
- Grid reference: NZ 26187 22998
- Date photo was taken: 18.04.2021

The existing view

12.90 A PRoW runs up the west side of the golf course from Heighington Lane, up to the village of School Aycliffe, before heading east along the northern boundary of the golf course. Along the west boundary it runs through a tree belt and there are no significant views towards the Site. The view opens up slightly on the north boundary, but even here the tree cover within the golf course and along Heighington Lane block views of the Site.

Predicted change to the view

12.91 The proposed building will be screened from view by the trees, but it may be possible to glimpse the tip of the flue through gaps in the tree line. It is likely that the building will also be screened from view from the majority of the golf course.

12.92 The sensitivity of the viewer is Medium and the magnitude of change Negligible or at worst Low resulting in an adverse impact on visual amenity of Negligible or Minor significance.

Proposed mitigation and residual impact

12.93 No mitigation is practical, the residual impact will be adverse of Negligible or Minor significance.

Viewpoint 9: from a rural footpath which runs along the drive to New House Farm, at its junction with the A6072

- Direction of view: Northeast
- Distance to nearest part of the site: 2.1 km
- Elevation: 107 m AOD
- Grid reference: NZ 25106 20863
- Date photo was taken: 18.04.2021

The existing view

12.94 There are few views towards the Site from this PRoW since it runs along the south side of a mature hedge. This view is taken through a field gateway. It is a rural view which illustrates how Merchants Park and the industrial estates of Newton Aycliffe are screened by tree cover, in particular Crumby's Plantation, which is visible in the middle distance. The warehouse which can be glimpsed through the trees on the right, is the one at Moordale Road. The Hitachi factory is screened by the plantation.

Predicted change to the view

12.95 The proposed building will be screened by the woodland, but it will be possible to see the tip of the flue rising above the plantation. The sensitivity of the viewer is Medium and the magnitude of change Low, resulting in an adverse impact on visual amenity of Minor significance, but only for a field gateway view. There is a PRoW further to the north but it is closer to the plantation and so will not afford a view of the building or the chimney.

Proposed mitigation and residual impact

12.96 None practical, there will be an adverse impact of Minor significance but only for a narrow viewpoint.

Viewpoint 10: from Coatham Lane as it crosses the A1 (M)

- Direction of view: Northwest
- Distance to nearest part of the site: 2.3 km
- Elevation: 76 m AOD
- Grid reference: NZ 28009 20423
- Date photo was taken: 18.04.2021

The existing view

- 12.97 There are few vantage points affording views towards the Site from the countryside to the south and south west due to the undulating nature of the topography, tree and hedge cover. The motorway bridge offers one of the few clear views towards Merchant Park, but the Site is screened by the Hitachi factory which occupies the ridge line.

Predicted change to the view

- 12.98 The proposed building will be screened by the factory and the tree line on the ridge. The flue is also likely to be screened by the trees, even in winter.
- 12.99 The sensitivity of the viewer is Low and the magnitude of change Negligible, resulting in an adverse visual impact of Negligible significance.

Proposed mitigation and residual impact

- 12.100 None required, residual impact Negligible.

PROPOSED MITIGATION AND RESIDUAL EFFECTS

- 12.101 Merchant Park is a purpose made business park which benefits from substantial screening provided by mature woodland. The access has already been built and infrastructure landscaping has now established. This landscaping will reduce the visibility of the Proposed Development to walkers as they pass through the business park to an acceptable level as it matures, requiring no further mitigation. The only landscape and visual effects that are predicted to arise as a result of the Proposed Development are Minor – Moderate adverse due to the visibility of the upper section of the flue in a few views. This cannot be mitigated through landscaping. As a result no additional mitigation is proposed and the residual effects are as the unmitigated effects.
- 12.102 There is limited scope within the plot for landscaping, such as tree planting, but given the scale of the building tree planting within the plot will not gain sufficient stature to screen the building, nor is screening required since it is already be provided by the perimeter woodlands. The only value of on plot planting will be to enhance the appearance of the interior of Merchant Park but it will have to effect beyond the boundary of Merchant Park.

CUMULATIVE EFFECTS

- 12.103 The only significant cumulative effects will relate to the build out of the remaining plots within Merchant Park. The park has been designed to cater for large buildings similar to that proposed and any new buildings will also benefit from the high level of screening afforded to the plots within the park. Build out will strengthen the developing industrial/commercial character of the land, but given the lands allocation for such use this is considered to be a Neutral effect. The only potential cumulative effect on the wider landscape will be if future developments also feature tall structures such as flues, which will increase the visibility of such elements on the skyline and signpost the location of the park within rural views to the west. In the absence of any firm proposals at this stage no cumulative effect can be considered at this moment in time.
- 12.104 The screening afforded to Merchants Park is such that while those passing through the area may pass through existing industrial and commercial business parks, travellers are unlikely to see the Proposed Development within Merchant Park from the road network and so there will be no increased sense of industrialisation of the area due to cumulative impact.
- 12.105 Overall, the cumulative impact of the Proposed Development on landscape character and visual amenity is considered to be Negligible.

CONCLUSION

- 12.106 The Site is a prepared plot within Merchant Park which does not lie within or close to a valued landscape subject to a protective designation. Merchant Park is designated within the Local Plan as a Prestigious Business Park and has outline planning permission for up to 900,000sq ft 83,600 sq m of new buildings. Currently the main completed development is the Hitachi Rail Europe train factory which occupies a large building immediately south of the Site. An Environmental Statement was produced as part of the outline application for Merchant Park and this included a landscape and visual impact assessment based on parameters for large warehouse type buildings and the planning authority concluded that the predicted landscape and visual effects would be acceptable. One of the main reasons for this is that Merchant Park benefits from substantial mature woodland screening on the north and west sides. Subsequently the train factory, bunding and landscaping will screen the Proposed Development from views further south.
- 12.107 From the majority of the surrounding countryside the proposed building will be screened by the substantial perimeter woodland and the nearby Crumby's Plantation. The trees within the woodland are a similar height to the tallest part of the building, but the trees will push the angle of view

elevation above the building in nearly all views (due to the lack of elevated viewpoints), the building will not be visible. While the flue will be 15m taller than the building, the angle of viewing elevation due to tree cover means that only the tip will be visible from the few potential vantage points within the surrounding countryside (mainly from a small area to the west). Since the flue is only 700 mm wide and the viewpoints are distant it will be a small and barely noticeable component within a wide panorama. No landscape mitigation to screen the building is required or proposed and it is impractical to screen the visible part of the flue in any views.

12.108 Residential areas lie a considerable distance from the Site and the proposed development will be screened by either intervening industry or tree cover. It is concluded that, overall, the proposed development will have no significant adverse effects on the visual amenity of residents.

12.109 It is concluded that the proposed development will not result in any significant adverse landscape or visual impacts.

Table 12.10 Residual Effects Summary Table

Potential Effect	Nature of Effect (Perm'nt or Temporary)	Significance of Effect	Mitigation Measure	Residual Effects
Topography (Construction effect)	Permanent	Negligible	None required	Negligible
Landscape features (Construction effect)	Permanent	Negligible	None required	Negligible
Visual impact of construction plant and machinery, including the use of tower cranes	Temporary	Minor to Moderate Adverse	Adoption of a construction environmental management plan	Minor to Moderate Adverse
Landscape character (Construction effect)	Temporary	Negligible	Adoption of a construction environmental management plan	Negligible
Landscape character (operational)	Permanent	Negligible	None required or practicable	Negligible
Visual impact of the completed development to people within residential properties	Permanent	Negligible	None required	Negligible
Visual impact of the completed development to users of the PRow which passes through Merchant Park	Permanent	Moderate Adverse	Already provided as part of the existing infrastructure landscaping	Negligible in summer, Minor adverse in winter.
Visual impact of the completed development to users of the PRow network beyond the Site	Permanent	Minor adverse	None practical, the only effect being that of the upper section of the flue.	Minor adverse
Visual impact to users of the road network	Permanent	Minor adverse on Heighington Lane	None practical, the only effect being that of the upper section of the flue from two short sections of the lane	Minor adverse
Cumulative effects	Permanent	Negligible unless other developments within Merchant park include structures that exceed 15 m in height.	None required	Negligible

REFERENCES

None

13 HERITAGE

INTRODUCTION

- 13.1 This Chapter has been prepared by M B Heritage Limited a specialist built heritage and archaeological consultancy established in 2009 and providing services to a wide range of public and private sector clients throughout the United Kingdom.
- 13.2 This chapter of the Environment Statement assesses the likely significant effects of the proposed development on the environment in terms of the built (above ground) historic environment. Given past evaluation of the site archaeological impact has been ‘*scoped out*’ of the ES although a summary of the findings of previous archaeological assessment and evaluation is provided for completeness.
- 13.3 The assessment set out within this Chapter was originally undertaken in April 2021. The proposed development, subject of the assessment, was refused planning permission in December 2021 and is currently the subject of an Appeal Public Inquiry (*APP/X1355/W/22/3292099*). In order to properly inform the Inquiry, this Chapter has been reviewed and, where appropriate, updated to reflect any changes to the baseline environment, relevant heritage receptors potentially affected by the development and/or changes to policy or best practice guidance. In summary this review notes:
- The National Planning Policy Framework was revised on 20th July 2021. No material changes to policy guidance in respect to the historic environment were made but paragraph numbers, where cited, have been updated.
 - No other changes to the relevant policy and best practice framework for the assessment have taken place.
 - As regards baseline environmental data relevant to the assessment, three additional designated heritage assets have been recorded on the National Heritage List for England within the study area:
 - The Stockton & Darlington Railway Boundary Stone, listed at Grade II (1476552), added to the statutory list on the 14th January 2022. An assessment of potential impacts upon the setting to the Stone, which is located around 350m to the south-east of the site, has been added at Appendix 1 and concludes no impacts during construction or operational phases of development.
 - The Aycliffe Wood Occupation Bridge is located around 600m to the north-east and crosses the main rail line. The structure is a Grade II listed building was added to the list on 2nd February 2022 (1478497). An assessment of potential impacts upon the setting to the Bridge has been

added at Appendix 1 and concludes no impacts during construction or operational phases of development.

- The School Aycliffe Lane Overbridge was added to the list on 2nd February 2022 as a Grade II listed building (1478390). The structure is located around 900m to the north/north-east of the site. An assessment of potential impacts upon the setting to the Bridge has been added at Appendix 1 and concludes no impacts during construction or operational phases of development.
- No further material changes to the environmental baseline have occurred.
- No material changes to the predicted effects arising from the development have occurred.
- The overall conclusions of the original assessment as set out in this Chapter remain valid.

13.4 The chapter and it's supporting appendices describe the relevant planning policy context in respect of the historic environment, the assessment methodology; the baseline conditions at the application site and surroundings; the likely significant effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects. In summary, the objectives of the chapter are to:

- Set out an appropriate assessment framework in order to consider potential built heritage impact;
- To identify those built heritage assets, both designated and non-designated which may be subject to environment effects; and
- To assess the nature and extent of these effects and consider mitigation as appropriate.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

13.5 The assessment has been undertaken having regard to National Planning Policy Framework and Historic England guidance relevant to the Development Proposals. The method used for assessing the potential effects of the Proposed Development on the built heritage receptors conform to the regulatory framework set out in the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. It considers the importance (significance) of each receptor, and the likely impact (without mitigation) of the Proposed Development upon them, in order to appraise the potential effects (significance of effects).

The Study Area

- 13.6 The Study Area adopted for this assessment has been defined by a 2km radius from the centre of the Site. This radius is considered appropriate have regard to the locational characteristics of the Site and nature of the Development. Designated heritage assets beyond the study area, up to a radius of 5km, were also considered in order to assess potential affects. All assets identified within the 2km study area have been scoped and initially assessed in order to fully determine baseline conditions and potential effects. Where potential effects are predicted these are considered in more detail within this Chapter and, where appropriate, mitigation measures recommended.
- 13.7 A number of information sources were consulted in order to establish baseline conditions:
- The Durham Historic Environment Record (DHER);
 - The National Heritage List for England (NHLE);
 - The National Record for the Historic Environment (NRHE);
 - Historic mapping of the site and surrounding area.
- 13.8 The assessment has been supplemented by a site visit, undertaken in April 2021, which has assessed the Site and surrounding area in order to enhance the baseline assessment.

Assessment Methodology

- 13.9 The following table sets out a summary of the factors for determining the value or sensitivity and significance of built heritage assets identified as part of the baseline study. This is guided by professional judgement informed by statutory and non-statutory designations, national and local policies and information resources. The list is not exhaustive and some assets may exhibit qualities greater than their designation. The importance of some assets may also be enhanced by their group value.

Table 13.1: Value and Significance of Built Heritage Receptors

Value/Sensitivity	Significance	Definition
Very High	International	<ul style="list-style-type: none"> • World Heritage Sites • Assets of recognised international importance • Assets that contribute to international research objectives
High	National	<ul style="list-style-type: none"> • Scheduled Ancient Monuments • Grade I and Grade II* Listed Buildings • Grade I and Grade II* Registered Parks and Gardens • Undesignated assets of the quality and importance to be designated • Assets that contribute to national research agendas
Medium	Regional	<ul style="list-style-type: none"> • Grade II Listed Buildings • Grade II Registered Parks and Gardens • Conservation Areas • Assets that contribute to regional research agendas
Low	Local	<ul style="list-style-type: none"> • Locally listed buildings • Assets compromised by poor preservation and/or poor contextual associations • Assets with importance to local interest groups • Assets that contribute to local research objectives
Negligible	Negligible	<ul style="list-style-type: none"> • Assets with little or no architectural/historic interest

13.10 No receptors of very high sensitivity fall within the Study Area.

13.11 Once the value or significance of the heritage assets has been established the magnitude of impact is considered. Potential impacts are defined as a change resulting from the Proposed Development which affects a heritage asset. These impacts are considered in terms of being either adverse or beneficial and in terms of being direct, indirect or cumulative. Regard is also had to impacts at construction and operational stages. The assessment will include consideration of impacts upon the significance, within setting, of relevant heritage assets and these impacts will vary from case to case and so cannot be generically defined. The magnitude of impact is assessed without reference to the sensitivity or value of the heritage asset.

13.12 The following table sets out the criteria adopted to assess the magnitude of impact of the Proposed Development upon built heritage receptors.

Table 13.2: Definition of Magnitude

Magnitude	Definition
High	Permanent changes over the whole receptor, with fundamental alteration to key characteristics that part of the significance of the asset or its setting. This can be beneficial or adverse.
Medium	Considerable or permanent changes, over the majority of the receptor, which results in discernible alteration to key characteristics that form part of the significance of the asset or its setting. This can be beneficial or adverse.
Low	Change, temporary or permanent, over a minority of the receptor or which has limited but discernible alteration to key characteristics that form part of the significance of the asset or its setting. This can be beneficial or adverse.
Negligible	Change that either has a very minor impact on a heritage asset or its setting or which is neutral in effect.

13.13 Once the value of the heritage assets and the magnitude of the affect has been determined it is possible to determine the significance of the impact. The following matrix, Table 13.3, illustrates the framework within which this significance is assessed. The assessment follows national guidelines and is based upon informed professional judgement.

Table 13.3: Impact Significance Matrix

Value/Sensitivity	Magnitude			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

13.14 The impact significance definitions are summarised in the following table.

Table 13.4: Impact Significance Definitions

Impact Significance	Definition
Major	Very large or large changes to the asset and/or its condition, both adverse or beneficial, which are likely to be important considerations as they affect assets of national or regional importance. Mitigation will very likely be required where adverse impacts are predicted.
Moderate	Moderate change or impact on assets of local or regional importance which will require consideration and potential mitigation where adverse impacts are predicted.
Minor	Small change or impact on assets of local or negligible importance which may require some consideration and potential mitigation where adverse impacts are predicted.
Negligible	No discernible change to the heritage asset.

- 13.15 Where the Proposed Development includes embedded mitigation measures which would alter potential impacts upon the built heritage resource these are considered within the initial assessment. Where appropriate, additional mitigation measures are suggested and a post-mitigation residual impact assessment presented.

Cumulative Impact Assessment

- 13.16 Potential cumulative impacts arising from the Proposed Development are considered in respect of committed or proposed developments falling within 2km of the Site. Impact is assessed in line with the criteria and definitions set out above and, where appropriate, potential mitigation measure are suggested.

Scoping Opinion

- 13.17 An Environment Impact Assessment (EIA) Scoping and Screening Opinion Request (Sol Environment, 2021) was submitted to the local planning authority in February 2021. The authority issued its Scoping Opinion, by letter dated 13th April 2021, and made the following comments in respect of heritage matters:

‘...With regard to the assessment of the visual effects of the development as part of a Landscape and Visual Impact Assessment, the applicant should agree the approach to the visual assessment with DCC at

an early stage, ensuring all key visual receptors are considered and assessed. Whilst the LVIA will be important to understand the landscape character of the site and its surroundings, a full understanding of the impact on cultural heritage cannot be gained from this assessment due to the differing criteria for assessment of elements such as setting. In addition, the intangible qualities of cultural heritage could not be assessed through an LVIA. The assessment should follow Historic England guidance on assessing setting – The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning: 3 (second edition). The Assessment Step 3 Checklist sets out the potential attributes of a development affecting setting that may help clarify its implications for the significance of the heritage assets.

The applicant has identified the Stockton and Darlington Railway Heritage Action Zone and well as the close proximity of the site to Heighington Station. It is noted that the applicant has not identified all of the designated and non-designated heritage assets within 2km of the site. Given the Grade I status of the Church of St Andrew in Aycliffe Village and the Church of St Andrew in Heighington (Darlington Borough Council), nationally significant heritage assets should be considered within a 5km radius. It is noted that the applicant has not identified the non-designated heritage assets within 2km of the site. This should be included as part of any detailed heritage settings impact assessment.

The Council's Archaeology officer advises that the proposal site was cleared as part of the previous development to the south so there is no need for any archaeological interventions. ...'

- 13.18 The scope of the assessment, undertaken below, identifies and assesses designated heritage assets falling within 2km of the Site (the Study Area) and records held on the Durham Historic Environment Record. Regard is also had to nationally significant assets (see Table 13.1) falling within 5km of the Site. In undertaking the assessment of potential impacts, regard is had to Historic England guidance, as summarised below.
- 13.19 With regard to the archaeological resource, having regard to historical evaluation of the site no archaeological impacts are anticipated. As such archaeology is scoped out of this assessment Chapter.

LEGISLATION, PLANNING POLICY AND GUIDANCE

- 13.20 The Planning (Listed Buildings and Conservation Areas) Act 1990 (the Act) sets out the principal statutory instruments which must be considered by the decision-taker in the determination of any application affecting a listed building or conservation area.

- 13.21 Section 66 of the Act states that in considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.
- 13.22 Section 69 of the Act allows local planning authorities to designate conservation areas. These are areas of special architectural or historic interest the character or appearance of which it is desirable to preserve or enhance. Section 72 requires that in the exercise of planning duties by an authority special attention shall be paid to the desirability of preserving or enhancing the character or appearance of conservation areas.
- 13.23 Case law (*see particularly E Northants DC v Secretary of State for Communities and Local Government [2014] EWCA Civ 137*) confirms that the duties imposed under the Act indicate that where harm to a listed building or conservation area or its setting is identified this a matter to which great weight and importance should be attached in the planning balance.
- 13.24 The policies contained within the National Planning Policy Framework, 2021, (hereafter the Framework), taken together, comprise the Government's view of what sustainable development should constitute in practice. The protection and enhancement of the built and historic environment is an over-arching environmental objective within the Framework (paragraph 8).
- 13.25 A heritage asset is defined within the Framework as:
- "A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority (including local listing)"*
- 13.26 Significance, for heritage policy, is defined in the Framework as:
- "The value of a heritage asset to this and future generations because of its heritage interest. This interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting."*
- 13.27 In undertaking any heritage assessment, the aim should be to demonstrate understanding of the nature of significance and the particular interest which contributes to that significance, the extent of the building fabric that holds this interest and its comparative level of importance. Historic England Advice Note 12, Statements of Historic Significance, Analysing Significance in Heritage Assets, 2019 (HEAN12), indicates that heritage assessments of significance should provide an impartial analysis of significance and the contribution of setting:

“A Statement of Heritage Significance is not an advocacy document, seeking to justify a scheme which has already been designed; it is more an objective analysis of significance, an opportunity to describe what matters and why, in terms of heritage significance.”

13.28 HEAN12 advocates a stage approach to decision-taking in applications affecting heritage assets:

- Understand the form, materials and history of the affected heritage asset(s).
- Understand the significance of the asset(s).
- Understand the impact of the proposal on that significance.
- Avoid, minimise and mitigate negative impacts in a way that meets the objectives of the National Planning Policy Framework.
- Look for opportunities to better reveal or enhance significance.

13.29 Further guidance on the assessment process is provided in Historic England Good Practice Advice in Planning 2, Managing Significance in Decision-Taking in the Historic Environment, 2015 (GPAP2). This notes that if there is apparent conflict between the proposed development and the conservation of a heritage asset consideration may need to be given alternative means of delivering the development which leads to a more sustainable result which reduces potential harm to significance. This process, reflected in HEAN12 advice, should be undertaken before weighing the public benefits of a proposal against any harm.

13.30 The Framework indicates that, when considering the impact of a proposed development on the significance of a designated heritage asset great weight should be given to an asset’s conservation. Such weight should be given irrespective of the extent of potential harm identified (paragraph 199). For heritage policy ‘conservation’ is defined as:

“The process of maintaining and managing change to a heritage asset in a way that sustains and, where appropriate, enhances its significance.”

13.31 Where development falls within the setting of heritage assets, the Framework indicates that authorities should look for opportunities for new development to enhance or better reveal their significance. Where proposals preserve those elements of setting that make a positive contribution to the asset (or which better reveal significance) they should be treated favourably (paragraph 206).

- 13.32 As regards the consideration of what constitutes the setting of a heritage asset the Framework provides the following definition:

“The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.”

- 13.33 Historic England has also published guidance in respect of the setting of heritage assets (Historic Environment Good Practice Advice in Planning, Note 3 (Second Edition), The Setting of Heritage Assets, 2017). It indicates, at paragraph 9, that:

“Setting is not itself a heritage asset, nor a heritage designation, although land comprising a setting may itself be designated. Its importance lies in what it contributes to the significance of the heritage asset or to the ability to appreciate that significance.”

- 13.34 The advice note sets out a staged approach to proportionate decision-taking and recommends a broad approach to assessment, undertaken as a series of steps that may be applied proportionately to complex and more straightforward cases (paragraph 19).

- 13.35 In considering the setting of an asset and potential impacts upon it, it is important to not draw too narrow an interpretation. Both policy and guidance provide a broad definition of setting which makes clear that this should not be based solely upon the existence of a physical or visual connection. Planning Practice Guidance, at paragraph 013 states that:

“The extent and importance of setting is often expressed by reference to visual considerations. Although views of or from an asset will play an important part, the way in which we experience an asset in its setting is also influence by other environmental factors such as noise, dust and vibration from other land uses in the vicinity, and by our understanding of the historic relationship between places. The term setting is not defined in purely visual terms in the NPPF which refers to the “surroundings in which a heritage asset is experienced”. The word “experienced” has a broad meaning, which is capable of extending beyond the purely visual.”

- 13.36 In respect of the consideration of development impacts upon views the Historic England setting guidance indicates that views which contribute more to the understanding of the significance of a heritage asset include:

- Those where the composition within the view was a fundamental aspect of the design or function of the heritage asset;
- Those where town or village-scape reveals views with unplanned or unintended beauty;

- Those with historical associations, including viewing points and the topography of battlefields;
- Those with cultural associations, including landscapes known historically for their picturesque and landscape beauty, those which become subjects for paintings of the English landscape tradition, and those views which have otherwise become historically cherished and protected; and
- Those where relationships between the asset and other heritage assets or natural features or phenomena such as solar or lunar events are particularly relevant.

13.37 The setting guidance provides a narrative framework for the consideration of potential development impacts upon the significance, within views and setting, of individual heritage assets. This is adopted within the assessment set out below.

BASELINE CONDITIONS

13.38 The baseline assessment summarises the heritage background to the Site and identifies recorded built heritage assets falling within the Study Area based upon a 2km radius from the Site centre, and, where appropriate, nationally significant designated assets falling within 5km of the site. The baseline is derived from various documentary resources and has been informed by field survey.

Statutory Designations

13.39 The National Heritage List for England (NHLE) holds 58 records falling within the Study Area. All relate to listed buildings with no scheduled monuments falling within the Study Area. No records of international importance, for example World Heritage Sites, fall within the Study Area.

13.40 A gazetteer of NHLE records falling within the Study Area is provided at Appendix 1 to this Chapter. The records include a number of heritage assets holding national significance:

- | | |
|--|-------------------------------|
| • <i>Heighington Hall (Grade II*)</i> | <i>List Entry No. 1121240</i> |
| • <i>Church of St. Andrew (Grade I)</i> | <i>List Entry No. 1322806</i> |
| • <i>Church of St. Michael (Grade I)</i> | <i>List Entry No. 1322953</i> |

13.41 The NHLE records 8 additional nationally significant assets falling within 5km of the Site and these are summarised at Appendix 1 to this Chapter.

13.42 One non-designation determination has been made by Historic England in respect of railway sleeper stones to the west of Newton Aycliffe Railway Station (NGR: NZ26511 24395). The determination

notes that the extent of survival of the stones is uncertain and the original purpose of this section of track, isolated from the rest of the railway, is unknown.

- 13.43 Heighington Conservation Area, designated by Darlington Borough Council falls within the Study Area around 1km at its closest point to the Site. The Council adopted a Conservation Area Appraisal for the Area in March 2019. The Aycliffe Village Conservation Area, designated by Durham County Council, falls within the Study Area to the east of the Site. No appraisal of the Area has been published by the Council. Both conservation areas are designated heritage assets of regional significance.

Non-Statutory Designations

- 13.44 The Durham Historic Environment Record (DHER) holds around 155 records falling within the Study Area. A number of these relate to designated heritage assets recorded on the NHLE. Those records falling within close proximity to the Site are summarised below:

D46076 Spring well NZ426451 522563

Building shown on 1850s mapping record. Demolished in the late 20th century when Heighington Lane was realigned.

D46139 Well to south of Spring Lane NZ426483 522334

Well marked on 1890s mapping, no longer shown by the 1980s.

D46137 Pond to the north-west of Whitworth NZ426654 522324

Pond shown on map of 1828, later drained. Survived as a hollow, now removed following site clearance.

D46075 Well north of Whitworth NZ426735 522309

Well shown on 1850s mapping. Removed following site clearance and development of the Hitachi Rail facility.

D46082 Iron Age and Romano British Settlement NZ426623 522267

Centred to the south of the Site. Geophysical survey identified anomalies consistent with a prehistoric or Romano-British settlement in 2002. Subsequent trial trenching identified a series of round houses, pits and ditches.

D7789 Whitworth Farm, Newton Aycliffe NZ426700 522200

Farmstead first listed on a map of 1754 with possible medieval origins. In use until the 1980 but demolished in the following decade.

D8935 Ridge and furrow earthworks at former Whitworth Farm NZ426700 522249

Likely medieval period ridge and furrow earthworks. Removed following site clearance and development of the Hitachi Rail facility.

D46086 Medieval pit to east of former Whitworth Farm NZ426783 522188

Single medieval pit identified during trial trenching in 2002.

D51741 Bronze Age cremation burials near Whitworth Farm NZ426805 522235

Burial site discovered during trial trenching in 2013.

D3067 Cod Ling, Aycliffe NZ427100 521200

Site of a pre-19th century farmstead.

D1486 School Aycliffe DMV NZ426000 523000

Remain of a deserted medieval village first recorded in 1351 but probable dating to the 9th or 10th century.

D5691 Royal Ordnance Factory, Aycliffe NZ427794 523399

Site of Royal Ordnance Factory No. 9, opened in 1941. Closed in 1945 and became a trading estate.

D59620 Post Medieval cobbled surface NZ426800 522200

Cobbled surface identified during watching brief.

D58639 Pit group at Amazon Park NZ426572 522088

Identified during trial trenching in 2013.

D8936 Munitions Bunkers to south-west of Newton Aycliffe NZ426532 521790

Sit of munition bunkers associated with the Royal Ordnance factory.

D49433 Ridge and Furrow, Long Tens NZ427215 522207

Ridge and furrow, likely medieval, earthworks located to the east of the rail line and site.

- 13.45 The potential impact of site development upon the archaeological resource has been evaluated as part of an Environmental Impact Assessment undertaken in 2011 in respect of the outline planning application for the wider development of the Site and land to the south. Subsequent evaluation and trial trenching (Wardell Armstrong Archaeology, 2013) has confirmed the nature and extent of archaeological remains and no further evaluation or assessment is required. This has been confirmed in scoping opinion in respect of this Assessment.
- 13.46 Having regard to built heritage assets recorded on the DHER, no buildings or structures are identified which may potentially be physically impacted by the Proposed Development.

Current Site Context

- 13.47 The Site comprises around 2.02 hectares of land, currently undeveloped and formerly in agricultural use, located to the south of Heighington Lane and north of the Hitachi Rail manufacturing plant. It forms part of an approved development (LPA reference 7/2013/0142/DM) for industrial and warehousing uses. Phase 1 of the development has been undertaken with the construction of the Hitachi plant. The Site has been cleared in preparation for development and contains no built heritage features. Former enclosure field boundaries within the Site have been removed.
- 13.48 The Site is visually enclosed by woodland screen belts to the west and north and by a landscaped embankment, balancing pond and the Hitachi plant to the south. Topography is generally flat.
- 13.49 The locality of the Site is dominated by industrial and warehousing buildings falling within the Newton Aycliffe Industrial Estate to the north-east. The Darlington to Bishop Auckland section of the Stockton and Darlington Railway runs around 400m to the east of the Site. Land is more open to the west with a site adjoining a further development plot with agricultural land beyond. To the north the Ineos Golf Course provides openness albeit screened by landscape planting/tree-belts to the north side of Heighington Lane.

Historic Background

- 13.50 The historical background to the Site was previously assessed within an Environmental Statement produced in respect of the Outline Planning Application (OPA) for the development of the wider site, in part now development by the Hitachi Rail manufacturing site to the south (Cushman & Wakefield, April 2007). The assessment included archaeological evaluation, including trial trenching of the OPA site.
- 13.51 A summary of the assessment findings is set out below:

Prehistoric and Roman Remains

No evidence of Prehistoric and Roman settlement or activity is identified within or in the vicinity of the Site.

Iron Age Settlement

The assessment has confirmed that sub-surface archaeological remains of Late Iron Age settlement and agriculture are present immediately below the topsoil throughout much of the area to the south of Demon's Beck. These remains are considered to be of regional importance.

Medieval Settlement and Agriculture

There is no evidence for medieval settlement within the boundaries of the development site, although medieval pits of unknown origin and function may be present. Well-preserved earthwork remains of medieval ridge and furrow survive within the central part of the Proposed Development area and there is the potential for sub-surface remains to survive within other parts of the Site. The earthwork remains have been surveyed and recorded. The ridge and furrow is considered to be of local archaeological importance. Where these remains survive as earthworks, they are considered to be features of historic interest in the local landscape.

Post-Medieval Settlement

There is the potential for sub-surface archaeological remains relating to the buildings and well associated with Whitworth farm within the central part of the development area. Cartographic evidence suggests a model farm layout dating to either the late 17th or 18th century. The site is considered to be of local importance.

13.52 Subsequent to the granting of Outline Planning Permission for the wider site further archaeological evaluation and assessment has been undertaken. The Site has been cleared of historic field divisions in readiness for development and contains no built heritage features. Further archaeological evaluation is not required and as such is scoped out of this Chapter.

SUMMARY OF BASELINE CONDITIONS

13.53 Table 13.5 provides a summary of those built heritage assets identified within the existing baseline as potentially affected by the proposed development.

Table 13.5: Baseline Conditions – Built Heritage Assets		
Value/Sensitivity	Significance	Heritage Asset - Baseline
Very High	International	None
		<i>Scheduled Monuments (NHLE reference in parenthesis)</i> Deserted Village Mordon (1002335) Ketton Bridge (1002345) Coatham Mundeville medieval village, fishpond and areas of ridge and furrow (1016109) Small multivallate hillfort and tower mill on Shackleton Beacon Hill (10161367) Deserted medieval village at Walworth (1011256)
High	National	<i>Grade I Listed Buildings (NHLE reference in parenthesis)</i> Church of St. Andrew (13221306) Church of St. Michael (1322953) Walworth Castle (1121175) <i>Grade II* Listed Buildings (NHLE reference in parenthesis)</i> Heighington Hall (1121240) Dovecote 45 metres east of Manor House (1121194) Middridge Grange Farmhouse (1121214)

Medium	Regional	<p><i>Grade II Listed Building (NHLE reference in parenthesis)</i></p> <p>Ivy House (1115747)</p> <p>Gazebo, terrace wall and sheds, south-east of Number 7 (1116286)</p> <p>16 East Green (1116243)</p> <p>Young Headstone 10 metres west of Church of St. Michael (1116441)</p> <p>Number 45 and Former Smithy (1116500)</p> <p>Wall to east of Heighington Hall (1116514)</p> <p>Hodgson Tomb 3 metres north of Church of St. Michael (1121201)</p> <p>Hearse House 35 metres north east of the Church of St. Michael (1121202)</p> <p>Churchyard wall and gate piers to east of number 10 (1121203)</p> <p>Pigeon Cote west of Coatsay Moor Farmhouse (1121204)</p> <p>Lawn House (1121208)</p> <p>Dovecote west of Dovecote Cottage (1121209)</p> <p>Walls Gate Piers and Pigsty to west and north of Trafalgar House (1121211)</p> <p>1 West Green (1121217)</p> <p>Garden Screen Wall north east of Heighington Hall (1121241)</p> <p>Gazebo and walls to rear of number 43 (1121242)</p> <p>Hodgson Chest Tomb, 5 metres south of south porch of Church of St. Andrew (1121507)</p> <p>3 The Green (1121508)</p> <p>Oakles Farmhouse (1121509)</p> <p>14 High Street (1159681)</p> <p>Lamp Post 7 metres east of number 7, The Green (1159681)</p> <p>Wall and Gate Piers in front of number 43 (1319904)</p> <p>Surtees Table Tomb 2.5 metres north of Church of St. Michael (1319974)</p> <p>Garden Wall and Gate Piers south of number 16 and number 18 (1320032)</p> <p>Dovecote and outbuildings north west of Trafalgar House (1320050)</p> <p>Old Farm Cottage (1322809)</p> <p>39 Church View (1322951)</p> <p>Churchyard wall, gate and gate piers to north of Village Hall (1322974)</p> <p>Coatsay Moor Farmhouse (1322975)</p> <p>17 Darlington Road (1322976)</p>
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		<p>East and North Garden Walls to south east of number 7 (1322978)</p> <p>7 West Green (1322980)</p> <p>42 West Green (1322981)</p> <p>Heighington Signal Box (1301940)</p> <p>Headstone to John Gibson, 7 metres south of south porch of Church of St. Andrew (1322807)</p> <p>Manor Farm House (1322977)</p> <p>Wilkinson Headstone 14 metres south of Church of St. Michael (1116409)</p> <p>The Village Hall (1121205)</p> <p>Holly House (1121218)</p> <p>Rutter Headstone 12 metres south of Church of St. Michael (1121243)</p> <p>Carter Headstone 30 metres south west of Church of St. Michael (1121244)</p> <p>Nurses' Teaching Centre, wall and gate piers (1149723)</p> <p>The Old Hall (1322952)</p> <p>Eldon House (1121207)</p> <p>Trafalgar House and garden wall attached to north (1121210)</p> <p>The Pump House (1115768)</p> <p>Locomotion One Public House and East Platform (1322808)</p> <p>The Cottage (1319919)</p> <p>The Manor House (1121206)</p> <p>Northcott (1115778)</p> <p>The Bay Horse Public House (1320296)</p> <p>38 and 39 West Green (1115742)</p> <p>Aycliffe War Memorial (1433531)</p> <p>Heighington War Memorial (1438087)</p> <p>Stockton & Darlington Railway Boundary Stone (1476552)</p> <p>Aycliffe Wood Occupation Bridge (1478497)</p> <p>School Aycliffe Lane Overbridge (1478390)</p> <p>Heighington Conservation Area</p> <p>Aycliffe Conservation Area</p>
Low	Local	None

13.54 A gazetteer and short description of NHLE assets and their setting is set out at Appendix 1 to this Chapter.

‘WITHOUT DEVELOPMENT’ BASELINE SCENARIO

- 13.55 With regard to the baseline of the Site itself, it is important to note that the Environmental Statement assesses the Site in its current undeveloped state. If the Site remains undeveloped, this state will effectively be maintained. However, given that the Site is allocated employment land, in the event the Proposed Development is not built out, it is highly likely to be subject to new build employment related development of some kind, which may or may not have similarities with the current scheme. Given the Site’s allocation, land value and need to ensure the efficient use of land, it is very likely to be developed as intensively as is now proposed.
- 13.56 In addition, it is likely that other surrounding plots within Merchant Park will be built out in the future and if these are typical of the large warehouse/factory type buildings that the outline consent for Merchant Park envisaged, then they will provide further enclosure to the Site.

IDENTIFICATION AND EVALUATION OF KEY EFFECTS

- 13.57 An assessment a potential impact, during construction and operational phases of the Development is set out at Appendix 1 to this Chapter. Significant effects are identified in respect of 3 designated heritage assets and the nature and effect of these effects is summarised below.
- 13.58 As part of the technical reporting in respect of the Proposed Development, a Landscape and Visual Appraisal (Sightline Landscape. April 2021) has been undertaken. The Appraisal includes assessment of potential visual impacts upon a number of viewpoints and this are referenced, as appropriate, below.
- 13.59 The Proposed Development will not directly impact (through direct physical impact upon building fabric) on any, currently known, designated or non-designated heritage asset. Assessed impacts upon the identified built heritage receptors will be indirect and upon the setting of the relevant receptor.

Construction Phase Effects

- 13.60 During the construction phase of the development temporary (duration of construction) adverse effects may arise from the visual impact of construction plant and machinery, such as tower cranes, material storage and site compounds, dust and vibrations, vehicle movements and light spillage. Predicted temporary impacts, where significant, upon the identified built heritage assets are set out

in Table 13.6. An assessment of construction phase effects upon all receptors identified within the baseline is set out at Appendix 1 to this Chapter.

Table 13.6: Predicted Construction Phase Significant Effects				
Heritage Asset	Nature of Effect	Sensitivity/Value	Magnitude of Impact	Significance of Effect
Church of St. Michael, Church View, Heighington Grade I Listed Building 1322953	Minor temporary (works) change to visual setting arising from the use of tower cranes and associated construction infrastructure.	High	Negligible	Minor Adverse (temporary)
Church of St. Andrew, Church Lane, Aycliffe Village Grade I Listed Building 1322806	Minor temporary (works) change to visual setting arising from the use of tower cranes and associated construction infrastructure.	High	Negligible	Minor Adverse (temporary)
Heighington Signal Box Grade II Listed Building	Minor temporary (works) change to visual setting affecting heritage values. Impacts will relate to the visual effect of tower cranes and associated construction infrastructure and impact of construction traffic, noise and vibration.	Medium	Low	Minor Adverse (temporary)
Locomotion One Public House and East Platform Grade II Listed Building 1322808	Minor temporary (works) change to visual setting affecting heritage values. Impacts will relate to the visual effect of tower cranes and associated construction infrastructure and impact of construction traffic, noise and vibration.	Medium	Low	Minor Adverse (temporary)
Heighington Conservation Area	Minor temporary (works) change to visual setting arising from the use of tower cranes and associated construction infrastructure.	Medium	Low	Minor Adverse (temporary)

Operational Phase Effects

- 13.61 The assessment of the completed and operational development is based upon the maximum parameters, height, scale and massing for the Proposed Development. Impacts assessed are permanent, indirect (upon setting) and summarised in Table 13.7. An assessment of operational phase effects upon all receptors identified within the baseline is set out at Appendix 1 to this Chapter.

Table 13.7: Predicted Operational Phase Significant Impacts upon Built Heritage Assets

Heritage Asset	Nature of Effect	Sensitivity/Value	Magnitude of Impact	Significance of Effect
Church of St. Michael, Church View, Heighington Grade I Listed Building 1322953	Minor permanent (operational) change to visual setting arising from the completed building. Limited impact upon heritage values.	High	Negligible	Minor Adverse
Church of St. Andrew, Church Lane, Aycliffe Village Grade I Listed Building 1322806	Minor permanent (operational) change to visual setting arising from the completed building. Limited impact upon heritage values.	High	Negligible	Minor Adverse
Heighington Signal Box Grade II Listed Building	Minor permanent (operational) change to visual setting affecting heritage values, including significant views.	Medium	Low	Minor Adverse
Locomotion One Public House and East Platform Grade II Listed Building 1322808	Minor permanent (operational) change to visual setting affecting heritage values, including significant views.	Medium	Low	Minor Adverse

	Minor permanent (operational) change to visual setting arising from the completed building. Limited impact upon heritage values.	Medium	Low	Minor Adverse
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- 13.62 Where significant effects are identified upon built heritage receptors (Table 13.6 and 13.7) these relate to impacts upon the significance, within setting, of the asset. Commentary is provided below on the nature of these impacts.

Church of St. Michael, Church View, Heighington (List Entry Number 1322953)

- 13.63 The Church, added to the statutory list in 1967, holds a high level of architectural and historic interest in the national context reflected in its higher grading. The building is located within the historic medieval core of settlement with Heighington around 1.2km to the west of the site. The Church occupies higher ground within the village and is a prominent landmark and communal focus, its visual prominence emphasised by the west tower which is well represented in views from West Green and Darlington Road from the west. Glimpsed and dynamic views are also available from Church View, approaching from the east, and in landscape filtered views from East Green and Darlington.
- 13.64 The church yard remains well defined and boundary walling and memorial stones within the yard contribute positively to setting, evidencing historic and contemporary function. The visual relationship with the Village Hall is significant and houses on Church View, in combination with treed boundaries, provide visual enclosure. This enclosure contributes positively to the experience of the asset from within the churchyard providing seclusion and relative tranquility to the immediate setting of the Church. Views from the churchyard tend to be filtered by landscape enclosure although the elevated position of the yard does allow longer distance views to the east and south which extend to take in the wider landscape setting of the Church.
- 13.65 Given distancing and intervening built and landscape form, the Site is not visible in views from within the churchyard nor does it form an element in views from the west which take in the Church. No views from within the Site are available onto the Church given the extent of landscape screening to the west of the site and flanking the A6072.

- 13.66 The curtilage setting to the Church is characterised by strong landscape enclosure and boundary walling, particularly to the east tall walling effectively screens outward views. This provides a tranquility to setting which contributes positively to significance. The Development will not be visible in ground level views from within the yard or within significant views onto the fabric of the Church. Whilst views from the Church tower (currently not publicly available) will extend towards the site, where the stack for the new building will rise above boundary screening, this will be viewed as part of an existing area of development to the north and south of Heighington Lane (B6444). The new building will not alter the overall composition of available views. Having regard to the wider setting to the Church and limited visual impact a negligible magnitude of impact upon significance is assessment. Having regard to the sensitivity of the asset a minor adverse, temporary, indirect impact at construction phase and **Minor Adverse Indirect** impact at operational phase is assessed.

Church of St. Andrew, Church Lane, Aycliffe Village (List Entry Number 1322806)

- 13.67 The Church is located at the southern edge of Aycliffe village, around 1km to the south-east of the site. Reflected in its higher grading, the Church holds a high level of architectural and historic interest in the national context and can be considered highly sensitive to development change. The building occupies a relatively isolated position to the south of the historic core of settlement within Aycliffe and is set within a yard with strong treed enclosure to the west. Access is taken via Church Lane from the High Street to the east. Later 20th and 21st century residential development to the north on Oaklea Mews and industrial development to the north-west and west has, to some degree eroded the historic landscape/agricultural setting to the Church. Retained fields to the north and west do however maintain openness to the setting of the building and illustrate the historic context of the building.
- 13.68 The Church is relatively well screened by trees/woodland falling within the church yard to the west and is not prominent in medium or longer distance views from these aspects. The Site has no inter-visibility with the Church given the extent of intervening industrial, warehousing and office development around Grindon Way and St. Andrews Way. Landscape bunds and screen planting to the east side of St. Andrews Way provide further screening/filtering elements. These screening elements will restrict any potential visual impact arising from the development during construction and operational phases. Given distancing and the landscape enclosure of the churchyard, no impacts of the experience of the Church from within its curtilage setting are identified. Views from the church tower (not currently publicly available) and perimeter of the church yard will potentially take in elements of the new building and taller chimney although impact upon heritage values will be of negligible magnitude and the overall composition of views will be maintained. Having regard

to the sensitivity of the asset a **Minor Adverse Indirect** impact at construction and operational phases is assessed.

Heighington Signal Box, Heighington Lane (List Entry Number 1391940)

- 13.69 The Signal Box is located to the west side of the Bishop Auckland and Weardale branch rail line, to the north of Heighington Lane and around 300m to the east of the Site at its closest point. Notwithstanding its comparatively small scale the building has a degree of prominence given its distinct functional character and its siting within an open area of land to the west of the rail line which allows the building to be viewed in short and medium distance views along the Lane from the east and west. The visual relationship of the Signal Box with rail infrastructure, Heighington Station platform and the rail crossing contributes to significance of the building and evidences historic and contemporary functional use. The former station buildings which original included a public house as a waiting room, to the opposite side of the rail line and now the Locomotion One Public House (Grade II listed), share group value with the signal box and contribute positively to setting.
- 13.70 The significance of the siting and setting of the Signal Box is of high order given that it is the location where George Stephenson's Locomotion No. 1 engine was first put on the rails to introduce the world's first passenger service in 1825. The Signal Box itself is one of the earliest surviving examples in the country and follows the earliest standard design produced by the Central Division of the North Eastern Railway.
- 13.71 The station buildings at Heighington Station forms part of the Stockton and Darlington Railway Heritage Action Zone (HAZ) which was established in 2018 and covers a 26-mile section of the railway. The aim of the HAZ, informed by a programme of research and designations, is to realise the potential of the line to become a heritage attraction and visitor destination in the build up to its 2025 bicentenary. The HAZ will seek to secure the long-term management and conservation of the line and its associated historic buildings and infrastructure.
- 13.72 Whilst the HAZ does not confer any additional statutory designation to the Station it does emphasise the significance of the shared setting to the buildings and infrastructure associated with the rail line. This includes platform areas extending to the north and south and which contributes positively to the experience of the designated assets.
- 13.73 At ground level, the Site is screened in views from the Signal Box and its immediate setting by boundary landscape/woodland planting to the north of the site (LVIA. Viewpoint 1), and continuing to the east along Heighington Lane, and by field boundary hedgerows to the east of the site. The proposed Development will be of a scale that will rise, in part due to the scale of the proposed chimney, above existing screening, and the upper sections of the building may be seen in filtered

views along the Lane from the east which take in the Signal Box. The new building will form a distinct new visual element in views from the west from southern platform areas although will not interrupt existing direct views onto the Public House and Signal Box. Similarly, the development will not diminish the visual relationship of the building with the rail infrastructure or Signal Box.

- 13.74 The proposed Development will introduce, to varying degrees, a new visual element within the setting to the Signal and detract from the character of westerly of views which take in the building from Heighington Lane and platform areas. The visual impact of the Development will however reduce as further plots are development to the east of the Site. Further impacts will include construction and operation phase effects, including construction traffic and vehicle movements associated with the operation of the building. Increased traffic movements will also influence the experience of the Station particularly from platform areas. Key elements of significance will however be retained and overall impacts are assessed as being of low magnitude, affecting a minority of the significance of the building, having a **Minor Adverse Temporary and Permanent, Indirect Impact**. Mitigation will be appropriate in terms of landscape screening and material treatment.

Locomotion One Public House and East Platform, Heighington Lane (List Entry Number 1322808)

- 13.75 The Public House is located to the east side of the Bishop Auckland and Weardale branch rail line, to the south of Heighington Lane and around 350m to the east of the Site at its closest point. The building was original designed as a public house/waiting room and booking office for the Station and continues in public house use. Given its location at foot path edge and distinct architectural character, the building is prominent in views from the east and west along the Lane. The visual relationship of the building with rail infrastructure, Heighington Station platform and the rail crossing contributes to significance of the building and evidences historic and contemporary functional use. The former station buildings share group value with the Grade II listed signal box to the west and which contributes positively to setting.
- 13.76 The significance of the siting and setting of the Public House and Signal Box is of high order given that it is the location where George Stephenson's Locomotion No. 1 engine was first put on the rails to introduce the world's first passenger service in 1825. The Signal Box itself is one of the earliest surviving examples in the country and follows the earliest standard design produced by the Central Division of the North Eastern Railway. The Public House pre-dates the Box and was likely constructed between 1825 and 1827.

- 13.77 As noted, above, the designation of the HAZ emphasises the shared significance of the Public House, Signal Box and rail infrastructure, including the line corridor. As such impacts are assessed have regard to the wider setting of the Public House and the experience of the Station, including from platform areas.
- 13.78 At ground level, the Site is screened in views from the Public House and its setting by boundary landscape/woodland planting to the north of the site, and continuing to the east along Heighington Lane (LVIA. Viewpoint 1), and by field/screen boundary hedgerows to the east of the site. The proposed Development will be of a scale that will rise, in part resulting from the taller chimney, above existing screening, and the upper sections of the building will be seen in filtered views towards the west from the curtilage of the Public House and from associated platform areas. The Development will form a distinct new visual element in views from the west along the Lane although will not interrupt existing direct views onto the Public House and Signal Box. The visual impact of the Development will be reduced by future plot developments to the east of the Site. Importantly, the development will not diminish the visual relationship of the building with the rail infrastructure or Signal Box.
- 13.79 The proposed Development will introduce a distinct new view element within the setting to the Public House and detract from the character of westerly of views which take in the building from Heighington Lane and from within curtilage. These impacts will include construction and operation phase effects, including construction traffic and vehicle movements associated with the operation of the building. Key elements of significance will however be retained and overall impacts are assessed as being of low magnitude, affecting a minority of the significance of the building, having a **Minor Adverse Temporary and Permanent, Indirect impact**. Mitigation will be appropriate in terms of landscape screening and material treatment.

Heighington Conservation Area

- 13.80 The Conservation Area, located at its nearest point around 1.1km to the west of the Site, takes in the historic core of the settlement, focused around the Church of St. Michael and the West and East Greens, and extending eastwards to take in later 19th development and formerly isolated farmsteads and areas of open space/agricultural land which contribute to the significance or special interest of the Area.
- 13.81 The adopted Conservation Area Appraisal (Darlington Borough Council. 2019) does not identify the Site as falling within an area making any contribution to the special interest of the Area (Figure 3). Significant views, taking advantage of the elevation position of the village, are identified to the south

and the expansive nature of views to the east are noted although described as 'busier'. Glimpsed views of Newton Aycliffe are noted.

- 13.82 Given intervening landscape form, including screen/woodland belts to the west of the Site, the Site makes no contribution to the visual setting to the Conservation Area. The screening providing by existing woodland/screen belts is illustrated by LVIA Viewpoints 5, 6 and 7. Whilst past of a wider historic landscape and agricultural setting to the village the Site no longer evidences past agricultural use and makes no contribution to significance.
- 13.83 The Proposed Development will be partly visible, principally arising from the proposed chimney, during construction and operational phases from within the Conservation Area, principally the eastern areas of open ground to the west of the A6072 and where views align with road corridors, including Heighington Lane, providing glimpsed views of the wider landscape to the east. The majority of the new building will however be screened and filtered by landscape planting and will be viewed in the context of the wider Newton Aycliffe Industrial Estate and the Hitachi Rail Building. The overall composition of views will remain unaltered and the development will not impact to any great degree upon the special interest of the Conservation Area or its setting.
- 13.84 Having regard to the scale and massing of the Proposed Development a limited visual impact is predicted during construction and operational phases where the new building will be visible in filtered views rising above existing landscape screening. Development impact upon heritage significance will be limited. Having regard to the sensitivity of the asset a **Minor Adverse, Temporary, Indirect Impact** at construction phase and **Minor Adverse Indirect Impact** at operational phase is assessed.

Aycliffe Village Conservation Area

- 13.85 The Aycliffe Village Conservation Area is located around 800m to the east of the Site and takes in the historic core of settlement arranged along the High Street and extending to the east to include The Green. Given the extent of intervening built form, including industrial buildings at scale within the Newton Aycliffe Industrial Estate and Esh Business Park, the Site does not fall within the setting to the Area. Given distancing and screening, no development impacts are predicted at construction or operational phases upon the significance of the Area.

ASSESSMENT OF CUMULATIVE EFFECTS

- 13.86 No cumulative assessment has been scoped into this Chapter of the Environmental Statement.

MITIGATION AND RESIDUAL EFFECTS

13.87 Where significant adverse likely effects have been identified associated with the construction phase of development (see Table 13.6) mitigation measures, where available, should be considered and recommended. Where no adverse effects are identified additional mitigation is not required. Table 13.8 sets out recommended mitigation measures during the construction phase. Whilst these measures will not reduce the overall magnitude of impact identified, they will moderate and reduce the duration of effects.

Table 13.8: Additional Mitigation Construction Phase

Heritage Asset	Magnitude of Impact (Const Phase)	Significance of Effect (Const Phase)	Mitigation Measure	Residual Impact (Post Mitigat'n)
Church of St. Michael, Church View, Heighington Grade I Listed Building 1322953	Negligible	Minor Adverse	Adoption of a construction environmental management plan to control hours of operation, on-site storage of materials, plant and machinery.	Minor Adverse
Church of St. Andrew, Church Lane, Aycliffe Village Grade I Listed Building 1322806	Negligible	Minor Adverse	Adoption of a construction environmental management plan to control hours of operation, on-site storage of materials, plant and machinery.	Minor Adverse
Heighington Signal Box Grade II Listed Building	Low	Minor Adverse	Adoption of a construction environmental management plan to control hours of operation, on-site storage of materials, plant and machinery. Approval of on-site construction lighting to reduce potential light spillage.	Minor Adverse
Locomotion One Public House and East Platform Grade II Listed Building 1322808	Low	Minor Adverse	Adoption of a construction environmental management plan to control hours of operation, on-site storage of materials, plant and machinery. Approval of on-site construction lighting to reduce potential light spillage.	Minor Adverse
Heighington Conservation Area	Low	Minor Adverse	Adoption of a construction environmental management plan to control hours of operation, on-site storage of materials, plant and machinery.	Minor Adverse

13.88 Where significant adverse likely effects have been identified associated with the Operational phase of development (see Table 13.7) mitigation measures, where available, should be considered and recommended. Where no adverse effects are identified additional mitigation is not required. Table 13.9 sets out recommended mitigation measures. Whilst these measures will not reduce the overall magnitude of impact identified, they will ensure that maximum scheme parameters, such as maximum building heights, are adhered to and ensure appropriate material and design treatment.

Table 13.9: Additional Mitigation Operational Phase

Heritage Asset	Magnitude of Impact (Operational Phase)	Significance of Effect (Operational Phase)	Mitigation Measure	Residual Impact (Post Mitigat'n)
Church of St. Michael, Church View, Heighington Grade I Listed Building 1322953	Negligible	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of material treatment, landscaping and open space.	Minor Adverse
Church of St. Andrew, Church Lane, Heighington Grade I Listed Building 1322806	Negligible	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of material treatment, landscaping and open space.	Minor Adverse
Heighington Signal Box Grade II Listed Building	Low	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of material treatment, landscaping and open space.	Minor Adverse
Locomotion One Public House and East Platform Grade II Listed Building 1322808	Low	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of material treatment, landscaping and open space.	Minor Adverse
Heighington Conservation Area	Low	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of material treatment, landscaping and open space.	Minor Adverse

SUMMARY

- 13.89 This Chapter has considered the potential effects upon the historic environment predicted to arise from the Proposed Development.
- 13.90 A review of baseline conditions, refined by field survey has identified around 67 designated heritage assets, recorded on the National Heritage List for England (NHLE), which may be subject to environmental effects. These assets hold national and regional significance. Two conservation areas, Heighington and Aycliffe Village fall within the vicinity of the Site to the west and east respectively.
- 13.91 An assessment of potential impacts upon NHLE recorded assets is set out within Appendix 1 to this Chapter. The Proposed Development will not impact, through direct physical interaction, upon the significance of the assets identified.
- 13.92 During the Construction Phase the Development will have a temporary residual impact of negligible to low magnitude upon the setting to a number of designated heritage assets although impact upon significance, as exhibited within these settings is assessed as minor adverse in extent and affect. Overall effects will be temporary in nature and subject to mitigation through implementation of a construction environmental management plan are considered insignificant in heritage terms.
- 13.93 During the Operational Phase the Development will have a residual impact of negligible to low magnitude upon the setting to a number of designated heritage assets. These impacts will primarily relate to the visual impact of the Development and will give rise to minor adverse impacts upon the identified assets/receptors.
- 13.94 A summary of residual environmental effects is set out at Table 13.10.

Table 13.10: Residual Effects Summary Table

Potential Effect	Nature of Effect (Permanent or Temp)	Significance of Effect	Mitigation Measure	Residual Effects
Visual impact of construction plant and machinery, including the use of tower cranes	Temporary	Minor Adverse	Adoption of a construction environmental management plan	Minor Adverse
Noise, vibration, dust and light pollution during construction	Temporary	Minor Adverse	Adoption of a construction environmental management plan	Minor Adverse
Visual impact of the completed development within the setting to a number of heritage assets.	Permanent	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of maximum building heights, massing, material treatment, landscaping and open space. Supplementary/reinforcement planting to site boundaries.	Minor Adverse
Visual impact of the completed development upon key views towards and from Heighington Station and Signal Box	Permanent	Minor Adverse	Design coding or conditions to secure scheme parameters in respect of maximum building heights, massing, material treatment, landscaping and open space. Supplementary/reinforcement planting to site boundaries.	Minor Adverse

13.95 In accordance with guidance set out within the 1990 Act and National Planning Policy Framework, the adverse residual impacts identified should be considered, with due weight attached to the nature and extent of harm assessed, in the context of the wider benefits of the Proposed Development.

REFERENCES

None

14 CONCLUSIONS

- 14.1 This chapter contains the overall conclusions of the EIA. The EIA has examined the potential impacts associated with the Proposed Development during both the construction and operational phases.
- 14.2 The EIA has been prepared in accordance with the Scoping Opinion issued by the DCC. It incorporates the first Regulation 25 request from DCC made during planning application determination, and has been further updated and revised in order to respond to the recommendations and comments made by the Planning Inspectorate as part of a request for more information under Regulation 25¹² of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the EIA Regulations).
- 14.3 Although the main body of the ES and the material conclusions of the assessment have not changed as a result of this update. The requirements of the Scoping Opinion are considered to be fully met by the EIA.
- 14.4 The conclusions from each topic assessed in the EIA are provided below.

DEVELOPMENT PROGRAMME AND CONSTRUCTION

- 14.5 This chapter identifies that the construction effects of the Proposed Development would be managed through the development of a project and site-specific Construction Environmental Management Plan. The CEMP would outline methods for contractor and general public liaison, hours of work, methods to deal with complaints, and outline management practices to control dust, traffic and access, waste, water resources and ecological effects, ensuring a high level of control throughout the construction works.
- 14.6 The procedures within the CEMP would ensure the delivery of a high level of environmental control throughout the construction phase, thereby minimising the potential for adverse effects.

CLIMATE CHANGE

- 14.7 An assessment of the potential climate change impacts has been carried out following the IEMA and The Waste and Resources Assessment Tool for the Environment (WRATE) WRATE. WRATE is a

¹² PINS Regulation 25 Request for additional information dated 29th April 2022

lifecycle carbon assessment tool used across the waste management sector and is the UK's principal tool for modelling the carbon and environmental impact of waste management services. The findings of the assessment have been structured in accordance using Institute of Environmental Management and Assessment Assessing Greenhouse Gas Emissions and Evaluating their Significance.

- 14.8 Due to a lack of regional specialist hazardous and clinical waste treatment infrastructure within the North East of the UK, it is currently necessary to export all clinical and specialist wastes considerable distances by road; there are no facilities comparable to that proposed within a two hour drive. Furthermore, a long-term under investment in the sector means that a majority of the existing UK plant will not be able to achieve the higher environmental standards and efficiency targets stipulated by the latest UK Environmental Permitting Regulations and EU Standards.
- 14.9 The delivery of the Proposed Development removes the need for the long-distance transport of hazardous and clinical wastes and therefore creates significant financial and carbon emissions savings associated with road transport. As such the proposed development will provide around a 70% reduction in overall vehicle transport miles, and associated carbon emissions.
- 14.10 The project has also been designed to recover all available heat produced during the high temperature incineration of waste and utilises this for all potential parasitic process heat and building loads. Furthermore, the project has been designed with the capacity to export approximately 5MWth of heat to neighbouring industrial users should it be practically and commercially possible to do so.
- 14.11 The carbon assessment demonstrates that based on the current baseline, the development of the proposed regional HTI facility would deliver carbon benefits over the current management method (baseline scenario) involving the out of region incineration of hazardous and clinical wastes.
- 14.12 The development of the proposed project of a regional HTI facility would deliver carbon benefits over the current management method (baseline scenario) involving the out of area incineration of hazardous and clinical wastes.
- 14.13 A regional facility will provide an 70% reduction in overall vehicle transport miles and associated carbon emissions.
- 14.14 The proposals would deliver carbon equivalent savings of more than 40% under normal operating conditions.

- 14.15 In the event that the proposed development exports the available 5MWth of heat to the neighbouring industrial sites, then the potential carbon equivalent saving that can be delivered by the development would be even greater.
- 14.16 The impact of the resulting GHG emissions from the project are considered to be **Beneficial**, as the results of the WRATE assessment demonstrate that the project will achieve the definition provided by IEMA. The project's net GHG impacts are below zero and it causes a reduction in atmospheric GHG concentration, whether directly or indirectly, compared to the without-project baseline. A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.

POPULATION AND HUMAN HEALTH

- 14.17 The potential effects on population as a result of the proposed development have been assessed across three areas; social, economic and human health.
- 14.18 Socio-economic effects have been deemed to be limited to a **Very Minor or Negligible positive** effect due to the creation of jobs during both the construction and operational phase.
- 14.19 An assessment has been carried out to determine the possible impacts on human health arising from dioxins and furans, and dioxin-like PCBS emitted from the proposed facility.
- 14.20 The site is situated in an existing industrial location, with no immediate nearby sensitive receptors. Impacts have been assessed under the worst-case scenario and considers that the most plausible pathways of exposure will be the deposition and subsequent uptake of the compounds of potential concern (COPCs) into the food chain as opposed to direct inhalation.
- 14.21 The maximum contribution of the facility to the Committee of Toxicity Tolerable Daily Intake is 1.8% for the farmer receptors and 0.1% for the residential receptors. Therefore, the impact of emissions on local sensitive receptors is considered to be not significant.
- 14.22 It has therefore been concluded that the facility has a **Negligible** effect on human health.

ACCIDENTS AND NATURAL DISASTER

- 14.23 The Proposed Development has been assessed against all potential manmade events - 'accidents' and naturally caused events - 'disasters' including those caused by climate change.

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- 14.24 The chapter includes an assessment of the likely significant effects arising from the vulnerability of the proposed development to major accidents or disasters that are relevant to the site. Individual topic chapters contain, where relevant, such an assessment for example, flood risk, traffic accidents, emissions releases and fire.
- 14.25 In the unlikely event of any onsite incidents, the volumes of substances (i.e. fuel, waste etc.) are small and the nature of materials are not highly toxic. As such it has been concluded they are not highly vulnerable to a major disaster.
- 14.26 There are no further anticipated significant risks associated with the development in regard to accidents and natural disasters.
- 14.27 It is concluded therefore that the Proposed Development is not vulnerable to accident or natural disaster, and that the day to day onsite management measures enforced by the Environmental Permit, will provide effective safety measures.
- 14.28 Furthermore, although it is recognised that the nearby Prefere Resin plant presents significant offsite environmental risk, the high degree of regulation of the facility under the COMAH Regulations adequately mitigates the risk to an acceptable level. Therefore, the construction and operation of the proposed development present a **Negligible** increase in the risk of the locality in terms of accidents and natural disasters.

AIR QUALITY AND ODOUR

- 14.29 An assessment has been carried out to determine the local air quality impacts associated with the construction and operation of the Proposed Development.
- 14.30 A qualitative assessment of the impact of dust generating activities has been carried out in accordance with the Institute of Air Quality management Guidance. The significance of the impact on human and ecological receptor locations following the implementation of appropriate mitigation measures has been assessed as **Negligible**.
- 14.31 The numbers of vehicles associated with construction are not predicted to be significant in terms of total emissions or construction duration.
- 14.32 Detailed air quality modelling using the AERMOD 7 dispersion model has been undertaken to predict the impacts associated with stack emissions from the HTI activities at the Site. As a worst-case, emissions from the stacks have been assumed to be at IED limits. Actual emissions from the Site are likely to be significantly lower.

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- 14.33 Predicted maximum receptor process concentrations are well within the short and long term air quality objectives for all pollutants assessed.
- 14.34 In accordance with the EPUK/ IAQM screening criteria, the increase in traffic associated with the Proposed Development is likely to have a **Negligible** impact to local air quality.
- 14.35 Odour impacts associated with the Site will be effectively mitigated by the design of the installation and the implementation of an Odour Management Plan and be regulated by the Environment Agency to ensure a **Negligible** impact.

WATER QUALITY, HYDROLOGY AND FLOOD RISK

- 14.36 The Water Quality and Hydrology assessment considers the potential effects of the Proposed Development on the water environment in the local area. The study area is defined as that generally within a 2km radius of the site, although a number of issues are considered at a greater distance or at the river catchment level, where necessary. The assessment of effects encompasses surface water and groundwater resources (in terms of water quantity), drainage and flood risk.
- 14.37 The key considerations are the potential effects on water quality, water resources, water supply, infrastructure, flood risk and surface water drainage.
- 14.38 The key potential effects during the construction and operation of the Proposed Development include contamination arising from general construction activities or through routine Site drainage. Mitigation has therefore been recommended through the preparation of a Construction Environmental Management Plan (CEMP). With these implemented, the risk of contamination to surface water and groundwater will be minimised.
- 14.39 The Site is not located within floodplain and, therefore, there is little or no risk of the Site flooding from rivers or the sea. The Site is also not vulnerable to flooding from groundwater, sewers or reservoirs. Potential effects relevant to flood risk are associated with managing surface water runoff from the Site.
- 14.40 The existing site is undeveloped and considered to be greenfield land. The proposed development is 100% impermeable and therefore there will be an increase in surface water runoff as a result of the development. In line with current policy, the feasibility of a sustainable drainage system has been investigated and surface water runoff will be managed to provide a **Negligible** impact compared to the current land use.

- 14.41 In conclusion, given the location and nature of the receptors, the overall residual effects of the proposed development with regard to water quality, water resources, drainage and flood risk is considered to be **Negligible**.

WASTE MANAGEMENT

- 14.42 The details pertaining to the waste management impact of the HTI facility are detailed within Chapter 5 and Chapter 6 of the ES. In summary, the facility will receive hazardous and clinical wastes which are required by law to be disposed through high temperature incineration in a highly controlled and secured manner.
- 14.43 The plant's largest waste stream as an output (estimated at circa 2,000 tonnes per annum based on input of 10,500 tonnes per annum) will be ash and air pollution control residues (APCR). Any ash produced by the plant will be used off site as a secondary aggregate material (i.e. recycled) where possible. All other residues will be removed off-site for either recovery, recycling, or to undergo chemical treatment and stabilisation before landfilling.
- 14.44 The main waste water stream once the site is operational will be sanitary, and site washdown water from the bin cleaning facilities. Any liquids that are arising that cannot be disposed to sewer will be removed by specialist contractor and treated off site.
- 14.45 The HTI plant will require a permit to operate as a Part A(1) process regulated by the Environment Agency under the *Environmental Permitting (England and Wales) (Amendment) Regulations 2013*. As part of the permit application process the EA will require the operator to demonstrate that all wastes generated will be re-cycled, as far as is practicable, and that wastes are handled in accordance with best available techniques (BAT). In addition, it will be necessary for the Operator to satisfy the Environment Agency that their proposed techniques for collecting, handling and storing waste materials will be adequately controlled.
- 14.46 During the construction phase demolition rubble and excavated soils will be generated. Sustainable solutions will be implemented to enable, as far as applicable, the re-use of waste materials and avoidance of landfill disposal. All site waste management activities will be controlled through Site Waste Management Plan as part of a wider Construction Environmental Management Plan (CEMP).
- 14.47 The impacts of the proposed development are therefore considered to be **Negligible** in terms of waste management.

LANDSCAPE AND VISUAL IMPACT

- 14.48 The Site is a prepared plot within Merchant Park which is a does not lie within or close to a valued landscape subject to a protective designation. Merchant Park is designated within the Local Plan as a Prestigious Business Park and has outline planning permission for up to 900,000sq ft 83,600 sq. m of new buildings.
- 14.49 Currently the main completed development is the Hitachi Rail Europe train factory which occupies a large building immediately south of the Site. An Environmental Statement was produced as part of the outline application for Merchant Park and this included a landscape and visual impact assessment based on parameters for large warehouse type buildings and the planning authority concluded that the predicted landscape and visual effects would be acceptable. One of the main reasons for this is that Merchant Park benefits from substantial mature woodland screening on the north and west sides. Subsequently the train factory, bunding and landscaping will screen the Proposed Development from views further south.
- 14.50 From the majority of the surrounding countryside the proposed building will be screened by the substantial perimeter woodland and the nearby Crumby's Plantation. The trees within the woodland are a similar height to the tallest part of the building, but the trees will push the angle of view elevation above the building in nearly all views (due to the lack of elevated viewpoints), the building will not be visible. While the flue will be 15m taller than the building, the angle of viewing elevation due to tree cover means that only the tip will be visible from the few potential vantage points within the surrounding countryside (mainly from a small area to the west). Since the flue is only 700 mm wide and the viewpoints are distant it will be a small and barely noticeable component within a wide panorama.
- 14.51 No landscape mitigation to screen the building is required or proposed and it is impractical to screen the visible part of the flue in any views.
- 14.52 Residential areas lie a considerable distance from the Site and the proposed development will be screened by either intervening industry or tree cover. It is concluded that, overall, the proposed development will have no significant adverse effects on the visual amenity of residents.
- 14.53 It is concluded that the proposed development will **not result in any significant adverse landscape or visual impacts.**

HERITAGE

- 14.54 A review of baseline conditions, refined by field survey has identified around 67 designated heritage assets, recorded on the National Heritage List for England (NHLE), which may be subject to environmental effects. These assets hold national and regional significance. Two conservation areas, Heighington and Aycliffe Village fall within the vicinity of the Site to the west and east respectively.
- 14.55 An assessment of potential impacts upon NHLE recorded assets has been undertaken. The Proposed Development will not impact, through direct physical interaction, upon the significance of the assets identified.
- 14.56 During the Construction Phase the Development will have a temporary residual impact of **Negligible to Low** magnitude upon the setting to a number of designated heritage assets although impact upon significance, as exhibited within these settings is assessed as **Minor Adverse** in extent and affect. Overall effects will be temporary in nature and subject to mitigation through implementation of a construction environmental management plan are considered **Insignificant** in heritage terms.
- 14.57 During the Operational Phase the Development will have a residual impact of **Negligible to Low** magnitude upon the setting to a number of designated heritage assets. These impacts will primarily relate to the visual impact of the Development and will give rise to **Minor Adverse** impacts upon the identified assets/receptors.