APPLICANT'S RESPONSES TO ISSUES RAISED AT DEADLINE 6

Drax Bioenergy with Carbon Capture and Storage

Infrastructure Planning (Examination Procedure) Rules 2010

Document Reference Number: 8.10.6

Applicant: Drax Power Limited

PINS Reference: EN010120

REVISION: 01

DATE: 24 May 2023

DOCUMENT OWNER: Drax Power Limited

AUTHOR: Various

APPROVER: C. Fountain

PUBLIC

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1. INTRODUCTION

1.1. PURPOSE OF THIS DOCUMENT

1.1.1. On 23 May 2022, Drax Power Limited ("the Applicant") made an application ("the Application") for a Development Consent Order (DCO) to the Secretary of State for Business, Energy and Industrial Strategy ("the SoS"). The Application relates to the Drax Bioenergy with Carbon Capture and Storage (BECCS) Project ("the Proposed Scheme") which is described in detail in Chapter 2 (Site and Project Description) of the Environmental Statement (ES) (APP-038). The Application was accepted for Examination on 20 June 2022.

1.1.2. This document, submitted at Deadline 7 of the Examination, contains the Applicant's responses to the representations submitted by the various Interested Parties at Deadline 6.

1.1.3. In this document, the Applicant has focussed on responding to points that have not already been made by Interested Parties and responded to by the Applicant. It also does not seek to comment on submissions from Interested Parties on the contents of updated Government Policy in general terms.

1.1.4. For this reason, the Applicant has responded to matters of the type identified in 1.1.3 above, raised by the Environment Agency, Natural England, North Yorkshire Council, Biofuelwatch, National Grid Carbon Limited, Mr Hewitt and Just Transition Wakefield.

2. ENVIRONMENT AGENCY

Table 2-1 – Environment Agency Responses to Examining Authority's Second Written Questions

Response Ref. (location in original submission)	Examining Authority's Written Question	Environment Agency Response	Applicant's Response
AQ.2.1	In relation to the Applicant's approach to operational amine emissions modelling, the ExA notes that that it is stated in the SoCG [REP5-016] that the EA agrees with the approach in principle. However, the EA also stated that it intends to produce a new set of EALs for amines by the end of June 2023, on which it will then consult, after which it will confirm its position. Please can the EA provide a timeline for this.	The consultant undertaking this work is due to submit a final report to the EA by 15 June 2023. We will then consult with UKHSA and aim to open a public consultation on the proposed new EALs by the end of July / early August. That consultation will run for three months after which we will then need to respond to the consultation via a 'Consultation Response Document' with the view to publishing it and the new EALs in Q1 2024.	The Applicant notes that the EA proposes to consult on new EALs after the close of the Drax BECCS examination, and that new EALs are anticipated to be published following the consultation in Q1 2024, which may occur after the determination of the Drax BECCS DCO Application.
FRW.2.1	Is the EA now satisfied with the measures set out in the REAC for the WPPP, with further evidence to be	We are satisfied with the measures set out in the REAC, WE14, for the WPPP. We welcome the requirement for further evidence to be provided as part of the submission of the WPPP.	The Applicant has undertaken liaison with the Environment Agency to agree an approach to WE14 within the REAC.

Response Ref. (location in original submission)	Examining Authority's Written Question	Environment Agency Response	Applicant's Response
	provided as part of the submission of the WPPP?	We note that item 9 of WE14 requires a '*Demonstration that there are no flows upstream from the Carr Dyke to the watercourses to the north (i.e. that the Landell Pumping Station controls the flow direction)*'. For surrounding watercourses/drains that are within the 500m but outside the REAC boundary it must be demonstrated that in case of an accident, the flow from the drains is towards the Carr Dyke which provides a cut-off without pumping polluted water into the Ouse.	The parties have agreed that, due to the complexities of the land drainage system in this area and the flow processes that could be operating at the time of any pollution event or as a result of mitigation measures that are put in place, WE14 will be refined as follows: 1 – To widen the watercourse pollution prevention plan boundary to encompass to the two watercourses on the northern bank in close proximity to the IDB. 2 – As part of the development of the watercourse pollution prevention plan the Applicant / the Applicant's contractor will: a. Agree a definition of a major pollution incident with the Environment Agency. b. The Applicant / the Applicant's Contractor will agree with the IDB the method for shutting

Response Ref. (location in original submission)	Examining Authority's Written Question	Environment Agency Response	Applicant's Response
			down the Landell Pumping Station / Carr Dyke culvert in the event of a major pollution incident to enable containment of any pollutants / prevent discharge to the River Ouse.

3. NATURAL ENGLAND

Table 3-1 – Natural England's responses to the Examining Authority's Second Written Questions

Response Ref. (location in original submission)	Examining Authority's Written Question	Natural England's Response	Applicant's Response
BIO.2.2	Could NE confirm whether it considers that dDCO R10 sufficiently secures the surface water drainage measures during operation.	Natural England considers that dDCO R10 is appropriate to secure the relevant surface water drainage measures, although, as set out in the SoCG Between Natural England and Drax Power Limited dated April 2023 (AS-032), Natural England's comments regarding the term 'substantially in accordance with…' and its proposed application in the context of mitigation measures relied upon in the conclusions of the HRA remain as detailed in Table 1 and Table 2 of our Written Representation (REP2-085)). We acknowledge the Applicant's statement in the SoCG that *"Without the term 'substantially, 'in accordance with' can be construed as meaning 'exactly the same as'.*	The Applicant notes and welcomes Natural England's agreement that dDCO Requirement 10 is appropriate. The Applicant also notes Natural England's continued concerns regarding the use of the term 'substantially in accordance with'. The Requirements include provision for consultation with and approval by relevant stakeholders. This will ensure that the detailed strategies that would be produced to discharge the Requirements achieve the intended mitigation. To provide more certainty on this matter, the procedure for discharge of requirements in Schedule 11 of the draft DCO will be amended at Deadline 8 to require that (in addition to the statement the Applicant is

Response Ref. (location in original submission)	Examining Authority's Written Question	Natural England's Response	Applicant's Response
		This is not appropriate for any Requirement in the draft DCO as it is a final plan to be developed based on the detailed design of the Scheme and any update in legislation or guidance. It is therefore important that the term 'substantially' remains as part of this Requirement in order to build in the flexibility needed for the plan to be developed in response to the greater level of detail that will be known at a later stage." However, we reiterate that there is potential uncertainty around whether this could lead to changes that mean the measures committed to in the HRA are not strictly implemented, and therefore the conclusions of the HRA could be undermined. We welcome reference in the SoCG to ensuring that "the mitigation outcomes that have been committed to are still delivered" and recommend that this	already required to submit alongside an application to discharge a requirement, confirming whether the subject matter of the application would give rise to any materially new or materially different environmental effects which are worse than those in the Environmental Statement) a statement is submitted alongside an application to discharge a requirement to confirm that the subject matter of the document being submitted for approval (which would include the mitigation measures set out within it) does not lead to a change in the conclusions of the HRA.

Response Ref. (location in original submission)	Examining Authority's Written Question	Natural England's Response	Applicant's Response
		should be confirmed in the relevant documents.	

4. NORTH YORKSHIRE COUNCIL

Table 4-1 – North Yorkshire Council's responses to the Examining Authority's Second Written Questions

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
DLV.2.1	The ExA notes the NYCC and SDC submission at D4 [REP4-042] in response to the action point from ISH3 to outline what it would wish to see in the REAC in terms of the Design Framework [APP-195] principles. However, it is not clear to the ExA what is being requested in some of the bullet points, therefore NYC is asked to clarify and expand on a number of the principles identified as follows: i) Siting – Please expand and clarify what the design principle relating to 'Siting' is. If it is in relation to the siting of buildings and structures, explain why the siting of structures	As an overall response to these questions the Authority would like to clarify that the submission at deadline 4 was submitted in such a way as to include all things that the Authority would consider necessary for good design. It was not intended to be read that such topic areas were not covered by or insufficiently covered by the Design Framework. They were listed for completeness. Please note that the Design Framework was a document that the Authority asked to be produced and were consulted on throughout the process. The document is a good piece of work. Our concern has been that the OLBS did not adequately secure sufficient landscape design to make use of	The Applicant welcomes NYC's response in relation to the Design Framework (APP-195). The Applicant has responded to the two outstanding points in relation to lighting and retained vegetation below. iv. Lighting The Applicant updated the Draft Lighting Strategy at Deadline 6 (REP6-020) in response to concerns raised by NYC with the following text: *The Lighting Strategy will be a substantially complete design demonstrating compliance with standards, guidance and policies outlined in this Draft Lighting Strategy. It will show this through good design or additional mitigation measures so as to ensure that artificial light does not have a significant negative impact on the*

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	described in the Design Framework is not sufficiently secured by the Works Plans [AS-073] for each part of Work No. 1 and Work No. 2. ii) Massing and Appearance – In relation to massing of building and structure, explain why the massing described in the Design Framework is not sufficiently secured by a combination of the Works Plans [AS-073] and the design parameters in Schedule 14 of the dDCO [REP4-022]. In relation to appearance, please clarify what the design principle is that NYC wishes to be included, and how this differs from Colour Palette and the massing of structures.	the framework across the whole of the Works area. At the Issue Specific Hearing the Applicant committed to updating the Outline Landscape and Biodiversity Strategy. That draft has been shared with the Authority and the parties have met to discuss the revised Strategy. The Authority is pleased to report that its concerns have largely been met. The balance of landscape development has been addressed and other than two points which have been referred to in our response to DLV2.4 the Authority is happy with the landscape elements of the scheme. The Local Authority's response to the specific questions are as follows: i) Siting. The description set out in the Design Framework is sufficient.	*immediate and wider surrounding environment. The expectation is that the parameters set within the Draft Lighting Strategy are achievable from a lighting, flora, fauna and environment perspective. The Lighting Strategy would outline compliance with the parameters identified in the Draft Lighting Strategy in the form of detailed calculations or provide justification as to why the parameters are unable to be met.* vi. Vegetation Retention The Applicant confirms that long term (30 years) maintenance and management will be carried out for the following: • New amenity planting (which will be determined at detailed design stage) within the Works areas.

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	iii) Colour Palette – Please confirm if Item D1 (5) of the REAC [REP5-011] covers this principle. iv) Night-time appearance and Lighting design – Please explain why principles relating to the night-time appearance and lighting design are not adequately covered by REAC Item D4 and the Draft Lighting Strategy [APP-184] which is included as a document to be certified in Schedule 13 of the dDCO [REP4-022] and secured by R8. If NYC proposes changes or additions to the Draft Lighting Strategy, please detail what these changes should be. v) The following bullet points appear to be taken from paragraphs 4.2.2 – 4.2.11 of	ii) Massing and Appearance: The Authority has no issue with the massing and appearance sections of the Design Framework. iii) Colour Palette: Confirmed iv) Lighting Design: The only issue that the Authority has with the lighting strategy is the level of detail. The Applicant has been asked by the authority in a meeting between the parties, to confirm the level of detail that will accompany the Lighting Strategy for approval. v) Green Infrastructure: The Local Authority is content with the document as drafted.	• Existing landscape areas and vegetation that have been identified for retention as detailed within the Outline Landscape and Biodiversity Strategy (OLBS) (AS-094) paras 3.3.7, 3.3.8, and OLBS Figure 3 (Existing Retained Vegetation) (APP-183). The Applicant is not committing to maintaining all existing vegetation within the Works areas, however the Applicant confirms that they would only seek to remove vegetation for operational reasons. It should be noted that the vegetation within the Power Station Site did not provide significant screening of the Power Station from the viewpoints used in the LVIA, apart from the linear belt of trees and shrubs around the perimeter of the Woodyard to the north of the Proposed Scheme. For the LVIA it was assumed that this vegetation was to be retained and this is shown on OLBS Figure 3 (Existing

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	the Design Framework under the subheadings of 'The Importance of Green Infrastructure' and 'Green Infrastructure in Relation To Drax Power Station': ~ Incorporation of the Natural England Guidance and Leeds City Region Green and Blue Infrastructure Strategy. ~ Opportunities to strengthen landscape framework surrounding Drax. ~ Combined Landscape and ecology benefits of green infrastructure. These paragraphs precede the subheading 'Green Infrastructure in Relation to the Proposed Scheme' rather than coming under	vi) vi. Vegetation retention. This topic has been covered in discussions between the applicant and the Authority. The Authority is content that the vegetation retention is sufficiently covered in the REAC and within the revised OLBS. The Authority is seeking clarification that the long-term maintenance and management will extend to all existing and proposed landscape and vegetation within the Works areas and not just new vegetation. vii) Enhancement Opportunities: Confirmed. viii) OLBS - Confirmed	Retained Vegetation) (APP-183). The Applicant has discussed with NYC that it is not considered appropriate to also commit to maintaining vegetation that it is not affected by the Proposed Scheme for the following reasons: • This vegetation is not being affected by the Proposed Scheme. • Such a commitment could impede the ability for Drax to carry out day to day operations on the site. • Future development on the Drax Power Station Site that requires consent e.g. planning consent, would include approval from the LPA including with respect to mitigation for that particular development and associated vegetation removal. Therefore, any existing vegetation affected by such future developments would be dealt with through the appropriate processes.

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	that subheading. Is it the understanding of NYC that paragraphs 4.2.2 – 4.2.11 are to be taken as design principles for the Proposed Development, or that they provide the context for the principles that follow from paragraph 4.2.12? vi) Vegetation Retention – Please confirm if Item G8 of the REAC and the OLBS [REP5-013] paragraphs 3.3.7 – 3.3.9 sufficiently cover the retention of vegetation as set out in the Design Framework. If not, please detail the measures that NYC requests to be included. vii) Enhancement Opportunities – Please confirm if Items D1 2), 4) and G8 of the REAC alongside the OLBS		

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	sufficiently cover the Enhancement Opportunities set out in the Design Framework. If not, please detail the measures that NYC requests to be included. viii) Please confirm if Items D1, 1), 2) and 3) of the REAC alongside the OLBS paragraphs 1.4.11 – 1.4.13 sufficiently cover the following principles: ~ To create an attractive and positive working environment for site users within the confines of Drax Power Station. ~ To provide a landscape structure capable of continuing development of ancillary industry.		

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	~ Planting measures which seek to enhance any new or modified public realm. ~ Improving the biodiversity value of amenity planting within the Power Station Site.		
DLV.2.4	NYC is asked to provide comments on the Applicant's updated OLBS [REP5-013] and the Applicant's Responses to Issues Raised at D4 [REP5-028] in relation to the concerns raised in its D4 submission [REP4-042], including whether its concerns on the following matters have been addressed and if not, what information NYC requires to address these concerns: i) Long-term Maintenance and Management of Landscape.	The Authority is much happier with the revised OLBS as drafted. There are two points that the Applicant has been asked to clarify and consider. These are: That the ongoing maintenance requirements relate to both existing landscape features and vegetation within the Works areas and not just new vegetation. That the details of the lighting design to be submitted for approval by NYC with be of sufficient detail to allow the Authority to sign off when it is submitted. The Applicant	The Applicant welcomes NYC's response in relation to the Design Framework (APP-195). The Applicant has responded to the two outstanding points in relation to lighting and retained vegetation below. iv. Lighting The Applicant updated the Draft Lighting Strategy at Deadline 6 (REP6-020) in response to concerns raised by NYC with the following text: *The Lighting Strategy will be a substantially complete design demonstrating compliance with standards, guidance and policies outlined in this Draft Lighting Strategy. It will show this through*

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	ii) Removal of existing vegetation. iii) Protection of existing trees. iv) The landscape mitigation plan for works other than the habitat provision area.	has committed to provide responses to those matters.	*good design or additional mitigation measures so as to ensure that artificial light does not have a significant negative impact on the immediate and wider surrounding environment. The expectation is that the parameters set within the Draft Lighting Strategy are achievable from a lighting, flora, fauna and environment perspective. The Lighting Strategy would outline compliance with the parameters identified in the Draft Lighting Strategy in the form of detailed calculations or provide justification as to why the parameters are unable to be met.* vi. Vegetation Retention The Applicant confirms that long term (30 years) maintenance and management will be carried out for the following:

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
			• New amenity planting (which will be determined at detailed design stage) within the Works areas. • Existing landscape areas and vegetation that have been identified for retention as detailed within the Outline Landscape and Biodiversity Strategy (OLBS) (AS-094) paras 3.3.7, 3.3.8, and OLBS Figure 3 (Existing Retained Vegetation) (APP-183). The Applicant is not committing to maintaining all existing vegetation within the Works areas, however the Applicant confirms that they would only seek to remove vegetation for operational reasons. It should be noted that the vegetation within the Power Station Site did not provide significant screening of the Power Station from the viewpoints used in the LVIA, apart from the linear belt of trees and shrubs around the perimeter of the Woodyard to the

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
			north of the Proposed Scheme. For the LVIA it was assumed that this vegetation was to be retained and this is shown on OLBS Figure 3 (Existing Retained Vegetation) (APP-183). The Applicant has discussed with NYC that it is not considered appropriate to also commit to maintaining vegetation that it is not affected by the Proposed Scheme for the following reasons: • This vegetation is not being affected by the Proposed Scheme. • Such a commitment could impede the ability for Drax to carry out day to day operations on the site. • Future development on the Drax Power Station Site, that requires consent e.g. planning consent, would include approval from the LPA including with respect to mitigation for that particular development and associated vegetation removal. Therefore any existing vegetation affected by

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
			such future developments would be dealt with through the appropriate processes.
NV.2.2	The ExA notes the LPA's submission at D4 [REP4-042] that it would provide further comment on its position regarding the demonstration of good acoustic design and residual noise impacts on residential receptors R6 and R14 having studied the indicative layout, revisiting the statistical analysis of background noise levels at LT4, and revisiting the operational noise assumptions. The LPA provided an update in its submission at D5 [REP5-032] but it is not clear to the ExA what measures it would like to see secured in the dDCO to ensure that good acoustic design forms part of the context case in terms of	i) The effects (at R6 and R14) are reported to be 'adverse' rather than 'significant' when viewed in accordance with BS4142:2014+A1:2019. The night-time background noise level is quantified through statistical analysis and represents a level that will be exceeded 30% of the time when all plant is operating at the same time. Therefore, the adverse impacts will occur under these circumstances. It is recommended that the ExA consider how realistic it is that all plant will be operating at the same time during night-time hours to appreciate the likelihood of the adverse impacts	i) In relation to the assessment the Applicant considers that it is also useful to note that it has taken an overly precautionary approach as the background noise levels measured during night-time, is also used as the basis of the operational noise assessment, were higher 70% of the time. The night-time background noise levels were measured in a series of 15-minute continuous readings. 70% of the noise levels measured in these series were higher than those presented in Table 7.26 of the ES which are the levels that were used in the assessment. This means that, proportionate to the survey period, the difference between the operational noise from BECCS and the background noise levels would be lower 70% of the time, also meaning

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	equipment choice and orientation. NYC is asked: i) Is the context of the 'deflated background noise level' and 'inflated rating level' sufficient to satisfy that any effects would be not significant? ii) Is NYC suggesting that the indicative layout needs to be changed or does NYC maintain that the rating levels should be reduced as previously requested? iii) Is there further information, for example how acoustic design was factored in to the early design options appraisal, that the Applicant could provide to answer NYC's concerns on this matter?	occurring under these circumstances. ii) In hierarchical terms, in the first instance the rating levels should be reduced as previously requested which reduces the adverse impact predictions to suitable levels. Failing that, the principles of the Noise Policy Statement for England (NPSE) apply to mitigate and minimise adverse impacts through good acoustic design. It is recommended that the ExA is reassured that the applicant has done everything reasonably practicable to mitigate and minimise adverse impacts through good acoustic design. iii) There are two options set out within Chapter 3 –	that the assessment would result in a more favourable outcome. Separate to this, the operational noise assessment has assumed that key noisy equipment will operate 100% of the time during the assessment period, as described in Appendix 7.2 and this therefore presents a reasonable worst-case assessment but also realistic of the normal operations. ii) The Applicant has undertaken a robust good acoustic design during the preliminary design where discussions between the acoustic consultant and the pre-FEED contractors were a key consideration. Examples of this are included in ES Appendix 7.2 (Operational Noise Assumptions) (APP-131), for instance the mitigated noise levels for the carbon dioxide compressor buildings in Table 4.3 are considerably lower than those presented in Table 1.1 of the same appendix, showing the

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
		'Consideration of Alternatives'; a northern solution and a southern solution. Both options are not quantified in noise terms for like-for-like comparison, which requires sophisticated noise modelling using, for example, 3D CadnaA software as is adopted and presented in Figure 7.3. This was discussed during a meeting with the noise consultant on 24 April 2023 and it is understood that further information is being submitted in their response to provide reassurance to the ExA, most notably the change in distance from noise sources to receptors and how the northern option is favoured over the southern option in acoustic terms.	unmitigated noise levels for the same equipment. Similarly, unmitigated and mitigated noise levels are presented in Appendix 7.2 for pumps, power turbines and flue gas booster fans. The Applicant confirms that the rating levels could not be reduced any further and also that the Applicant has done everything reasonably practicable to mitigate and minimise adverse impacts through good acoustic design as described above. iii) The Applicant advises that the consideration of alternatives in Chapter 3 (Consideration of Alternatives) (APP-039) of the ES, and subsequent information submitted to NYC on 5 May 2023, appended to this response (Appendix A), provide the appropriate level of assessment to inform an optioneering process. The outcome of this exercise shows that the nearest noise

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
			sensitive receptors would be closer to the southern layout option compared to the preferred northern layout option. Therefore, the preferred northern option is most favourable in terms of noise impact.
NV.2.4	The extract of BS4142:2014+A1:2019 Technical Note, March 2020 Version 1 that the Applicant provided at D4 [REP4-026] states "absolute levels may be as, or more, important than relative outcomes where background and rating levels are low." And goes on to clarify that BS 4142 doesn't define 'low' in the context of background sound or rating levels, although it does say "The note to the Scope of the 1997 version of BS 4142 defined […] low rating levels as being less than about 35 dB LAR,TR. The WG suggest that	i) The margin by which the rating level exceeds the background is more important to appreciating what the impact will be as it is a comparison of what noise exists without the scheme vs. what it will likely be when operational. Reviewing the absolute noise levels enables a comparison between the predicted operational noise levels against BS8233:2014 design criteria for habitable rooms. What is clear from the data is that the receptors currently enjoy very quiet living conditions and will	i) The Applicant welcomes NYC's comment and agrees that the receptors currently enjoy very quiet living conditions and will continue to do so alongside the Proposed Scheme in accordance with BS8233:2014 design criteria for habitable rooms. The Applicant clarifies that there is no adverse exceedance in relation to BS8233:2014 but an initial estimate in accordance with BS4142:214+A1:2019 indicating an adverse impact depending on the context. Taking into account the contextual considerations, then the operational noise effect due to operation of the post combustion

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	similar values would not be unreasonable in the context of BS4142, but that the assessor should make a judgement and justify it where appropriate." Can NYC answer the following questions: i) In the context of the above technical note and the rating levels for R6 and R14 being 34 & 35 dB LAR,TR respectively, are the absolute noise levels, or the margin by which the rating level exceeds the background, more important in terms of assessing the significance of effect and why? ii) Is NYC satisfied with the assessment and conclusions drawn by	continue to do so alongside the scheme in accordance with BS8233:2014 design criteria for habitable rooms. However, the adverse exceedance still exists, and it should be noted that the scope of BS8233:2014 applies to new residential development and excludes assessing the effects of change in the external noise levels to occupants of an existing building. ii) NYC are satisfied with the assessment and conclusions drawn by the Applicant of the absolute noise levels in paragraphs 7.9.17 and 7.9.18 of ES Chapter 7.	carbon capture technology would be not significant, as noted in paragraph 7.9.20 of the ES Chapter 7. ii) The Applicant welcomes this comment.

Response Ref. (location in original submission)	Examining Authority's Written Question	North Yorkshire Council's Response	Applicant's Response
	the Applicant of the absolute noise levels in paragraphs 7.9.17 and 7.9.18 of ES Chapter 7 [APP-043]? If not, please provide an explanation of the information required to adequately assess the absolute noise levels.		

5. BIOFUELWATCH

Table 5-1 – Representation from Biofuelwatch (Biofuelwatch comments on any other responses) (REP6-034)

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.1	**REP2-073 para 57, REP4-020 ref 9.8** The applicant's response, which refers to EA Guidance, does not address the concern that the location with the largest nitrosamine concentrations may not even be on figure 6.8 [APP-075]. Biofuelwatch notes that the Environment Agency was unable to confirm whether the applicant's approach is correct in their response to the ExA's questions (AQ.1.4 of [REP2-076]). The applicant's response says photolytic degradation of the nitrosamines has not been taken into account in the amine chemistry modelling, which will lead to overestimation of pollutant concentrations at distance from the stack. Any such overestimation may, however, not be significant at this geographical scale because of the stability of nitrosamines in the atmosphere (see paragraph 72 of Biofuelwatch's deadline 2 submission [REP2-073]) and because photolytic degradation requires sunlight (and therefore will not occur at night and will be greatly reduced when the sun is obscured by clouds). Biofuelwatch also notes the applicant did not comment on the findings of the Norwegian Institute for Air Research and the Norwegian Institute for Water Research (in collaboration with the Norwegian Institute of Health and others) that reported	The Applicant notes that Figure 6.8 (Annual Mean Amines Nitrosamines Maximum Contribution (With Proposed Scheme - Baseline) (APP-075) shows the total concentration of nitrosamines plus nitramines resulting from the Proposed Scheme. The maximum impact from nitrosamines is indeed contained within the figure and occurs between 13 and 15km from the power station. The maximum impact from nitramines, as modelled, occurs slightly further from the stack and at the edge of the modelled study area but is also appropriately represented with the 15 x 15km study area, since this extends some 21km downwind of the power station on the prevailing wind direction (i.e. the distance from the stack to the north-east corner of the study area is over 21km). Therefore, whilst the maximum modelled concentration of nitrosamines plus nitramines occurs close to the edge of the modelled study area, it is indeed captured within it. Furthermore, as explained previously, the assumptions inherent within the modelling of impacts become increasingly conservative with distance from the stack.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	significant nitrosamine concentrations over considerable distances (considered in paragraph 68 of Biofuelwatch's deadline 2 submission). Biofuelwatch requests that the ExA requires the applicant to carry out modelling that shows, beyond doubt, the location with the predicted highest nitrosamine concentration together with one or more supporting diagrams to show the full extent of the geographical spread of nitrosamine concentrations. Biofuelwatch also requests diagrams showing the cumulative modelled nitrosamine impact with other consented plants to aid the assessment of cumulative impacts.	As such, EA and ExA can be confident that the maximum impact of nitrosamines has been conservatively assessed. As a final note, paragraph 68 of Biofuelwatch's deadline 2 submission states that the Norwegian Institute for Air Research and the Norwegian Institute for Water Research (in collaboration with the Norwegian Institute of Health and others) found that 'maximum hourly nitrosamines concentrations decline only slightly at distance of 10km'. The modelled study area is, as stated above, 15km x 15km and the maximum modelled nitrosamine concentrations occur at the edge of this study area. This is beyond the distance at which the Norwegian study reported slight declines in concentrations. Taking into account the Norwegian study and the conservative modelling of the Proposed Scheme, the EA and ExA can also be confident that the point of maximum ground level impacts on nitrosamines and nitramines has been captured within the study area.
5.2	**REP2-073, para 59, REP4-020, ref 9.9** The modelling assumes both no existing amine/nitrosamine emissions and no background amines/nitrosamines. Biofuelwatch is not aware of any existing monitoring equipment, but existing emissions levels and environmental levels must be measured and included in the assessment. The applicant's response	The Applicant's response to the previous question, related to emissions of amines from the existing process and it is reiterated here. Whilst there is a theoretical potential for the formation of amines in the combustion process, that potential is very low and is not of environmental concern.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	acknowledges the possibility of amine emissions from biomass combustion and goes on "Drax's current permit to operate makes no reference to any requirement to either control or monitor emissions of amines". This is then followed by the incorrect conclusion that "it is logical to conclude that the impacts of amines from the biomass combustion are not of environmental concern". This is flawed: a. because amines clearly are of environmental concern (as shown by the applicant's proposal and theEALs defined by the EA) b. because the proposal will increase amines and nitrosamines c. because it assumes that all matters of environmental concern are regulated by permit to prevent environmental impacts. This is clearly not the case with impacts of non-threshold pollutants are inevitable regardless of whether they are measured and regulated. Without an assessment of existing emissions, the cumulative impact of the proposal cannot be properly assessed. It should be noted that the applicant has included existing emissions of other pollutants in its assessment, so it is Biofuelwatch's position that it must do so for amines and nitrosamines.	The future impact of the Proposed Scheme on amines and nitrosamines has been comprehensively and appropriately assessed for the ES, both alone and cumulatively. It is considered that Biofuelwatch are conflating the matters of 'environmental concern' between the issue of amines in the carbon capture process, which are a core component of that process, and the possibility of amines in the combustion process, which are minimal.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.3	**REP2-073, para 61, REP4-020, ref 9.9** The applicant's response says " the location of maximum ground level impact as a function of distance from the stacks would also need to coincide" and considers the chance of this occurring to be "vanishingly small". However, short-term impacts can occur without maximum ground level impacts coinciding. The short-term impacts need to be modelled because nitrosamines formation depends on both amine concentrations and other pollutants (such as NOx), so the combined modelled short-term concentration could easily exceed the maximum ground level impact from one plant even if maximum ground level pollution concentrations from two plants do not coincide. A range of meteorological conditions is likely to exist under which such less-than-maximum ground level impacts combine. Biofuelwatch notes that the Environment Agency was unable to confirm the applicant's approach was correct in their response to the ExA's questions [REP2-076].	The Applicant reiterates their previous response and notes that maximum short term concentrations are assessed on an hour by hour basis. To have maximum impacts or even near maximum impacts occurring from more than one plant in any given hour would, as stated previously require the dispersion of the wind from source to receptor, within the same hour and the location of maximum impacts from both plants to occur at that receptor. The chances of this occurring are indeed vanishingly small, and the suggestion that the combined modelled short term concentration 'could easily exceed the maximum ground level impact from one plant' is wholly unrealistic. Taking into account the fact that the impacts of the proposed scheme are assessed in terms of the maximum impacts anywhere within the study area makes the suggestion by Biofuelwatch even more unlikely i.e. to exceed the maximum impacts presented in the ES, the meteorological conditions would have to be such that the near maximum impacts from two plants will occur, not at any receptor at any time, but at the location of maximum impact of the two or more plants in the same hour. This simply will not occur and does not warrant assessment.
5.4	**REP2-073, para 65, REP4-020, ref 9.9** The applicant responded "Firstly, the contribution of Drax and Keadby to total NOx concentrations is significantly	The Applicant's modelling of NOx and nitrosamines within the plume is undertaken for each hour of the year and assumes that the emissions of NOx are continuously

Response Ref.	Comment (including location in original submission)	Applicant's Response
	lower than the background contribution to these pollutants, whether taken alone or cumulatively." Whilst background levels exceed Drax's long-term contribution to NOx concentrations, Drax can be expected to make a very significant contribution to the level of NOx within the plume. These high NOx levels within the plume will coincide with high amine concentrations. The applicant's approach to cumulative emissions does not take this variability of NOx concentrations into account. The applicant has also not justified the use of background NOx levels in the model of nitrosamines concentrations rather than peak plume NOx levels. The applicant responded "Secondly, there remains a significant excess of these pollutants in the air, implying that adding a minor contribution from another source will not significantly affect reaction rates." Whilst there may remain a "significant excess of these pollutants in the air" for complete breakdown of amines, this does not mean that the breakdown rate of amines is not dependent on NOx concentrations. The equations used by the ADMS chemistry module in the ADMS chemistry module user guide show reaction rates to be dependent on NO and NO2 concentrations. This is also confirmed by the applicant's response which said "the "[modelled] formation of nitrosamines was higher with the Hull Freetown background concentrations (NOx annual mean ~38µg/m3 in 2016) than alternative rural sites such	at their peak levels. The modelling therefore captures both typical and worst case concentrations of NOx within the plume itself. These modelled concentrations are combined with background concentrations of NOx that vary on an hourly basis. The Applicant is therefore confident that over the five years of modelling, the combination of peak plume and peak background concentrations, together with the converse possibility of minimum plume and minimum background concentrations, coinciding has been appropriately represented in the calculation of a robust annual mean impact from nitrosamines and nitramines. To suggest that all assessments should be based on peak coinciding with peaks is unhelpful since it would clearly overpredict impacts and this runs counter to best practice in the assessment of worst likely effects. As a final point of note, Biofuelwatch quote the Applicant in saying that the modelled formation of nitrosamines was higher with the Hull freetown background concentrations than the alternative rural sites such as Ladybower. Using Hull Freetown and Ladybower for sensitivity testing provides an extreme example of the potential variation in nitrosamine formation due to variations in annual mean NOx concentrations. The range of concentrations, 9ug/m3 and 38ug/m3, across these two sites is significantly greater than the potential

Response Ref.	Comment (including location in original submission)	Applicant's Response
	as at Ladybower in Derbyshire (NOx annual mean ~9µg/m3 in 2016)". Increased reaction rates will lead to higher levels of nitrosamines near the plant and would be likely to increase peak nitrosamine levels. The applicant has provided insufficient evidence that the assumptions the applicant considers to be "conservative" are sufficient to outweigh the non-conservative assumption implicit in the applicant's approach including that the increased air pollutants (such as NOx and ozone) from multiple sources will not increase the reaction rate of nitrosamine production. The applicant has not shown that the resulting environment levels cannot exceed the sum of the predicted nitrosamine levels modelled from each independent pollution source and there is the further concern that the level used by the applicant's model does not reflect the higher NOx levels that can be expected within the plume.	cumulative contribution of the Proposed Scheme and other schemes (<1ug/m3 over the majority of the study area). As such the Applicant is confident that the modelled impacts using Hull Freetown, which are a highly conservative representation of maximum NOx concentrations for the majority of the study area do indeed produce conservative modelled impacts for nitrosamines and this conclusion is independent of whether cumulative impacts are considered or not.
5.5	**REP2-073, para 66c, REP4-020, ref 9.9** The applicant considers regulation of amines in biomass burning and says "it is logical to conclude that the impacts of amines from the biomass combustion are not of environmental concern". It is, however, clear that amines (and their breakdown products) are of great environmental concern. Whilst the concentrations of amines released from biomass combustion have not historically received much consideration, they deserve careful consideration	The Applicant has made careful consideration of the potential impacts of the Proposed Scheme on amine and nitrosamine concentrations, and as stated on multiple occasions has undertaken a conservative assessment of impacts. The sentence has been quoted out of context – it referred solely to the formation of amines from biomass combustion without carbon capture and not to the potential environmental concern of amines as a chemical species.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	when assessing the cumulative impact of the proposed emissions which include significant amine emissions arising from the carbon capture plant. The applicant has not assessed these cumulative impacts nor provided sufficient information to support their view that they do not "warrant inclusion in the assessment of impacts".	
5.6	**REP2-073, para 66d, REP4-020, ref 9.9** The applicant has said "those such as domestic wood burning etc are not affected by the Proposed Scheme and therefore do not require inclusion in the assessment." It is appropriate for background pollution levels to be considered. The applicant has not satisfactorily assessed the background levels of amines and nitrosamines arising from domestic wood burning. It is also appropriate to consider the impact of domestic wood burning emissions combined with other emissions from the proposed facility. An appropriate assessment should be made of environmental concentrations that take into account the domestic wood burning emissions to ensure that the proposal cannot result in environmental concentrations that exceed safe levels. Biofuelwatch requests that environmental concentrations (the background concentrations) are determined prior to the planning and permitting assessments being made because without such concentrations it is impossible to determine cumulative impacts of both amines and nitrosamines.	The Applicant has clearly stated within the ES (para 6.5.54, bullet point d of Chapter 6, (Air Quality) of the ES (APP-042) that measured background concentrations of amines and nitrosamines were and continue to be unavailable. Nevertheless, the assessment has been able to demonstrate that the impacts of amines can be screened as insignificant using EA criteria and that the incremental risk associated with the impact of the Proposed Scheme on concentrations of nitrosamines and nitramines are acceptable.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.7	**REP2-073, para 66e REP4-020, ref 9.9** The EA has said "background concentrations for amine and degradation products are unavailable for the study area" but this does not mean that a robust assessment can be made without determining background concentrations. The applicant has said "impacts from amines being screened as negligible irrespective of the background concentration" but, as considered elsewhere, there is concern over the level of amines emitted. Also, since amines result in the atmospheric formation of nitrosamines, which are not predicted to be negligible, the applicant has provided insufficient evidence that amine emissions (and the resulting nitrosamines) are negligible irrespective of the background concentrations of amines and nitrosamines. Other sources of environmental amines and nitrosamines, such as naturally occurring amines and nitrosamines, should be included in the assessment. Biofuelwatch requests that environmental concentrations (the background concentrations) are determined prior to the planning and permitting assessments being made because without such concentrations it is impossible to determine cumulative impacts of both amines and nitrosamines.	See response above.
5.8	**REP2-073, para 66 e REP4-020, ref 9.9**	The Applicant's assessment of impacts simply does not assume that the background concentrations of either amines and nitrosamines are zero. That is a

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant's response concludes "it can be robustly concluded that the addition of maximum to maximum impacts is indeed conservative". Biofuelwatch considers the applicant's assessment of cumulative impacts to be neither conservative nor robust. Biofuelwatch notes that the EA have also been unable to confirm that the applicant's assessment of cumulative impacts is conservative and robust [REP2-076] but Biofuelwatch is concerned that the EA may accept the applicant's approach that considers background amine and nitrosamine concentrations to be zero (apparent EA agreement with Section 6.7, with associated limitations and assumptions provided in paragraph 6.5.54, of ES Chapter 6 (Air Quality) [APP-042] as shown by [REP5-016]). Biofuelwatch requests the ExA to ask the EA if it is confident that background amine levels and nitrosamine levels are so low that they can be excluded from an assessment of the Predicted Environmental Concentrations of amines and their breakdown products, and, it it is confident background levels can be excluded, why it is confident when natural processes and domestic wood burning both emit amines and when a study by Ge et al[1] noted 154 amines occurring in the atmosphere.	misrepresentation of the EA's screening criteria for insignificant in the context of the assessment of amines. For nitrosamines, we are rightly concerned with the specific risks associated with the increase in nitrosamine concentrations and this incremental risk is independent of existing risks from nitrosamines since, as noted by Biofuelwatch, the pollutant is not a threshold pollutant where risk begins above a certain concentration.

[1] Xinlei Ge, Anthony S. Wexler, Simon L. Clegg, Atmospheric amines – Part II. Thermodynamic properties and gas/particle partitioning, Atmospheric Environment, Volume 45, Issue 3, 2011, Pages 561-577, ISSN 1352-2310, https://doi.org/10.1016/j.atmosenv.2010.10.013. (https://www.sciencedirect.com/science/article/pii/S1352231010008757)

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.9	**REP2-073, para 67 REP4-020, ref 9.9** The applicant's response says "Reference is made within the report to aldehydes in the emissions from carbon capture plants rather than as degradation products in ambient air. It is, therefore, entirely appropriate to consider primary emissions of aldehydes only in the Applicant's air quality impact assessment." but this does not address the concern raised that environmental aldehyde concentrations can be expected to exceed those modelled by the applicant because the emissions result in the atmospheric formation of aldehydes as a degradation product. Biofuelwatch does not consider the applicant's modelling of aldehydes to be adequate when it does not consider a potentially significant source of aldehydes, i.e. aldehydes arising from the atmospheric breakdown of amines. Biofuelwatch requests the ExA require the applicant to include consideration of the atmospheric formation of aldehydes in its consideration of environmental aldehyde concentrations so that the impact of the proposal on aldehyde concentrations (and so human health and the environment) can be appropriately assessed.	The Applicant has undertaken a robust assessment of aldehydes. By far the greatest impacts from aldehydes will arise from direct emissions rather than the atmospheric degradation of amines. To illustrate this point, the average emission rate of amines (primary and secondary) that will be permitted from the Proposed Scheme is of the order of 1g/s. The average emission rate of aldehydes is 6g/s. Therefore, even if all amines degraded to aldehydes – an unrealistic assumption - this would increase the modelled impact from aldehydes by less than 20% (since both components disperse in proportion). This would increase the maximum annual mean impact of aldehyde from 0.1% of the annual mean environmental assessment level to 0.12% of the EAL, the maximum hourly mean impact from 1.4% to 1.6% of the EAL, where the insignificance criteria for these metrics are 1% and 10% of the EAL respectively. Moreover, it is reiterated that the above calculations assume that all amines degrade to aldehydes. In reality, not all amines will degrade and certainly not degrade to aldehydes. In summary, the applicant's assessment of impacts on aldehydes is robust.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.10	**REP2-073, para 69-70, 215 REP4-020, ref 9.23** The response says "The identification (pre-mitigation) of the potential for effects significant at 'up to an international scale' reflects the relative importance of the receptors in line with a defined geographical context, as per the CIEEM guidelines; not that the impacts would have a transboundary, international, impact. The Applicant wishes to clarify that this does not mean that significant effects would occur across an internationally significant area, or that direct air quality impacts of Drax could be significant at International scale." The Imperial College and the Norwegian Institute for Public Health study reported concerns over cumulative impacts when plants are located hundreds of kilometres apart. The applicant considers "These are theoretical studies that do not reflect the specific impacts of Drax and the dispersion of pollutants from a main stack that is 259m tall." Biofuelwatch considers the Imperial College and Norwegian Institute for Public Health study to be relevant because it shows the considerable distances over which combined impacts can be expected to endanger human health. Drax points out the height of the stack. Higher stacks can be expected to increase the distance pollutants travel and therefore have the potential to increase the distance at which harmful cumulative impacts may occur. It is therefore appropriate to consider that the plant has the potential for impacts at international scale (beyond impacts on sites of	The Applicant reiterates their previous response to this question, but further notes that Biofuelwatch make the assertion that 'Higher stacks can be expected to increase the distance pollutants travel and therefore have the potential to increase the distance at which harmful cumulative impacts may occur'. This is a misunderstanding of the dispersion process for realistic stack heights. Higher stacks do not 'increase the distance pollutants travel'. To illustrate this, consider the reverse statement: Lower stacks reduce the distance pollutants travel. If this were true then reducing stack heights would be beneficial but it is palpably not true. Higher stacks allow plume concentrations in the near field to disperse (vertically and horizontally) before impacting at ground level. However, once the plume is well mixed in the vertical, then the initial height of the release becomes less important such that at distance from the stack it is largely immaterial whether the release was from a tall or short stack. It is true that the point of maximum ground level impact of a plume moves further from the stack with increasing stack height. However, the magnitude of the maximum concentration at that point of maximum impact decreases with stack height. As such, ground level concentrations, including at distance from the stack, decrease with a taller stack although as stated above,

Response Ref.	Comment (including location in original submission)	Applicant's Response
	international ecological importance). France and the Netherlands are less than 400 km away from the Drax site and the Drax stack height may be higher than that assumed by the Imperial College study potentially leading to pollutants travelling greater distances. The proposal may therefore result in elevated nitrosamines concentrations in other countries so the potential for such impacts should be assessed to inform a decision on whether international consultation on the proposal is appropriate.	the benefits of the increased stack height reduce with distance from the stack. See our response to Response Ref 5.1 above in relation to the insignificant potential for impacts on nitrosamine concentrations to cause impacts in other countries.
5.11	**REP2-073, para 84 REP4-020, ref 9.10** The applicant responded "An assumption that the non-BECCS units do not operate at all in the future is unrealistic and irrelevant and would require a wholesale change in government policy." Biofuelwatch disagrees. Market conditions may change to make it uneconomic to operate the non-BECCS units in future. Accidents or unforeseen technical difficulties may also mean that the non-BECCS units cease to operate either for a time or permanently. Regulations may change which could also make the non-BECCS units uneconomic in the future. The applicant said "It is wholly incorrect to assert that the impacts on nitrosamine concentrations may be significantly higher than predicted" but the applicant predicts aldehyde and nitrosamine concentrations from the BECCS units would decrease when the non-BECCS	The Applicant maintains its position that the operational scenarios and the sensitivity tests around these scenarios remains credible and robust. The output of these scenarios and the assessments undertaken within the EIA are also believed to remain robust. The Applicant has provided a robust justification of its future operational scenarios in Appendix B of the Applicant's Response to Relevant Representations and Additional Submissions (PDA-002), and responses in Applicant's Responses to Issues Raised at Deadline 1 (Table 5.1, Ref 5.6) (REP2-067) and Responses to Issues Raised at Deadline 2 (Table 9.1, Ref 9.7) (REP3-020). As such, the Applicant considers modelling a scenario in which the non-BECCS units are not operating to be un-

Response Ref.	Comment (including location in original submission)	Applicant's Response
	units operate continuously so, if the non-BECCS units cease operation (or only operate occasionally), nitrosamine concentrations can be expected to be significantly higher than predicted. The safety of the proposal must not be dependent on the dubious assumption that the non-BECCS units will remain operational. Biofuelwatch therefore requests that the ExA require the applicant to model the impacts with a scenario where the non-BECCS units are not operating.	necessary since it represents an unrealistic future scenario. The Applicant is not aware of a realistic set of market conditions that would result in it being uneconomic to operate all of the non-BECCS units. This scenario would require there to be no demand for electricity that is generated from biomass fired plants. As set out in Appendix B to this submission, National Grid's Future Energy Scenarios envisage a role for Bioenergy up to 2050. In the event of unplanned outages and accidents the Applicant would seek to get the units working again as soon as it is possible to do so. The idea that a unit which may have future contracted generation associated with it would simply be left inoperable is not realistic. However, to reiterate, the Applicant considers the mid-merit scenario to be robust and formal consideration of a scenario in which the non-BECCS units do not operate at all is not required.
5.12	**REP2-073, para 88-90 REP4-020, ref 9.11** The applicant responded "The modelling was undertaken using v5.2.4. The software version naming convention is such that where a model is named X.Y.Z, major changes to the software warrant an update to the number X, minor changes update number Y and number Z updates are	The Applicant reiterates their previous response to the question of model version, but further notes that the studies noted by biofuelwatch to illustrate the changes between ADMS 5.2 and 5.1 specifically address the impacts of buildings and fires. Neither of these scenarios have great relevance to the Drax model. Buildings (or in

Response Ref.	Comment (including location in original submission)	Applicant's Response
	minor patches. The model validation studies undertaken for ADMS version 5 will be applicable to all versions starting with number 5." Each version of ADMS is different software and so may produce different results. It is not the case that validation tests made with version 5.0 will necessarily produce the same results as tests made with 5.2.4. CERC validation documents show that ADMS 5.2 was a significant change from ADMS 5.1 and results in different environmental predictions – sometimes very significantly different (e.g. the Millhouse power plant and Warehouse fire windtunnel scenarios). The applicant may consider the model validation studies for ADMS version 5 to be applicable to all versions starting with number 5, but assessment of uncertainties based on validation studies made against a different version has limited usefulness because different versions of ADMS can, and do, produce different results. Minor version changes typically correct software bugs and such changes also have the potential to impact predictions and may also introduce new bugs. Bugs and errors in some such complex modelling systems are to be expected, but the potential consequences of such software bugs and errors have not been quantified nor have the modelling predictions been compared with results from other modelling software systems. The modelling uncertainty remains unquantified.	this case cooling towers) have little influence on the dispersion of pollutants from the main stack and the Applicant is not modelling fires. As noted in the previous response, the model validation exercises from simple stacks are the most relevant to Drax and these remain valid across the ADMS models. Biofuelwatch then appear to suggest that CERCs quality assurance processes might be inadequate and that new bugs in the model might have been introduced. This is pure speculation and unfounded in reality. Furthermore, it runs counter to their own assertion below that they do not question that ADMS is the appropriate model to use to model emissions from Drax.
5.13	**REP2-073, para 91-94, 96-97 REP4-020, ref 9.11**	The Applicant refers to their answer above.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant's response considers that "the idealised wind tunnel and field studies used for model validation are directly applicable to the Applicant's modelling." Wind tunnel studies do not use data obtained from actual plant emissions and so are highly unlikely to reflect all the complexities of atmospheric dispersion. An idealised environment will provide more predictable results than true atmospheric dispersion so is not a reliable guide to the levels of uncertainties to be expected from a real-world scenario. There also appears to be a lack of consideration of whether validation scenarios with a single point source accurately reflect emissions from a stack with multiple flues. The applicant's response has given no evidence that uncertainties in a validation scenario with flat terrain and no coastal effects would accurately reflect the uncertainties in the Drax scenario when Drax is near an estuary and has terrain that is not flat within the distance modelled. The applicant still has not quantified the uncertainties that can be expected, but, the uncertainties in the modelling results can be expected to be greater (and in Biofuelwatch's estimation, considerably greater) than those in a validation scenario with flat terrain and without coastal effects especially when the validation scenario was known to the developer during development of the modelling software system. The applicant's response says "The ADMS suite of models is the most widely used dispersion model in the	The ADMS model is well validated and is the most appropriate tool with which to assess the impacts of the Proposed Scheme. Uncertainty has been taken into account in the modelling through the use of appropriately conservative assumptions.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	UK." Biofuelwatch repeats that it does not does not question the appropriateness of the software used by the applicant for pollutants such as NOx, SO2 and particulates but that the uncertainties remain unquantified. The applicant's response also illustrates the lack of differentiation between the modelling software system (ADMS) and any model created using this modelling software system. As stated in Biofuelwatch's deadline 2 submission [REP2-073], both the uncertainties in the modelling software system itself and the model created using that modelling system have to be considered. The applicant's response does not clearly differentiate between these two sources of uncertainty and does not quantify either.	
5.14	**REP2-073, para 100 REP4-020, ref 9.11** The applicant's response says "in the meteorological data used for the air quality assessment, calm conditions account for less than 0.7% of hours in the year and these differences are, therefore, insignificant within the context of the assessment of the Proposed Scheme." Biofuelwatch disagrees. The applicant's assessment predicts short-term NO2 impacts based on the 99.79th %ile of hourly values. Conditions for 0.7% of hours have the potential to impact such predictions and should be assessed, especially with the research by M. Theobald et al showing large differences in peak hourly concentrations	The Applicant reiterates their previous response. Furthermore, we note that the environmental impacts of greatest concern to the Proposed Scheme relate to annual average impacts and these will not be perceptibly impacted by calm conditions.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	between the two most widely used air dispersion modelling systems under calm conditions. Modelling predictions made with a model that essentially removes calm periods from the assessment is not sufficiently robust and potentially subject to very significant error.	
5.15	**REP2-073, para 102 REP4-020, ref 9.11** The applicant's response says "Biofuelwatch note that the EfW at Kirk Sandall has been modelled without buildings. This is correct but this has no significant impact on the conclusions of the assessment. The primary impact of buildings on dispersion is to rapidly mix pollutants from lofted plumes down to ground level due to enhanced turbulence in the wake of the building. However, once a plume has become well mixed with the atmospheric boundary layer, as happens with distance downwind from a source, the impact of any enhanced mixing near the source is much reduced. Kirk Sandall EfW lies 20km south-south-west of the Drax power station and where there is potential for cumulative impacts between the Proposed Scheme and Kirk Sandall, the influence of near source building effects will, therefore, be negligible." However, the applicant's own figures show peak nitrosamine impacts occur at distances at or in excess of 15km with impacts extending an unknown maximum distance. Nitrosamine concentrations arising from Drax's emissions will combine with Kirk Sandall emissions and	Biofuelwatch's response mixes impacts from Drax on amine concentrations with emissions from Kirk Sandall EfW which do not include amines to suggest that there is a potential for significant underprediction of impacts. This is unrealistic. For non-amine pollutants, the maximum cumulative impacts do not occur in the immediate vicinity of either Drax or Kirk Sandall and our previous response stands. In relation to amines, the Applicant has already stated above that there is no potential for cumulative impacts on these pollutants and has addressed any notions raised by biofuelwatch in relation to variations in NOx concentrations in the cumulative plumes and their impact on amine degradation by noting that total NOx concentrations are conservatively assessed through using background concentrations based on Hull Freetown. There is no potential for 'significant underprediction of environmental nitrosamine concentrations' near Kirk Sandall.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	impact nitrosamine concentrations near Kirk Sandall. There is therefore the potential for significant underprediction of environmental nitrosamine concentrations near Kirk Sandall since buildings near Kirk Sandall have not been modelled.	
5.16	**REP2-073, para 105-106 REP4-020, ref 9.11** The applicant's concluding response on uncertainty says: "… the Applicant's treatment of uncertainty in the modelling has been: a. to use a well validated dispersion model (ADMS); b. to ensure that model inputs parameters are set at their worst case e.g. emission rates, where there is potential variability; c. to undertake sensitivity testing including for meteorological conditions; and d. to assess the Proposed Scheme against the maximum modelled concentrations over all model scenarios." Biofuelwatch's concluding comments on this response from the applicant are: a. Whilst a previous version of ADMS was validated by the developer, the version of ADMS used by the applicant has not been validated.	The Applicant has repeatedly addressed all of the points raised by Biofuelwatch and note that no additional information has been provided by Biofuelwatch to demonstrate that the assumptions on which the modelling has been based are not conservative.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	b. The validation carried out was not independent and it can be expected that the software will have been built and tested to perform at its best under validation scenarios with no assessment made of its likely performance in other situations. Biofuelwatch do not consider dispersion modelling software should be considered "well validated" without independent validation. Biofuelwatch do not consider a dispersion modelling software version to be well validated when not even the developer has published validation data for that particular software version. c. The applicant has not shown that all model inputs are worst case with no response to the detailed issues raised on these matters and the lack of compliance with ADMLC Guidelines d. Whilst some sensitivity analysis has been carried out, this is limited and does not include all important parameters, nor has there been any quantification of the resulting cumulative uncertainty. e. An assessment against the "maximum modelled concentrations over all model scenarios" does not give reassurance that the actual environmental concentrations could not exceed those modelled for all the reasons given in Biofuelwatch's submission.	
5.17	**REP2-073, para 108-109 REP4-020, ref 9.12**	As noted in the Applicant's previous response, the images of the plume at Drax show the merging of the

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant's response says " the environment at Drax is well represented in the model i.e. there is only a single source – the main stack …" but saying Drax has been "well represented" is not the same as saying Drax has been "accurately represented". The applicant's response says "Widely available images of the plumes at Drax show the gases from individual flues merging rapidly on exit from the stack." Current emissions from individual flues have similar characteristics such as temperature. It is not surprising that such emissions mix well, but this gives no assurance that emissions from flues with very different characteristics will mix so quickly that it is appropriate to model them as a single source. The response gives insufficient indication that the potential complexities and impact of multiple flues within the Main Stack have been considered nor whether the validation scenarios considered by the developer of the ADMS modelling system reflect such a potentially complex scenario. Incomplete mixing of the plumes has the potential to significantly impact environmental concentrations.	plumes. Therefore consideration of unmerged plumes is un-necessary. Drax has had numerous discussion with the regulatory authorities over its lifetime and has never been asked to assess unmerged plumes during its operations.
5.18	**REP2-073, para 110-115 REP4-020, ref 9.12** The applicant's response says "In relation to the sulphur dioxide concentrations within the BECCS and non-BECCS units, the proposed mitigated concentrations will be adopted and secured via the permitting process. … it is proposed that sulphur emissions are reduced not	The SO_2 concentrations in the exhaust gases from Drax are low and SO_2 is not involved in the significant routes to formation of atmospheric nitrosamines and nitramines. The assessment is therefore in line with current best practice, which allows for the use of the ADMS amine chemistry module.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	increased in the future. The flue gas cooler system also known as the quench column uses a water fed spray system to cool the flue gas down. The water used in the quench column can be adjusted for pH to augment the removal of the SO2 in the flue gas to meet the proposed reduction in emissions. Furthermore, it is emphasised that the carbon capture technology has been optimised for the Drax exhaust specifications and the modelled emission limits for nitrosamines and amines take account of the performance of the unit under Drax-specific conditions." Whilst the applicant shows the methods by which it may be possible to reduce SO2 for permit compliance, the applicant has not commented on the potential impact of SO2 on the complex chemistry of atmospheric nitrosamine formation. There are no robust predictions of the impact of SO2 and particulates on nitrosamine formation. The applicant's response gives no assurance that SO2 concentrations will not result in higher nitrosamine concentrations than those modelled at permit compliance levels.	It accords with current scientific knowledge. For example: ▪ The influence of SO_2 is not considered within the Norwegian study on the Atmospheric Degradation of Amines, Neilsen et al, 2012 that underpins the ADMS amine chemistry module. ▪ Experience with CO_2 capture from coal flue gas in pilot scale: Testing of different amine solvents, Knudsen et al. Energy Procedia 1 (2009) states that amines can be lost from the carbon capture process by irreversible adsorption of flue gas pollutants including SO2, but makes no mention of the influence of SO2 on the atmospheric formation of nitrosamines All readily available research points to the reactions considered with the CERC chemistry module being the most important for the formation of nitrosamines and nitramines. No evidence is provided for SO_2 being a significant contributor or catalyst for these reactions. The sensitivity tests undertaken for amine reaction rates are appropriate for consideration of uncertainty in the modelling.
5.19	**REP2-073, para 116-118 REP4-020, ref 9.13** The applicant responded "The regulation of the Drax power plant is a matter for the Environment Agency and	The regulation of the power plant is correctly stated to be a matter for the Environment Agency and the permitting regime, including accounting for uncertainties.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	the permitting regime, and not a matter for consideration within the DCO." Whilst Biofuelwatch agrees that regulation of the Drax power plant is a matter for the Environment Agency (see paragraph 180 of Biofuelwatch's deadline 2 submission [REP2-073]), Drax disagrees that consideration of the permitting regime is not also an important matter for the ExA. Biofuelwatch considers that the ExA must consider how the plant will be regulated, and the implications of that regulation, in order to assess the appropriateness of the proposal in land use terms. Regulation of the plant allows exceedances of emissions limits without regulatory intervention and the EA considers it necessary to permit such exceedances (page 125 of EA decision document for permit application EPR/SP3609BX/A001). The applicant considers " it is unnecessary and unrealistic to model the impacts of the plant at levels that would invoke regulatory intervention since by definition these emissions would be promptly rectified via the permitting process". Biofuelwatch maintains that since emissions exceedances do not necessarily invoke regulatory intervention, the permitting process will be unlikely to rectify them and even more unlikely to rectify them promptly. As shown in the example in Biofuelwatch's representation, such exceedances could be 169% of the limit. Higher uncertainty in measurements than considered by Ricardo in its example would of course, lead to the	The Applicant in response to the comments by Biofuelwatch notes that the purpose of the EIA is to identify worst realistic impacts and not the worst theoretical and unrealistic impacts that are repeatedly suggested by Biofuelwatch.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	potential for even higher exceedances without regulatory intervention. Regulated plants can, and do, operate near to regulatory limits. As an example, the Annual Performance Report 2021 for Lakeside EFW Ltd[2] shows the annual mean NOx emissions exceeded 90% of the ELV. Biofuelwatch considers the potential for exceedances to be more than just "hypothetical". This is, of course, just one of many examples where the applicant's predictions are based on assumptions that are not worst case.	
5.20	**REP2-073, para 119-120 REP4-020, ref 9.14** The applicant's response includes "Emissions from the Keadby plant and the Proposed Scheme should not be compared since different technology providers are used in each case." It remains unclear to Biofuelwatch why Drax is confident that its plant, using a different technology provider, will result in more carbon dioxide capture with just 6% of the amine emissions. The applicant has provided insufficient evidence to justify the carbon capture efficiency and amine emissions.	The Applicant's assessment is based on information provided by the technology provider and will be subject to permit conditions that will require the plant to meet their proposed emission limits.
5.21	**REP2-073, para 121-123 REP4-020, ref 9.14**	The volume flow rates and exhaust gas temperatures will be included with the returns made to the Environment

[2] https://ukwin.org.uk/library/127-AnnualPerformanceReport-2021.xlsm

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant has responded "The exhaust conditions, including temperature and flow, reflect the expected conditions based on the actual biomass combustion flue gas conditions and changes to the gas stream for capture units the associated with the operation of the technology. Emission monitoring including peripherals such as velocity and flow are regulated under the permit." Emission monitoring of emissions temperature and flow velocity is not the same as emissions regulation. Biofuelwatch's request to the ExA with questions for the Environment Agency remain for the reasons given in paragraph 123 of our submission.	Agency under the permitting regime and will be considered within the regulation of the plant.
5.22	**REP2-073, para 124-130, para 200-204 REP4-020, ref 9.15** The applicant has responded "Biofuelwatch suggest that the Environment Agency derived EALs are inadequate. ate for nitrosamines" but the summary provided by the applicant of the process undertaken by the EA does not address Biofuelwatch's concerns. The concern that the Environment Agency's EALs may not prevent harm to health is raised in the context of the proposal under consideration which assesses nitrosamine impacts (including the health impact) by comparison of modelling predictions with the EALs. The ExA should not be	In response, the Applicant defers to the work undertaken by EA in deriving EALs that are designed to be protective of human health and the acceptance of both the EA's EALs and the Applicant's approach to the assessment by UKHSA. The EA and UKHSA are the pre-eminent bodies in the UK for assessing the environmental and human health impacts of industrial processes. Furthermore, the Applicant reiterates that for reasons set out in the ES (paras 6.5.56 – 6.5.60, APP-042) and Air Quality Technical Note 2 (REP2-065), the assessment is conservative and robust.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	surprised by the possibility that the defined EAL may not prevent harm to health; the government recognises other existing EALs are inadequate to prevent a significant health burden (see paragraph 47 of Biofuelwatch's deadline 2 submission [REP2-073]) and there is very little information on which to set an EAL. Biofuelwatch requests that the ExA considers the risk that the EALs are not adequate to protect human health because insufficient health-related data is available. The applicant's response said "UKHSA is satisfied that the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative and in-line with the current knowledge base relating to nitrosamines and nitramines". Biofuelwatch notes that UKHSA view [REP2-097] was based on the applicant's statement that "the assessment is based on worst case, conservative, assumptions" [AS-038] but, as Biofuelwatch has pointed out, the modelling predictions are neither worst case nor conservative. Biofuelwatch is concerned that the UKHSA's satisfaction was based on an incorrect understanding of the applicant's assessment. The wording of UKHSA's response is also of concern. The UKHSA may be satisfied that the risk assessment of the amine emissions themselves may be appropriate but that does not necessarily mean that the UKHSA is satisfied	

Response Ref.	Comment (including location in original submission)	Applicant's Response
	that the risk assessment of nitrosamines and nitramines is appropriately conservative. Biofuelwatch request the ExA to ask UKHSA why it considers the applicant's assessment to be appropriately conservative when: a. the applicant's modelling predictions are not worst case b. cumulative uncertainties have not been quantified c. N-nitrosamines and N-nitramines can accumulate in the environment, d. there is considerable uncertainty regarding the atmospheric chemistry e. there is considerable uncertainty regarding interactions with other pollutants f. there is considerable uncertainty regarding toxicity g. little or no consideration appears to have been given to the potential for other health impacts such as endocrine disruption and the potential worsening of diabetes (Tong, M., Longato, L. & de la Monte, S.M. Early limited nitrosamine exposures exacerbate high fat diet-mediated type 2 diabetes and neurodegeneration. BMC Endocr Disord 10, 4 (2010). https://doi.org/10.1186/1472-6823-10-4), and when the applicant's consideration of health impacts in [AS-038]	

Response Ref.	Comment (including location in original submission)	Applicant's Response
	on which UKHSA satisfaction appears to be based does not consider non-cancer health impacts, and h. when the novel solvents proposed by the applicant remain unpublished and with potentially even higher levels of toxicity, chemistry, accumulation and interaction uncertainties. Biofuelwatch request the ExA to ask the UKHSA why it is confident in the likely EA approach of reliance on unvalidated chemical transformation dispersion modelling predictions with unquantified uncertainties to ensure compliance against an environmental threshold which has considerable uncertainty and was set after relaxing lifetime risk by an order of magnitude.	
5.23	**REP2-073, para 124-133 REP4-020, ref 9.15** The applicant said "The Applicant has shared details of the Technology Supplier's derivation of process-specific EALs with Environment Agency for review. The methodology follows the Environment Agency's methodology and has made the EALs more stringent for amines. The revised EALs have been applied conservatively." The applicant's assessment of impacts, and therefore the application being assessed by the ExA, depends on these EALs. For the public consultation to be meaningful, the information and evidence behind these	The Applicant reiterates that appropriate details of the technology specific compounds and EAL derivation have been shared with the EA.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	EALs must be released by the applicant so it is available for public scrutiny and comment before the ExA makes its decision. Biofuelwatch requests that the ExA requires the applicant to release this information and provides sufficient time for comment.	
5.24	**REP2-073, para 139-144 REP4-020, ref 9.16** The applicant said "Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency. The carbon capture plant has been designed to align with the Drax emissions profile." Biofuelwatch continues to consider the use of supplier-derived EALs for undisclosed chemicals to be unacceptable. Such crucial information must be disclosed so there is an opportunity to comment on the toxicity data used to inform the EALs. Without this it is impossible to properly comment on and assess the risks. The lack of full disclosure of these chemicals calls into question the legitimacy of the public consultation.	The Applicant notes that the technology specific information shared with EA will be considered during the permitting process.
5.25	**REP2-073, para 158 REP4-020, ref 9.16** The applicant's response says "Taking into account the low concentrations of the degradation products and potentially confounding impacts from other sources of nitrosamines, it is, in practical terms, impossible to	The Applicant fundamentally disagrees with the assertion that the testing of the CERC chemistry module against the data collated for ADA project is insufficient to demonstrate the robustness of the modelling. The testing work undertaken by CERC has demonstrated that the

Response Ref.	Comment (including location in original submission)	Applicant's Response
	validate the chemistry module in field trials." Biofuelwatch is glad to see the applicant confirm Biofuelwatch's concern that validation of the chemistry module has not been done and perhaps cannot be done. The applicant says "the model developer has undertaken extensive testing of the module using the data and conclusions of the Atmospheric Degradation of Amines (ADA) project (Nielson et al, Atmospheric Degradation of Amines. Summary Report: Photooxidation of Methylamine, Dimethylamine and Trimethylamine. Climit project no. 201604. Norwegian Institute for Air Research. January, 2011)." Such data obtained from a simulation chamber whilst primarily aiming to study photo-oxidation impacts, does not provide sufficient data to robustly validate the performance of the ADMS Chemistry in atmospheric conditions especially when the research reported "major uncertainties". The applicant's assessment is based on the use of modelling software that is unvalidated and potentially impossible to validate with field trials. It is similarly concerning that the applicant says "The compound specific reaction rates used in the Drax application of the CERC amine chemistry module were provided by the technology supplier" but have given no reviewed scientific research to support the technology supplier's figures. Not only are the predictions being made with unvalidated software (confirmed by the EA's Air Quality Modelling and Assessment Unit guidance	fundamental processes associated with amine degradation are appropriately represented. As noted in previous responses, the work undertaken by CERC, coupled with the conservative assessment methodology ensure that the assessment of impacts of nitrosamines is robust.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	"AQMAU recommendations for the assessment and regulation of impacts to air quality from amine-based post-combustion carbon capture plants" reference AQMAU-C2025-RP01), even if the software was validated the validation would not give assurance that the chemistry module is appropriate for modelling the breakdown of the particular amines proposed. The proposal has the potential for profound long-term impacts on health and the environment. Biofuelwatch considers the applicant's predictions are far from being adequately robust to support the proposed location of the plant near homes and important ecological sites.	
5.26	**REP2-073, para 164-166 REP4-020, ref 9.16** The applicant's response says "Biofuelwatch make reference to statements about the application of the ADMS chemistry module to MEA. As stated in the air quality assessment, the assessment of impacts is based on the technology specific compounds and not MEA. These comments are not, therefore, relevant." The comments from Biofuelwatch on MEA were made because the applicant commented that "a stable nitrosamine is not formed from MEA in the atmosphere" [APP-127]. Biofuelwatch does not understand why the applicant includes comments on MEA and the breakdown	The Applicant disagrees with Biofuelwatch. The application of the ADMS chemistry module to MEA is not relevant to the assessment of impacts from the Proposed Scheme since the process does not use MEA. The Applicant used data available for MEA to inform the sensitivity testing of the chemistry module and to quantify the sensitivity of the modelled impacts to variations in reaction rates that reflected the uncertainty in reaction rates for widely studied amines. The impacts of the Proposed Scheme were not, however, based on MEA and detailed consideration of MEA chemistry is, therefore, not relevant.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	of MEA in its application if, in fact, the applicant considers MEA to be irrelevant. Biofuelwatch requests the application documents be updated so they properly reflect and disclose the chemicals that the applicant intends to use. A consultation providing information on solvents that the applicant does not intend to use, whilst also refusing to disclose the solvents that the applicant does intend to use, is not a meaningful consultation. Biofuelwatch also notes that the applicant has said that the ADMS chemistry module was based on results from the Nielson et al study (applicant's response 9.11 (85 – 106)) which considered the photooxidation of Methylamine (MEA), Dimethylamine and Trimethylamine. Even though the ADMS chemistry module was based on the chemistry of MEA, the ADMS chemistry module does not model the degradation of MEA to nitrosamines which is known to occur. With such significant concerns over the modelling of the simplest of amines remaining unanswered (with the ADMS chemistry module not including all reactions that are known to lead to nitrosamines), any predictions made using the ADMS chemistry module for the modelling of different amines should be considered subject to very great and unknown levels of uncertainty. With the potential impacts so great, an assessment made based on such a	In response to the point raised in relation to the degradation of MEA to nitrosamines, the Applicant notes that the reaction rates provided by the technology supplier allow for the formation of stable nitrosamines from both primary and secondary amines.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	tool cannot, with the current level of development and validation, be considered sufficiently robust.	
5.27	**REP2-073, para 167 – 168 REP4-020, ref 9.16** The applicant has said "the ozone concentrations used in the ADMS chemistry module have been taken from hourly sequential data from the Hull Freetown AURN station and have been applied on a year specific basis". Biofuelwatch does not understand why the applicant has applied ozone concentrations on an annual basis when the ADMS Chemistry Module user guide says "It is strongly recommended to use hourly varying background values". Biofuelwatch asks the ExA to consider the potential impact on modelling predictions of the unvalidated ADMS Chemistry Module that has not been used as recommended by the provider and developer.	Biofuelwatch has misinterpreted the Applicant's statement. Ozone (and nitrogen oxides) background concentrations have indeed been applied as hourly varying background values. The correct interpretation of the statement is that for each year of meteorological data modelled (2016 to 2020), the applicant has used the corresponding hourly background values from Hull Freetown i.e. 2016 meteorological data has been matched with 2016 ozone and NOx concentrations, 2017 met data matched with 2017 ozone concentrations etc.
5.28	**REP2-073, para 167 – 168 REP4-020, ref 9.16** The applicant has said "The compound specific reaction rates used in the Drax application of the CERC amine chemistry module were provided by the technology supplier." The applicant has provided no details of how the applicant determined the reaction rates. There is no indication that the reaction rate determination was independently peer-reviewed.	The Applicant notes that the technology specific details have been shared with the EA.
5.29	**REP2-073, para 178 – 179 REP4-020, ref 9.16**	Please refer to Response Ref 5.22.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant has responded to concerns about nitrosamine uncertainties with "Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency." This is not an adequate response to the concerns raised which impact the ExA's assessment, not just the Environment Agency's regulation of the plant. An appropriate land-use assessment requires an understanding of the residual risks and, without much more information from the applicant, there are huge uncertainties with correspondingly high levels of risk. The plant's location, near residential areas and important ecological sites, is not appropriate for a proposal with such high levels of prediction uncertainties and risk. Biofuelwatch therefore requests the ExA ask the applicant to respond in detail to the concerns raised. The applicant has also said "UKHSA is satisfied that the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative and in-line with the current knowledge base relating to nitrosamines and nitramines." The applicant puts considerable weight on this response from UKHSA, mentioning it four times in their response to Biofuelwatch's representation. Such a brief, one sentence response does not address Biofuelwatch's detailed concerns about the adequacy of the applicant's risk assessment. Further comments on UKHSA's satisfaction	

Response Ref.	Comment (including location in original submission)	Applicant's Response
	are considered in this document with reference to 9.15 (124 – 139) of [REP4-020]	
5.30	**REP2-073, para 191 – 195 REP4-020, ref 9.19** The applicant responded "In the first instance, it is reiterated that the DCO application relates to the installation of a carbon capture plant and not to the use of biomass as a fuel. The Applicant has a permit to operate biomass units and this permit does not require continuous monitoring of Dioxin emissions and this has never been raised as a concern by Environment Agency." Dioxin emissions are likely to occur from the existing plant. The proposal can be expected to prolong the burning of biomass at Drax. Since dioxins are persistent in the environment, prolonging biomass burning can be expected to result in higher environmental levels of dioxins in soils, animals and humans around the plant. The applicant has also not shown that the proposed changes cannot result in increased dioxin formation to levels that are a risk to human health. The applicant also said "Notwithstanding this, the reference identified by Biofuelwatch (Zhang et al, Emission characteristics of polychlorinated dibenzo-p-dioxins and dibenzofurans from industrial combustion of biomass fuels, 2022.) relates to the combustion of biomass in industrial boilers used for heat production	The Applicant reiterates that the assessment of the existing process for dioxin emissions is un-necessary. Biofuelwatch continue to conflate theoretical risks with actual risks. The ES provides an assessment of the worst likely effects from the Proposed Scheme. It does not and should not consider theoretical and unrealistic risks.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	in China. It is not relevant to the combustion of biomass in large combustion plant subject to regulation under the Industrial Emissions Directive, including stringent controls on emissions of particulate matter." The paper by Zhang et al. is sufficient to show biomass combustion can produce dioxins. Simple internet searches show other peer-reviewed papers to be in agreement that combustion of biomass produces dioxin. The applicant points out that the plant is regulated under the Industrial Emissions Directive including stringent controls on emissions of particulate matter. Control of particulates is not, however, control of dioxins with dioxins of concern from plants that have particulate abatement. The EA does not require monitoring of dioxins from the Drax plant but that does not mean dioxin emissions from Drax are within safe levels - only that they remain unmonitored and unregulated. Unfortunately, there are many examples of inadequate EA regulation and investigation. The widely reported failure by the EA to adequately regulate sewage in UK rivers is an example of inadequate regulation. Many would consider the EA's finding of "puzzling" and elevated levels of dioxins found near UK incinerators in 2007 (EA 2007 UK Soil and Herbage Pollutant Survey UKSHS Report No. 10) but failing to investigate further (https://www.whatdotheyknow.com/request/uk_soil_and_h	

Response Ref.	Comment (including location in original submission)	Applicant's Response
	erbage_pollutant_su?nocache=incoming-1989594#incoming-1989594) to be another example of inadequate regulation. The ExA should also consider that regulation under the Industrial Emission Directive appears insufficient to prevent dioxin contamination. For example, levels of dioxins near regulated plants in Paris have been found to be nearly 50 times regulatory limits with health authorities there advising residents not to consume eggs from locally reared hens[3]. Biofuelwatch therefore continues to request that the Examining Authority requires: a. an assessment of the risks to human health from dioxins (and dioxin-like compounds), and b. continuous measurement and control of dioxin emissions to ensure the limits assumed by the assessment are not exceeded.	
5.31	**REP2-073, para 196 – 199 REP4-020, ref 9.20** The applicant's response refers to the requirement for "a leak detection and repair programme that is appropriate to the solvent composition" and a "hazard assessment and	The query raised refers to potential fugitive emissions of CO2. The CO2 captured would be compressed prior to entering the transport and storage system.

[3] Press release on 19 April by Agence Régionale de Santé Ile de France, https://www.iledefrance.ars.sante.fr/polluants-organiques-persistants-lagence-recommande-titre-conservatoire-de-ne-pas-consommer-les

Response Ref.	Comment (including location in original submission)	Applicant's Response
	mitigation for the plant must consider the risks of accidental releases to environment." The applicant has not addressed the concern that there is no quantification of the potential environmental concentrations that may arise from fugitive emissions nor any assessment of the potential significant impact that any fugitive emissions of CO2 may have on the efficiency of the plant.	Monitoring systems will measure and record the volumes and pressures of CO2 exiting and entering the various systems. A change in these volumes and pressures due to a leak would be identified and detected. In the event of a leak being detected the CCS plant would be shut down and CO2 dispersed through the main vent stack (Work No.s 1E (III) AND 1E (IV)). Drax are currently in the process of using a staged process for the addition of the carbon capture activity to the current environmental permit. As part of this process Drax have provided information detailing the approach to managing unplanned emissions as required by section 3.5 of the Post-Combustion Carbon Capture BAT guidance. In the event of a fugitive emission incident, the Applicant will be obliged to provide an estimate of the emissions, based on the monitoring data. These operations will be managed through the environmental permit which is regulated by the Environment Agency.
5.32	**REP2-073, para 205-208 REP4-020, ref 9.22** The applicant's reply considers that "The detailed air quality assessment submitted in support of the DCO application demonstrates that no significant air pollution will arise as a result of the Proposed Scheme" but the	The Applicant reiterates that the regulation of the process is a matter for the EA and not the DCO. The EA's derivation of EALs has been subject to consultation and their subsequent publication demonstrates that they are considered appropriate for

Response Ref.	Comment (including location in original submission)	Applicant's Response
	applicant's reply has not addressed the detailed concerns outlined in paragraphs 205-208 that show the risk of significant pollution. Furthermore, the permitting process assesses impacts using EALs that are known to be inadequate for the protection of human health. The use of inadequate EALs that do not prevent harm to human health is not sufficient to prevent significant pollution. The applicant said that "the parallel permitting process will ensure that the plant will operate within the parameters assessed within the DCO ES". Unfortunately, the permitting process does not ensure the plant will operate within the parameters assessed within the DCO ES. An example of this is the plant's emissions which may exceed the emissions modelled because of measurement uncertainties (paragraphs 116-118 of Biofuelwatch's deadline 2 submission [REP2-073]). Another example is the use of parameters used for the modelling, such as surface roughness, which are not worst case and not measured by the EA. The permitting process does not require the plant to be operated with a particular surface roughness nor is it clear how it could do so, making it essential that a precautionary worst-case surface roughness (and other modelling parameters) should be used. Yet another example is the temperature of the emissions which, whilst monitored, are not typically controlled by EA permits (paragraph 101 of Biofuelwatch's	use in the assessment of environmental impacts. The technology suppliers have undertaken further work using the EA methodology to derive compound specific EALs. Moreover, the compound specific EALs have been applied conservatively to the sum of both primary and secondary amines i.e. the assessment is based on the lowest EAL derived by the technology supplier, applied to amines as a group of compounds rather than on a compound specific basis. The assessment of impacts presented in the ES is both robust and conservative. In this regard, the Applicant notes paragraph 4.11.16 of the draft revised NPS EN-1, which states that: "*The Secretary of State should not refuse consent on the basis of pollution impacts unless there is good reason to believe that any relevant necessary operational pollution control permits or licences or other consents will not subsequently be granted. On this basis, it is reasonable for the Secretary of State to consider residual amenity issues only when considering whether the development itself is an acceptable use of the land or sea, and on the impacts of that use*".

Response Ref.	Comment (including location in original submission)	Applicant's Response
	deadline 2 submission [REP2-073]). It is therefore not the case that the permitting process ensures that the plant will be operated within the parameters assessed within the DCO ES. It is therefore necessary for the ExA to satisfy itself that each of the parameters used by the applicant in the DCO ES (including the parameters that underpin the modelling) will be controlled (not just measured) so as to ensure modelling predictions cannot be exceeded. Even if the EA regulates such parameters, the ExA should consider that the EA often relaxes regulatory permit requirements without consideration of land use impacts. There are many examples of the EA allowing, for example, permit variations for increased combustion feedstock - increases that inevitably also increase emissions. If minded to permit the proposal, the ExA needs to be confident that the pollution considered in its land-use assessment will not be exceeded and therefore needs to obtain assurances from the EA on each parameter on which the ExA's assessment depends. Alternatively, the ExA needs to apply conditions to the proposal to ensure the pollution levels assumed in its land use assessment will not be exceeded.	
5.33	**REP2-073, para 211 REP4-020, ref 9.22** The applicant's response agrees that "it is doubtful that it would be practical to install equipment to measure nitrosamine concentrations at a large number of	The key for the assessment is the impact of the Proposed Scheme. As noted above, the screening of amine impacts as insignificant is independent of the

Response Ref.	Comment (including location in original submission)	Applicant's Response
	locations". With so much uncertainty regarding predicted environmental levels and with measurement of pollution concentrations subject to so much uncertainty, the applicant's response confirms Biofuelwatch's concern that it will be difficult, perhaps impossible, to assess the health impact of the proposal. The location is inappropriate for a proposal whose impact is subject to such considerable uncertainties and when it is unlikely to be practical to measure environmental levels to detect environmental levels likely to cause unacceptable health impacts.	background concentrations and the assessment of nitrosamines is based on an acceptable incremental risk. The Applicant disagrees that the location is inappropriate for the Proposed Scheme. The physical measurement of impacts is not an absolute requirement for the acceptability of the process. This applies equally to the assessment of impacts on ecological receptors – the impacts of the process change on nitrogen deposition could not be measured in the field. The important facts are that the Applicant has used best practice techniques with conservative but realistic input data to assess the potential environmental impacts of the Proposed Scheme. Their approach is robust. The approach also reflects *"the latest research in areas such as amine degradation where understanding is still developing"* as is required by paragraph 4.8.19 of the draft revised NPS.
5.34	**REP2-073, para 212 REP4-020, ref 9.23** The applicant's response says they could not obtain a copy of the referenced paper but the findings of Karl et al. should not be dismissed just because the applicant could not obtain the paper. The applicant has instead used the critical loads in the Matthias et al. task paper - critical loads which are based on an unlikely "homogeneous distribution over a length of 10m (depth of soil)" (quote	The screening assessment presented by the Applicant provides sufficient confidence that uncertainties around the details of the critical load derivation will have no significant impact on its conclusions. That is the purpose of a screening exercise. The Applicant has used all available data in their assessment of impacts. It must be borne in mind that using the current best practice approach to modelling the

Response Ref.	Comment (including location in original submission)	Applicant's Response
	from Matthias et al.). A critical load derived from such large soil depths is not precautionary and amines are unlikely to be distributed homogeneously as assumed. SEPA's August 2015 paper "Review of amine emissions from carbon capture systems" recognises the impact of amines on ecosystems that are "already under pressure from acid and nutrient nitrogen (N) deposition and above or close to their critical load" (which is the case for many protected ecological environments around Drax). SEPA recognises "amines may also cause corrosive damage themselves" and that "more research is required into the multiple and complex effects of amines and their reaction products on the environment".	deposition of amines illustrates that they make an insignificant contribution to the overall impact on acid and nutrient nitrogen of the Proposed Scheme, and is based on the latest research. It is not credible that the uncertainty in the model parameters for the deposition would amount to the over an order of magnitude increase in the impacts that would be needed to affect even the numerical presentation of the impacts let alone make a significant change to the assessment of the significance of effects. Again, Biofuelwatch are mixing theoretical risks with actual risks.
5.35	**REP2-073, para 215-216 REP4-020, ref 9.23** The applicant's response says "No impacts are predicted to European Sites or other important ecological features outside the UK and the Applicant therefore considers no international consultation is required" but since the applicant has not modelled or assessed the impact at sites outside the UK it is not surprising that the applicant considers that no impacts are predicted. The applicant's response also says "In relation to paragraphs 215 to 216, impacts are predicted at an 'international geographical scale' in terms of the importance of the ecological features being assessed" but, with the hundreds of kms that amine breakdown products can travel (see paragraph 70)	As set out in the HRA Report (REP6-021), the Proposed Scheme would not lead to significant adverse effects on European Sites and their qualifying interests, including SPA/Ramsar bird species. This has now been agreed with Natural England, as set out in the Statement of Common Ground between Natural England and Drax Power Limited (REP5-017). In relation to Biofuelwatch's point about amines and dispersion beyond the 15 km Study Area around the Main Stack, please see our response at REP2-073, para 57, REP4-020, ref 9.8. In summary, concentrations of amines (and their breakdown products) arising from the Proposed Scheme contribute a very small fraction (<3%)

Response Ref.	Comment (including location in original submission)	Applicant's Response
	impacts on an international geographical scale should only be ruled out after proper assessment. Furthermore, impacts on migratory birds are also impacts of international importance because the birds migrate internationally.	of nitrogen deposition arising from the power station with the Proposed Scheme, and the degradation products contribute less than 0.1% of the nitrogen deposition. As noted in our response, the point of maximum impact of the degradation products is captured by the study area and will continue to decrease outside of this area. Beyond UK borders, therefore, their impact would be imperceptibly low and incapable of contributing to significant effects in-combination with other plans and projects. As set out in the HRA Report (REP6-021) and Chapter 8 (Ecology) of the ES (APP-044), significant adverse effects on migratory bird species associated with designated sites are not predicted.
5.36	**REP2-073, para 218-224 REP4-020, ref 9.24** The applicant's response says "Emissions from the site are monitored and will have to comply with limits set by the Environment Agency assuming that the Environment Agency agrees that there is a realistic possibility of emission and at a level which will require monitoring and reporting. Concentrations of amines entering aquatic habitats are believed to be below levels which represent any risk to aquatic ecosystems, however, again emissions will be monitored where required and reported through the Environmental Permit." There has been extensive press coverage that Environment Agency regulation gives	In relation to Biofuelwatch's points around deposition of amines and nitrosamines, the Applicant refers the ExA to our response in row 9.24 of Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020). The points around deposition impacts are also addressed in Response Ref 5.10 above.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	inadequate protection to aquatic habitats. Harm to aquatic environments has been widely reported as occurring throughout the UK with no river being considered good in overall health. The Wildlife and Countryside Link warns that the water quality of rivers in England is the worst in Europe. It is clear that the EA regulation alone provides inadequate protection of aquatic environments making it important that the ExA gives full consideration to potential impacts on the aquatic environment from the proposal. If EA regulation could protect aquatic environments, it can be assumed that the EA would have acted to prevent the harm that is clearly occurring across the UK. The applicant's response also says "the risk of deposition impacts is low, due to the inherently low amine and nitrosamine emissions, and their efficient dispersion resulting from the stack height, exit velocity and plume temperature. This is however a matter that will be dealt with in the Environmental Permit that will set parameters for emissions from the operational phase of the Proposed Scheme." Deposition impacts are an important matter for the ExA because of the predicted critical load/level exceedances at protected sites. Such impacts are relevant to the consideration of whether the site is an appropriate location for the proposal. Setting of parameters for emissions will not address the concerns over modelling of deposition impacts, uncertainties of deposition impacts and the harmful impacts of such depositions.	

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.37	**REP2-073, para 225 REP4-020, ref 9.25** The applicant's response draws attention to updated modelling predictions. Whilst the predicted ammonia level at Thorne Moor has been reduced, the applicant is still predicting resulting environmental concentrations in excess of twice the critical level and the applicant's assessment of ammonia levels do not consider important sources of uncertainty such as the uncertainties inherent in the modelling software system. The applicant's modelling predictions still show an exceedance of the nitrogen deposition and acid deposition critical loads at Thorne Moor and a significant exceedance of the maximum cumulative acid deposition impact for Lower Derwent Valley SAC and Ramsar site. The applicant considers that "a number of elements of conservatism have been embedded into the dispersion modelling, which demonstrate the precautionary and conservative approach that has been taken during modelling and assessment of operational air quality effects" but, as pointed out in Biofuelwatch's submission, not all aspects are precautionary, uncertainties have not been quantified (and remain unquantified) and so there can be no assurance that actual environmental concentration will not be significantly worse than the modelling predictions.	As set out in the HRA Report (REP6-021), no adverse effects on the integrity of any European Site are predicted, including in relation air quality impacts. For ammonia (NH3) and nitrogen deposition, impacts of the Proposed Scheme are below the significance screening threshold of 1% of critical level. This is the case for the Proposed Scheme alone (see paragraph 3.5.48 of the HRA Report (REP6-021)) and the proposed Scheme in-combination with other plans and projects (see Table 3.14 of the HRA Report (REP6-021)). With application of operational emissions abatement, impacts from the Proposed Scheme alone are below the significance screening threshold of 1% of critical load for acid deposition. Impacts are therefore classed as insignificant. After the application of operational emissions abatement, the Proposed Scheme and other plans and projects would lead to a worst-case in-combination impact of up to 1.5% of critical load for nitrogen deposition and 1.3% of critical load for acid deposition for Thorne Moor. As Biofuelwatch correctly infer, these figures exceed the 1% significance screening threshold. They therefore cannot be discounted on purely numerical grounds. The Applicant has assessed these impacts between paragraphs 4.3.71 and 4.3.85 of the HRA Report (REP6-021). The Applicant has concluded there would be no

Response Ref.	Comment (including location in original submission)	Applicant's Response
	By definition of critical loads and critical levels, increases above critical loads and critical levels can be expected to cause ecological harm. Even based on the applicant's predictions, which are not worst case predictions, ecological harm is to be expected. **REP2-073, para 225 REP4-020, ref 9.25** The applicant's response says "a number of elements of conservatism have been embedded into the dispersion modelling" but the applicant has provided no quantified data to demonstrate that conservative elements outweigh elements that are not conservative and precautionary. The result is a modelling prediction that is an unknown point on the risk profile. Biofuelwatch considers such an assessment is not sufficiently robust.	adverse effect on the integrity of Thorne Moor SAC following this analysis. This has been agreed with Natural England, as set out in the Statement of Common Ground between Natural England and Drax Power Ltd (REP5-017). In their Representation (REP6-034) Biofuelwatch state that 'The applicant's modelling predictions still show … a significant exceedance of the maximum cumulative acid deposition impact for Lower Derwent Valley SAC and Ramsar site'. As set out in Appendix 8 of the HRA Report (Lower Derwent Valley Habitats and Soil Analysis, (REP3-009)), the acid deposition critical load class for Lower Derwent Valley has been changed from the 'acid grassland' to the 'calcareous grassland' critical load class. This is a matter of agreement with Natural England as set out in Row 19 of Table 1a of their Deadline 4 Relevant representation (REP4-041). With the change to the acid deposition critical load class, the Proposed Scheme, both alone and in-combination with other plans and projects, contributes less than 1% of the revised critical load and therefore do not exceed the 1% screening criteria and can be ruled out of causing a significant adverse effect on numerical grounds alone. The full assessment is provided between paragraphs 3.5.58 to 3.5.60 and Table 3.14 of the HRA Report

Response Ref.	Comment (including location in original submission)	Applicant's Response
		(REP6-021) and is a matter of agreement with Natural England as set out in the Statement of Common Ground between Natural England and Drax Power Limited (REP5-017). The statement that there is 'a significant exceedance of the maximum cumulative acid deposition impact for Lower Derwent Valley SAC and Ramsar site', is therefore incorrect. The Applicant would reiterate that a conservative assessment of the potential air quality impacts has been undertaken, to address the uncertainties associated with dispersion (air quality) modelling and the underpinning data sources. Please refer to rows 9.7, 9.9, 9.10, 9.12 – 9.16, and 9.23 – 9.27 of Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020).
5.38	**REP2-073, para 235 REP4-020, ref 9.26** The applicant has not answered the questions in paragraph 242 a-c. Instead the applicant has said "However, the assumption that the dry deposition behaviour of amines and nitrosamines is akin to ammonia is appropriate since the high solubility of these pollutants directly affects its uptake by plants even when deposited by 'dry deposition'." The applicant may consider the value "appropriate" but that does not make it precautionary or worst case. As identified in Biofuelwatch's submission, the	The Applicant has applied the deposition velocity provided by AQTAG06 for ammonia to the deposition of all amines and degradation products. They are water soluble but are also chemically similar to ammonia. To simply state that HCl is also readily soluble and then compare the deposition velocities of HCl to that of ammonia neglects the fact that HCl and ammonia / amines are wholly unrelated compounds, in particular HCl is acidic and ammonia/amines are basic compounds.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	depositions used by Karl are little more than an educated guess. The applicant has used an argument based on water solubility to support the deposition velocity used, but HCl is also readily soluble and [APP-127] shows the applicant has used a dry deposition velocity for HCl in long vegetation that is twice the value the applicant has used for amines. As stated in Biofuelwatch's submission, the considerable uncertainty regarding deposition is widely recognised. Biofuelwatch considers that insufficient evidence has been provided to demonstrate that the deposition velocities used are sufficiently precautionary. In response to 242 d for nitrosamines, the applicant has said "uncertainties in the deposition velocity will not impact on this conclusion" but the context in the applicant's response suggests this comment relates only to nitrosamines. The applicant has provided no evidence that uncertainties in nitrogen deposition, acid deposition and amine distribution will be unaffected by the considerable deposition uncertainties (up to a factor of ten based on the referenced EA science report).	Furthermore, the contribution of amines and nitrosamines to nitrogen deposition is, as noted in Response Ref 5.35 above, very small (<3% of deposition from the process). As such, based on current knowledge, there is no credible route by which uncertainties in the amine/nitrosamine deposition velocity would lead to significant increases in N- or acid deposition over those presented within the ES.
5.39	**REP2-073, para 243-244 REP4-020, ref 9.27** Biofuelwatch appreciate the confirmation that "the potential contribution of amines, nitramines, and nitrosamines to Proposed Scheme nitrogen deposition has been included within the dispersion (air quality) modelling reported in the ES Air Quality chapter (APP-042) and all	The Applicant confirms that amines and degradation products are included in the mitigation scenarios and cumulative scenarios. The deposition velocities used for all compounds follow best practice as set out in AQTAG 06.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	subsequent iterations of the dispersion modelling". Can the applicant also confirm that the potential contribution of amines, nitramines and nitrosamines has been included in the mitigation model scenarios and the cumulative impact scenarios too? The applicant's response claims to respond to paragraph 244, but the applicant has made no comment on "If precautionary deposition velocities were to be used for nitrogen (including amines, nitrosamines and nitramines), there is the likelihood that the predictions would show nitrogen deposition poses an unacceptable risk to other ecological sites too."	For amines/nitrosamines, it is considered appropriate to model deposition using the velocity for ammonia given the similarity in properties between amines and ammonia. To suggest that the deposition velocity for amines should be based on that for HCl, a wholly unrelated compound, is lacking in scientific rationale.
5.40	**REP2-073, para 246-247 REP4-020, ref 9.28** The applicant's response refers to REP2-107 and REP3-009 but REP2-107 does not consider acid impacts and REP3-009 is focussed on determining applicable critical loads. The concern remains that the significant critical load exceedance means acidic pollution is likely to cause significant ecological harm.	The Applicant refers the ExA to our response at Row 9.28 in Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020) and stands by that assessment.
5.41	**REP2-073, para 248 a REP4-020, ref 9.29** The applicant's response acknowledges the river level fluctuations. The response repeats the applicant's view that "the high acid neutralising capacity of the river means the minor in-combination acid deposition that would occur would not trigger Likely Significant Effects (LSE) to the	The HRA Report (REP6-021) and in particular Appendix 7 (REP2-107) and Appendix 8 (REP3-009) set out that the River Derwent SAC and Lower Derwent Valley SAC and Ramsar and their qualifying interests would not be subject to significant negative effects from the air quality impacts of the Proposed Scheme. In addition, as set out

Response Ref.	Comment (including location in original submission)	Applicant's Response
	riverine habitats present, regardless of the proportion of riverine vegetation that is above or below the surface of the water at any given time" but the response provided no evidence that lichens, bryophytes, plants, invertebrates, amphibians and floating vegetation (identified as a feature) will not be adversely affected. All of these are potentially vulnerable to acidic air pollutants directly rather than through river water or soils. The applicant's response recognises the presence of alluvial woodland but not other alluvial vegetation (which is a protected feature and may be exposed more at times of low water level) and not the lichens and bryophytes that are part of the overall alluvial woodland habitat and have the potential for being impacted by acidic pollution.	in the HRA Report (REP6-021), there have been significant reductions in UK-wide and local sulphur dioxide (SO_2) concentrations in recent decades, and a corresponding significant reduction in acid deposition. It is a matter of agreement with Natural England that the Proposed Scheme, including in-combination with other plans and projects, would not trigger likely significant effects on the River Derwent SAC or SSSI, or Lower Derwent Valley SAC and Ramsar and it's underpinning SSSI, as set out in The Statement of Common Ground between Natural England and Drax Power Ltd (REP5-017) The Applicant would highlight that amphibians are not a qualifying interest of any of the River Derwent or Lower Derwent Valley designations. The Applicant also refers the ExA to our previous response in Row 9.29 of Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020) including in relation to lichens and bryophytes.
5.42	**REP2-073, para 248 b REP4-020, ref 9.29** The Applicant's response says the woodland in proximity to the River Derwent SAC and SSSI is primarily 'alluvial woodland'. Whilst the SAC citation refers to alluvial forests as a designated feature, this does not mean that riverine woodland is not also present nor that it is not of significant	The Applicant would highlight that 'alluvial woodland' and 'riverine woodland' are essentially the same thing. 'Riverine woodland' has therefore been considered in the assessment of the Lower Derwent Valley SAC and underpinning SSSI.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	importance to the river's ecology. Aerial images show there to be riverine woodland. It is highly likely that riverine woodland is vital to the ecosystem including important habitat for species such as otters. The impact on riverine woodland, and any other species it supports, including lichens and bryophytes, should be assessed. The applicant's response considers the applicant's revised ammonia predictions and reports these as under the screening threshold for Lower Derwent Valley but these predictions do not take significant uncertainties into account, such as the uncertainties inherent in the modelling software system and measurement uncertainties. These cumulative uncertainties must be quantified in order to ensure the ammonia screening threshold is unlikely to be exceeded at Lower Derwent Valley and other important ecological sites.	Otters are a qualifying interest of both the River Derwent SAC and Lower Derwent Valley SAC. They have been assessed as a receptor in the Ecology Chapter of the ES (APP-044) and in the HRA Report (REP6-021) in the context of being a qualifying interest of the referred to European Sites. The Applicant also refers the ExA to our previous response in Row 9.29 of Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020) including in relation to lichens and bryophytes.
5.43	**REP2-073, para 248 c REP4-020, ref 9.29** The applicant's response does not show beyond doubt that acidic air pollutants will not cause harm to habitats and protected species.	The Applicant disagrees with Biofuelwatch and considers the assessment work completed to date shows this. The Applicant also refers the ExA to our previous response in Row 9.29 of Table 9.1 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020). The Applicant stands by the response contained therein.
5.44	The applicant's response points out that the nitrogen levels considered by the referenced study are large compared to the predicted increased nitrogen from the	The Applicant refers the ExA to our previous response in Row 9.30 of Table 9.1 of The Applicant's Responses to

Response Ref.	Comment (including location in original submission)	Applicant's Response
	proposal. The reference **REP2-073, para 260-261 REP4-020, ref 9.30** was included to show that the species is sensitive to nitrogen. Just because the study considered larger nitrogen levels does not mean that smaller increases in nitrogen will not harm the rare orchids that are present. The applicant considers that "there is no prospect of operational nitrogen deposition impacts, including cumulatively with other plans and projects, detrimentally affecting the green-winged orchid population" but has not shown that the expected nitrogen increases will not harm this rare orchid perhaps as a result of other species out-competing this rare orchid for habitat. Biofuelwatch requests that the ExA require the applicant to provide supporting evidence for their claim that "there is no prospect of operational nitrogen deposition impact … affecting the green-winged orchid population".	Issues Raised at Deadline 2 (REP4-020). The Applicant stands by the response contained therein.
5.45	**REP2-073, para 262-264 REP4-020, ref 9.31** The applicant's response includes "A number of the bird species were recorded in areas that were relevant to the assessment of ecological effects when the Drax Jetty was part of the Proposed Scheme, but were not recorded in areas that are relevant to the assessment of effects of the Proposed Scheme following removal of the Drax Jetty. These include for example marsh harrier, which was only	In relation to part 'a' of Biofuelwatch's comment, marsh harriers are most closely associated with wetland habitats, for example reedbeds and marshes, although they may also use other habitats including farmland where these are close to wetland features. It is therefore unsurprising that when these were recorded during the Drax BECCS wintering bird surveys, they were recorded in proximity to the River Ouse and it's fringing vegetation.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	recorded adjacent to the River Ouse, in excess of 2 km from the Proposed Scheme current Order Limits." a. Strandberg et al. "Complex Timing of Marsh Harrier Circus aeruginosus Migration Due to Pre- and Post-Migratory Movements" found Migrating Marsh Harrier (Circus aeruginosus) make substantial post-migration movements (up to 632 km) after arriving at wintering grounds. Biofuelwatch asks the applicant why marsh harriers found nearby cannot be impacted by the proposal. b. Whilst "a number" of the bird species were recorded in areas relevant when the Drax Jetty was part of the scheme, others were not. Does the applicant accept that the proposal is likely to impact some of the protected and notable species identified in the applicant's ecology report? The applicant considers it wants to "correct the record" in relation to paragraph 264 saying "the paragraph being quoted refers to Nationally, not Internationally important sites". Biofuelwatch would point out that the listed sites include sites that also have SAC status and therefore are of international importance.	Whilst it is not impossible that marsh harriers could on occasion use habitats closer to the Proposed Scheme, the surveys completed for the Proposed Scheme (APP-138) and previously completed for the Drax Repower Project (APP-147 and APP-148) did not record any such activity. This is consistent with the habitats present being sub-optimal for marsh harrier and habitats along the River Ouse being of greater suitability. Locations where marsh harrier were recorded during the Drax BECCS wintering bird surveys are well beyond the distances at which they could potentially be disturbed by construction or operation activities, or otherwise be significantly impacted by the Proposed Scheme. In relation to part 'b' of Biofuelwatch's comment, the Applicant's assessment in relation to breeding and wintering birds is set out between paragraphs 8.9.65 and 8.9.70 of Chapter 8 (Ecology) of the environmental Statement. This sets out that prior to the application of targeted mitigation, effects are predicted to be significant at up to a District geographical scale. With the application of mitigation effects are predicted to remain significant at up to a District scale in the short term, due to the unavoidable impacts of construction (paragraph 8.11.7 of Chapter 8 of the ES). Effects during Operation

Response Ref.	Comment (including location in original submission)	Applicant's Response
		in the longer term are predicted to be beneficial at a Local scale (paragraph 8.11.19 of Chapter 8 of the ES). The Applicant therefore identified in the Application materials that there was potential for impacts on 'some of the protected and notable [bird] species identified…' and identified appropriate avoidance, reduction, and mitigation measures to address effects in the medium to long term. The Applicant's position in relation to paragraph 264 (which refers to paragraph 8.9.6 of Chapter 8 of the ES) remains unchanged. European Sites are considered to be receptors of International Importance whilst SSSI are considered to be receptors of National Importance, notwithstanding that in some instances boundaries overlap (all European Sites have underpinning SSSI designations). Paragraph 8.9.6 refers specifically to SSSI sites, with European Sites and their qualifying features and conservation objectives assessed elsewhere within the ES (and HRA Report (REP6-021)) to reflect the differing reasons for designation. In addition, Eskahorm Meadows SSSI and Burr Closes SSSI referred to in paragraph 8.9.6 of Chapter 8 of the ES are not part of any European Site.
5.46	**REP2-073, para 275-76, 394-397 REP4-020, ref 9.31**	To prevent leaks the from the areas which contain potentially contaminated surface water runoff, the

Response Ref.	Comment (including location in original submission)	Applicant's Response
	The applicant considers that a drainage strategy will be in place for the containment of leaks (e.g. 9.4 in response to paragraphs 394-397). The applicant has not responded to how daily checks will be done to detect potential pollutants that may be harmful to the environment in quantities that observation may be unable to detect. Drax's fire prevention plans have not prevented the significant fires that have occurred at Drax. Biofuelwatch is concerned that the applicant's drainage strategy will be similarly unable to protect the plant from leaks and accidents of the proposed chemicals - including chemicals with extremely high toxicity to aquatic systems. The widely reported pollution of rivers throughout the UK shows EA regulation to provide inadequate protection.	discharge valves would be kept closed until the water is tested and found not to contain any contaminants Section 6.4 of REP2-043. The twice daily checks detailed in Section 6.4 of REP2-043 would be visual inspections undertaken by the key operatives to ensure the integrity of the site, at least once during each of the two shifts. In addition to the visual inspections, the operatives will monitor the process equipment to ensure any issues that observation alone cannot detect through measures such as pressure monitors etc. The Drax Fire Prevention Plans in relation to the drainage strategy are detailed in paragraph 6.4.10 of the Drainage Strategy (REP2-043) which details that the pump which discharges water from the site to the River Ouse will be shut, preventing contaminants in the fire water from reaching the aquatic environment.
5.47	**REP2-073, para 284-286 REP4-020, ref 9.32** The applicant considers the need for a sett exclusion/disturbance licence to be an "unlikely event" but since monitoring of badgers has not been carried out to identify the status of badgers and setts prior to the application, the application lacks evidence to support the view that such a licence would be "unlikely". Biofuelwatch notes that the applicant has said " that no further badger	The Applicant's position remains as per row 9.32 of The Applicant's Responses to Issues Raised at Deadline 2 (REP4-020). The Applicant would highlight that the results of the badger surveys completed to inform the Application are contained in the confidential Appendix 8.5 (Badger Summary Report) (APP-140) of the ES and have therefore been made available to the ExA, Natural England, and the NYC Ecologist.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	surveys have been completed by the Applicant since the surveys that informed the Environmental Statement were completed and does not intend to complete further surveys at any point during Examination of the Proposed Scheme." (4.10 of [REP4-020]). Biofuelwatch considers such a survey should be done prior to the application being determined so the ExA can properly consider the impact of the proposal on badgers. Natural England receives a licence fee for the issue of licences for the closure of badger setts. An independent observer may consider the conflict of interest that arises from the receipt of fees for issuing such a licence compromises Natural England's independence on this matter. Badger setts may "regularly" be closed under such licences,as indicated in the applicant's response, but the regularity of an event is not a satisfactory justification for harm to a protected species. The applicant says "unnecessary closures of badger setts should always be avoided where practicable". Biofuelwatch agrees. Biofuelwatch considers the proposal to be unnecessary because there are better ways to decarbonise the electricity supply with less environmental impact, risk and cost. Biofuelwatch considers any risk of closure of badger setts to be unnecessary and avoidable. Biofuelwatch's request remains that the ExA asks Natural England why it might be "satisfied" that the destruction of	It is 'unlikely' that badgers will establish new setts in areas that may need to be cleared to facilitate construction of the Proposed Scheme, as previously stated. This is because the majority of habitats in these areas are less suitable for sett construction than the location where a sett has been recorded (as per APP-140). Badgers are common and widespread at a UK level and as such were not identified as an Important Ecological Feature in the Applicant's Ecology Chapter of the ES (APP-044). As previously highlighted in The Applicant's Responses to Issues Raised at Deadline 2 they also receive legal protection for reasons relating largely to animal welfare rather than nature conservation. As such, the well-managed closure of a badger sett anywhere in the UK would never have a 'National' level impact, as Biofuelwatch seem to be implying could be the case.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	badger setts would not adversely affect the nationally protected badger. Without further surveys there are no assurances that badgers will not be impacted.	
5.48	**REP2-073, para 387 REP4-020, ref 9.1** The applicant has responded that "a temporary / construction phase drainage system will be implemented (REAC [WE8] ([REP2-053], to be updated at deadline 3) this will prevent an increase in contaminants (particularly silt and gravel) being discharged to the Carr Dyke and River Ouse". This is welcome, but the response does not confirm a risk assessment will be included.	The Applicant has agreed a Watercourse Pollution Prevention Plan (WPPP) with the Environment Agency, this is WE14 in the REAC (REP6-015). This has been updated at Deadline 7 to increase the number of watercourses within the WPP (REP6-015, Rev10 being submitted at Deadline 7). The mitigation section of Chapter 12 (Water Environment) of the ES (APP-048) outlines the measures which would be in place to manage the risks. The relevant Guidance for Pollution Prevention is PPG 6, which is currently under review provides further details as to how the temporary drainage strategy will be developed.
5.49	**REP2-073, para 390 REP4-020, ref 9.2** Drax's response considers only the process wastewater treatment plant and gives no consideration to the possibility that the wastewater treatment plant will not be 100% effective nor the possibility of other leaks/discharges of amines.	The WWTW would operate in accordance with the Environmental Permit for the Proposed Scheme which is currently being determined by the Environment Agency, this is expected to include a range of parameters within which the WWTW will need to operate within. Waters which are potentially contaminated with Amines are to be collected, stored and treated offsite at an appropriate facility, as detailed in reference 4.2 of Table

Response Ref.	Comment (including location in original submission)	Applicant's Response
		4.1 – Environment Agency RR Response in AS-038 (Applicant's Response to Relevant Representations and Additional Submissions - Rev 1).
5.50	**REP2-073, para 392 REP4-020, ref 9.3** Drax's response says "the Proposed Scheme does not affect the baseline position in relation to drought" but it remains the case that the applicant's assessment does not give consideration to the ecological impact of water abstraction in a period of drought. Drax's response says "it is also worth recognising that the River Ouse is tidal at the point of abstraction and hence a drought affecting the river would be extremely unlikely" but the applicant has provided no evidence that tidal characteristics make it "extremely unlikely" that a drought would not affect the river.	The Environment Agency have granted Drax an abstraction licence for the abstraction of water from the River Ouse. In providing the Abstraction Licence the Environment Agency will have considered the impacts of droughts. As the Proposed Scheme will not require alterations to the current abstraction licence, the Proposed Scheme will not alter the ecological impact of water abstraction in the event of a period of drought to the River Ouse.
5.51	**REP2-073, para 399 REP4-020, ref 9.5** The applicant's response says Drax Power Station is required to comply with specific requirements and operates a Major Accidents Prevention Policy (MAPP). The response considers the risks associated with the various substances onsite are carefully assessed and controlled. Since the applicant claims to carefully assess and control risk, will the applicant explain why its application did not identify important risks identified in Biofuelwatch's representation such as the risk of explosion	The Environmental Statement Risk Record (APP-172) identifies two potential MA&D events associated with the accidental release of amine based solvent from the BECCS plant, namely risk record entry numbers 2 and 3. The reasonable worst consequence of these MA&D events were identified as being: an onsite unconfined vapour fire / explosion leading to structural damage and harm to people on-site; and a fire contained within the waste storage area with limited smoke / combustion products drifting off-site, respectively.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	resulting in a major release of the amine based solvent? If risks have been assessed "carefully", the applicant is yet to explain why the "Significance" of fires is considered "Not Significant" even though risks from fire can be very large. Drax has clearly not prevented fires from occurring and yet the pollution emitted from fires is not included in the applicant's list of pollution incidents. It is difficult to have confidence in the applicant's risk assessments when important risks are not included or the potential significance of them not recognised. The applicant's response does not address the inconsistency between the assessment of risk as "low" and the significant fires that have occurred. The applicant's response that the "risk of these events has been considered 'low' due to the existing regulatory mechanisms that are in place" only serves to emphasise the inadequacy of the "existing regulatory mechanisms" which have clearly not prevented significant fires from occurring. Biofuelwatch submits that fires that have occurred shows the applicant's confidence in fire protection and detection standards is misplaced and asks the ExA to give consideration to the failure of these standards to prevent previous fires. Biofuelwatch also asks the ExA to give consideration to the increased potential harm to human health and the environment that would arise from the proposal, with the toxic pollution in	The reasonable worst consequence identified for each of these MA&D events did not meet the criteria of a MA&D as the receptor of harm was identified as on-site maintenance workers (and not any human receptors otherwise) whose health and safety is managed via other regulatory regimes.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	the event of a fire. Biodfuelwatch considers these risks have not been adequately addressed. The applicant's response shows Drax considers itself to be a "competent and responsible operator". Since the applicant's competence and responsibleness has not prevented significant fires, Biofuelwatch assumes that the applicant considers such fires to be unavoidable. Biofuelwatch asks the ExA to consider whether the site is appropriate for the proposal when the potential risks include the potential for major unavoidable fires of flammable and toxic solvents with the potential for huge ecological and human health harm.	
5.52	**REP2-073, para 400 REP4-020, ref 9.5** In response to Biofuelwatch questioning the likelihood of many events associated with a changing climate assessed by the applicant as low, the applicant only responded with "With regard to climate events, the Proposed Scheme will be constructed using materials that comply with current UK Building Regulations and BE EN codes. Where no BS EN code exists, the Eurocodes and ISO standards will be adopted." This does not adequately address the specific risk assessment examples raised.	For the mitigation measures where no BS EN codes have been referenced, the most appropriate design measures, BS EN codes, Eurocodes and ISO standards or equivalent best practice guidance will be adopted to mitigate residual climate impacts identified.
5.53	**REP2-073, para 404 REP4-020, ref 9.6** The applicant considers that "The use of 'reasonable' or 'realistic' worst-case is EIA standard practice and refers to	The Applicant refers to section 4.7 of Chapter 4 (EIA Methodology) (APP-040) of the ES and the response provided in the Applicant's Responses to Issues Raised

Response Ref.	Comment (including location in original submission)	Applicant's Response
	the "Rochdale envelope" and refers to PINS advice note 9. However, PINS 9 quotes Judge (Sullivan J. (as he then was)) in Milne (No. 2) ('the Judgment') and says "It is important that these should be adequate to deal with the worst case …". The applicant's 'reasonable worst-case' is not adequate to deal with the worst case and the applicant has not assessed the ''likely significant' effects should the worst case occur. Biofuelwatch considers the applicant's use of 'reasonable worst case, 'realistic worst-case' and 'a worst-case' to be insufficiently precautionary for the assessment of impacts on important ecological sites and insufficiently precautionary for the protection of human health.	at Deadline 2 (REP4-020) and notes that the worst-case scenario was identified for each topic and set out in each chapter.
5.54	**REP2-073 Para 8-14** **Issue:** Burning Trees to Generate Electricity is Not Sustainable. **Additional Comments:** Drax's Independent Advisory Board H2 2022 update[4] said '*Drax should reassess its criteria for determining carbon neutrality. For example, Drax should move away from saying "carbon stocks are increasing/stable" and stating biomass is carbon neutral.'* Given the need (as expressed	The Proposed Scheme seeks consent to retrofit a carbon capture plant at Drax Power Station. As such considerations of the use of biomass are outside the scope of the application. Notwithstanding this, the Applicant has identified in previous submissions (Table 11.1 of REP4-020) the derivation and use of the term zero rated is consistent with well established IPCC accounting terminology.

[4] [redacted]

Response Ref.	Comment (including location in original submission)	Applicant's Response
	by Drax's own advisors) for Drax to cease stating biomass is carbon neutral and the need for Drax to cease saying carbon stocks are increasing/stable, it is clear that Drax's combustion of trees for electricity should not be considered sustainable. The applicant says in [REP4-020] "*The Applicant's position is that biomass is zero rated at the point of combustion, not that it is carbon neutral*." There clearly are considerable carbon emissions from combustion. This zero rating is effectively an accounting trick that shifts Drax's emissions to the forestry sector because the increase in forestry sector emissions arising from Drax has not been determined. Biofuelwatch argues that such emissions are considerable because, as Drax's scientific advisors point out, carbon stocks are not stable. The applicant considers its approach "aligns to guidance from the IPPC, the GHG protocol and the UK Environmental Reporting Guidelines for quantifying emissions of GHG from biogenic sources, such as biomass, where emissions are rated as zero" but Biofuelwatch submit that none of these bodies, and specially not the IPCC, would support overall increased greenhouse emissions from a failure to consider the full impacts of a plant. The applicant says nothing about the IPCC's warning that the use of bioenergy can increase emissions. Carbon stocks are not stable and Drax's combustion of biomass is not carbon neutral. Such a development is not	The Applicant's position remains that biomass is zero rated at the point of combustion, consistent with the IPCC, the GHG protocol and the UK Environmental Reporting Guidelines for quantifying emissions of GHG from biogenic sources.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	sustainable. The ExA may consider that the proposal could achieve carbon neutrality (or perhaps be carbon negative), but this is far from certain because of the huge uncertainties in the proposal itself, the failure of similar plants elsewhere to live up to expectations, and because the proposal is dependent on other components outside the scope of the DCO (such as the pipeline and carbon storage). Furthermore, since carbon stocks are not stable, the continued unsustainable removal of biomass from the environment shows Drax cannot be considered sustainable regardless of any assessment of the greenhouse gas emissions.	
5.55	**REP2-073 Para 15-21** **Issue:** Conformity with Government Policy **Additional Comments**: Since the statement from Drax's scientific advisors shows carbon stocks are diminishing (or likely diminishing) and that the combustion of trees is not carbon neutral, the proposal should not be considered to be "renewable". The proposal will reduce available energy generating capacity, has significant risk and so should be considered neither renewable nor sustainable.	The Proposed Scheme seeks consent to retrofit a carbon capture plant at Drax Power Station. As such considerations of the use of biomass are outside the scope of the application. Notwithstanding this, Page 39 of the Government's Energy Security Plan confirms that bioenergy, which is produced from biomass: *'is considered a renewable, low-carbon energy source, because its inherent energy comes from the sun, it removes carbon dioxide from the atmosphere as it grows, and it can be used to directly displace oil, coal and natural gas.' The ESP confirms that the use of biomass combined with carbon capture and*

Response Ref.	Comment (including location in original submission)	Applicant's Response
		storage 'can deliver negative emissions, which is key to delivering net zero.'
5.56	**REP2-073 Para 50-53** **Issue**: Current regulations and air quality standards, as currently implemented, do not prevent harm to health and have not prevented Drax from contributing to that harm over a large area (because of its high stack). **Additional Comments:** Drax's response to Biofuelwatch's submission 2 representation [REP2-073] mentions matters that it considers to be matters for the Environment Agency and the permitting regime, but this does not address the concern that the Environment Agency and the permitting regime do not prevent harm to health. The Environment Agency may say it will not permit "significant" pollution, but the EA's use of the word "significant" does not appear to be the normal English language use of this word because the government accepts that pollution, which is permitted by the EA, already causes a "significant burden" and harm to health. Such a "significant burden" should be considered significant pollution by the ExA and the ExA cannot assume the Environment Agency is able to prevent such significant pollution.	The Applicant's position remains that the Environmental Permit is the appropriate mechanism for controlling Air Quality emissions and for protecting human health. The Applicant is not aware of any reason why the Environment Agency would be unable to prevent such significant pollution under the operation of the Environmental Permit.
5.57	**REP2-073 Para 58**	As previously stated, the Applicant is confident that worst case cumulative impacts have been considered for

Response Ref.	Comment (including location in original submission)	Applicant's Response
	Issue: That figures be provided to show the sensitivity analysis results for nitrosamine and the cumulative nitrosamine concentrations. **Additional Comments:** Many uncertainties in the predicted nitrosamine concentrations have not been assessed nor the cumulative impact of all these uncertainties nor the potential cumulative nitrosamines contractions taking all uncertainties into consideration.	amines and nitrosamines as set out in Chapter 6 (Air Quality) of the ES (APP-042) in para 6.5.30 - 31, with results reported in paras 6.12.9 to 6.12.12. The results of the amine sensitivity testing are provided in Tables 1.23 and 1.24 of Appendix 6.4 (Operational Phase Air Quality Results Tables: Human Receptors) of the ES (REP2-032).
5.58	**REP2-073 Para 60** **Issue**: Biofuelwatch asks that, as a precautionary approach, the modelling assumes that emissions are already at the maximum level that may go undetected with existing monitoring equipment. **Additional Comments:** The modelling assumes no existing nitrosamine emissions but this is unlikely. The modelling also assumes no existing background nitrosamines. Biofuelwatch is not aware of any existing monitoring equipment, but existing emissions levels and environmental levels must be measured and included in the assessment. There may already be significant levels of nitrosamines so the applicant has provided insufficient information to demonstrate that the proposal will not result in exceedances of EALs. Furthermore, the applicant's reply	As noted above, the Applicant considers that modelling existing emissions of nitrosamines is unnecessary. The risk of significant existing emissions is theoretical and their modelling would go beyond the precautionary principle. The impacts of the Proposed Scheme on amines and nitrosamines have been appropriately and conservatively assessed. The modelling follows current best practice. To include pollutants, whether monitored or not, at their limit of detection in the modelling is not best practice and is an effectively unbounded exercise.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	recognises the difficulties of environmental nitrosamine measurement so Biofuelwatch requests the ExA give consideration to the high level of risk that is likely (assuming EA regulation) and the inappropriateness of the location given such a high level of risk.	
5.59	**REP2-073 Para 63** **Issue**: Annual average environmental concentrations from just Keadby 3 are predicted to be up to 54% of the EAL, with 47% of the EAL at one of the studied sensitive receptors. Uncertainties make these figures even higher with the Keadby 3 applicant showing exceedances of the EAL by a factor of 5 in some scenarios. **Additional Comments:** Whilst the applicant's reply gives some consideration to cumulative impacts, it makes no mention of the predicted levels from Keadby 3 that are already a high percentage of the EAL and, in some scenarios, already very significantly exceed the EALs. Biofuelwatch does not understand how the applicant can consider *any* further increase in such levels to be acceptable.	To reiterate the Applicant's previous response, the cumulative assessment of impacts has been considered using a conservative methodology. The figures of 54% and 47% are screening model results for Keadby. They were superseded by detailed modelling results that were considerably lower and it is the latter model results that were used in the Applicant's cumulative impact assessment.
5.60	**REP2-073 Para 66f** **Issue**: Biofuelwatch considers that predictions should be made of the cumulative harmful amine breakdown	The Applicant has clearly set out their approach to modelling amine chemistry and to the assessment of cumulative impacts in Chapter 6 (Air Quality) (APP-042).

Response Ref.	Comment (including location in original submission)	Applicant's Response
	products (such as nitrosamines) to account for: … Amine breakdown chemistry (and uncertainties of that chemistry). **Additional Comments** There remains no consideration of the potential cumulative uncertainty that takes uncertainties in the amine breakdown chemistry into account.	Uncertainties are considered in paragraphs 6.5.55 to 6.5.60.
5.61	**REP2-073 Para 73-74** **Issue:** Biofuelwatch requests that the Examining Authority gives consideration to the very limited number of such plants that the area will be able to support if pollution is not to exceed safe levels. This very limited capacity for the local area to support carbon capture plants should be seen as a valuable resource, especially with the proposed pipeline in the area and the considerable pipeline extension costs that would be incurred if plants were to be located further away. Efficient use of limited resources is an important planning consideration.	The Applicant's position remains that the Environmental Permit is a suitable mechanism for controlling emissions from Drax Power Station. It is the position of the Applicant that the Proposed Scheme will deliver a range of benefits. The Need and Benefits (Document Reference APP-033) submitted with the Application sets out the need for the Proposed Scheme as well as the benefits that it will deliver. These include (at Paragraph 8.1.3) that: *'The first phase of BECCS at Drax will permanently remove at least 8 million tonnes of CO2 from the atmosphere each year, making Drax Power Station the world's largest single site carbon capture project."* The Applicant's position is that Drax Power Station is a suitable and appropriate site for the installation of CCS technology.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.62	**REP2-073 Para 79-81** **Issue:** The cumulative nature of uncertainties and the way uncertainties are usually quantified. **Additional Comments:** The applicant has not responded. Biofuelwatch requests that ExA ask the applicant why they have not quantified uncertainties with 95% or 99% confidence interval bounds. Biofuelwatch is concerned that the uncertainties are so great that the applicant is unable to quantify them.	The Applicant has clearly set out their approach to modelling amine chemistry and to the assessment of cumulative impacts in Chapter 6 (Air Quality) (APP-042). Uncertainties are considered in paragraphs 6.5.55 to 6.5.60.
5.63	**REP2-073 Para 86, 98** **Issue:** There is a lack of independent validation from which to reliably and accurately estimate the uncertainty arising from these modelling tools. The validation done by the developers uses scenarios known to the developers when the modelling tools were created, so it is not surprising that the tools have been created to perform well for the validation scenarios. It can be expected that errors in other situations will exceed those used for validation. **Additional Comments:** Whilst the applicant has responded with some consideration of validation (considered in the previous subsection), the applicant has not responded to the concern that the knowledge the developers have of the validation scenarios during software development and	The Applicant has set out why the validation scenarios are applicable to the modelling of the Proposed Scheme, namely that there is only a single source – the main stack, on flat terrain without coastal effects and, given the difference in height, only minor influence from buildings (the cooling towers). As such, the idealised wind tunnel and field studies used for ADMS model validation are directly applicable to the Applicant's modelling.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	testing means the tools can be expected to be less accurate in non-validation scenarios.	
5.64	**REP2-073 Para 99** **Issue:** The two most widely used modelling software systems can produce very different results this shows that the predictions can be subject to considerable uncertainty just from the software systems themselves.	The Applicant has acknowledged in their ES that uncertainty is an inherent property of any modelling study. The dispersion model selected, ADMS, has been shown to be fit for purpose with reference to relevant model validation studies and has been widely used for the assessment of impacts from industrial facilities.
5.65	**REP2-073 Para 101** **Issue:** ADMLC says an extended section on modelling input data, possibly with many sub-sections should be provided and lists many matters that should be provided. ADMLC guidance says the model will be sensitive to mass emission rates, efflux velocity, efflux temperature, terrain, buildings - but it is unclear whether these uncertainties have been considered and how they may affect the results. There are also important modelling parameters used by ADMS such as "surface roughness", modelling grid size and others which can impact the results. To consider just one such parameter, "surface roughness", the applicant has selected a "surface roughness" value of 0.2 that corresponds to a minimum surface roughness for agricultural use. Agricultural land can, however, have a higher surface roughness. The immediate vicinity of the	The quantified sensitivity testing undertaken by the Applicant is set out in paragraphs 6.9.25 to 6.9.31 of Chapter 6 (Air Quality) (APP-042). The conclusion of the testing was the results presented were demonstrably robust.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	emissions is also far from purely agricultural. The site itself is a large and complex industrial site and the surrounding area has trees and other buildings. Biofuelwatch has not found an assessment of the uncertainties arising from the applicant's selection of "surface roughness" in the applicant's Environment Statement. **Additional Comments:** The applicant has not responded to these points. Biofuelwatch remains concerned that the air quality assessment does not appear consistent with ADMLC guidance nor does it appear to have used worst-case values for important modelling parameters such as surface roughness.	
5.66	**REP2-073 Para 103-104** **Issue:** The applicant's assessment is not to the standard required by the EA which says: "You must show that you have estimated the level of uncertainty in your predictions." An estimate of the uncertainty of prediction should be considered essential for any application of predictions for the assessment of health or ecological risk. **Additional Comments:** Despite the applicant's response to the concerns about uncertainty, there is still no quantified estimation of the	The quantified sensitivity testing undertaken by the Applicant is set out in paragraphs 6.9.25 to 6.9.31 of Chapter 6 (Air Quality) (APP-042). The conclusion of the testing was the results presented were demonstrably robust.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	cumulative uncertainty. It is difficult to see how the ExA can weigh the health and ecological risk of the proposal when uncertainties remain quantified.	
5.67	**REP2-073 Para 131** **Issue:** If the applicant considers Karl 2009 authoritative for the consideration of deposition, it appears inconsistent to use an alternative [higher] threshold level for human health.	The statement made by Biofuelwatch lacks a scientific basis. They are conflating a statement around the consideration of an appropriate deposition velocity for amines with a statement around the setting of an appropriate assessment standard for the protection of human health for the consideration of nitrosamines and amines in air. These metrics are completely separate. The Applicant has used the Environment Agency derived Environmental Assessment Level for NDMA on a precautionary basis. Biofuelwatch are well aware of this rationale and to use any other standard would have been unjustified and attracted significant criticism.
5.68	**REP2-073 Para 132-136** **Issue**: The recognised need for EAL revision and updated regulation. **Additional Comments:** Biofuelwatch does not understand how the ExA can consider the proposal adequately safe when the application attempts to assess the proposal using an assessment framework (such as EALs) and regulatory	The Applicant considers the use of EALs, derived for the protection of health, to be entirely appropriate for the assessment of likely significant effects on human health and the environment.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	framework that is recognised as inadequate and in need of updating.	
5.69	**REP2-073 Para 145-150** **Additional Comments:** Biofuelwatch does not consider that the ExA can adequately assess the appropriateness of the proposal at the location when so much information is missing and when the proposal cannot be compared to alternatives (such as a process using different solvents). Biofuelwatch does not consider a consultation that does not include such important information to be a meaningful consultation.	The carbon capture plant has been designed to align with the Drax emissions profile. Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency as part of the application for an Environmental Permit. This application itself will be subject to consultation.
5.70	**REP2-073 Para 154** **Issue:** The ES is not in accordance with SEPA recommendation and gives insufficient detail for the pollution impacts to be fully and accurately assessed	Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency as part of the application for an Environmental Permit. This application itself will be subject to consultation.
5.71	**REP2-073 Para 155** **Issue:** The considerable uncertainties are compounded further still, when, as in the case with this proposed development, the solvents themselves are claimed to be proprietary and details of the formulation have been	Detailed information on the proprietary amine solvents and their degradation products have been shared with the Environment Agency as part of the application for an Environmental Permit. This application itself will be subject to consultation.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	withheld. This makes it impossible to robustly assess the health impacts of the proposed development.	
5.72	**REP2-073 Para 156** **Issue:** There are no real world examples on which to assess the release of amine degradation products from BECCS with woody biomass. Drax admits this is the first project of its kind globally. Since scientific understanding of the chemistry is still poor, there is the possibility of much greater impacts arising from the use of woody biomass than with fossil fuels. This could result in higher levels of nitrosamines than expected or, potentially, compounds with increased toxicity. Biofuelwatch considers these uncertainties have not been adequately considered.	The Applicant acknowledges the uncertainties inherent in all air quality assessments. As such it has undertaken a highly conservative assessment to ensure that this does not lead to underestimation of potential impacts. The UK Health Security Agency in response to WQ AQ1.11 confirmed that '*it is satisfied that the applicant's risk assessment for amine emissions from the proposed post-combustion carbon capture plant is appropriately conservative*.' (RR-141)
5.73	**REP2-073 Para 157** **Issue:** The applicant's predictions are made using the ADMS Amine Chemistry Module. This module was produced in 2016 and aims to simulate reactions shown in a 2011 report. Biofuelwatch has found no updates to the module to account for results of pilot carbon capture installations or recent research. The ADMS predictions may therefore not reflect the latest scientific understanding of nitrosamine formation and dispersion. **Additional Comments:**	The Applicant considers that the primary reactions involved in the degradation of amines in the atmosphere are those represented by the reactions modelled in the ADMS amines chemistry module. Indeed the Norwegian 'Atmospheric Degradation of Amines – ADA' project reports remain the seminal research papers in the field. The Applicant notes that Biofuelwatch has not provided any specific evidence to support their assertion that the air quality assessment does not reflect the latest scientific understanding of amine degradation and dispersion.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	Whilst recognising there may not be other commercially available modelling software for amines and amine breakdown products, the applicant does not appear to have given considerations to whether the predictions may not reflect the latest scientific understanding of nitrosamine formation and dispersion.	
5.74	**REP2-073 Para 159 -163** **Issue:** The comments from Alun Roberts-Jones on behalf of the EA show the considerable uncertainties regarding the assessment method. **Additional Comments:** The applicant has made no response to these comments. The uncertainties in the nitrosamine modelling approach remain unquantified.	The quantified sensitivity testing undertaken by the Applicant is set out in paragraphs 6.9.25 to 6.9.31 of Chapter 6 (Air Quality) (APP-042). The conclusion of the testing was the results presented were demonstrably robust.
5.75	**REP2-073 Para 177** Biofuelwatch requests the applicant provides additional explanation to support the modelling assumptions. Why was the initial design mass emission data provided by MHI no longer representative of the proposed BECCS plant? What has changed?	Following discussion with MHI during the Front End Engineering and Design process regarding the emissions profile for the BECCS scheme, adjustments were made to generate a more accurate assessment of the flue gas composition and its emission to atmosphere. For example, modifications have been made to the temperature of the emission and also the Sulphur Dioxide concentration within the flue gas. These modifications reflect the conditions and requirements at Drax Power Station. This resulted in a minor change in mass releases that required an update to the air quality

Response Ref.	Comment (including location in original submission)	Applicant's Response
		modelling to ensure a realistic worst case assessment. All of the modelling files and outputs have been made available to the relevant regulatory authorities. These modelling files will be assessed and interrogated as part of the determination process for the Environmental Permit.
5.76	**REP2-073 Para 182-187** **Issue:** DEFRA considers PM2.5 modelling inadequate for the assessment of environmental targets yet the application is using modelling to assess health and ecological impacts when the modelling of amines and amine breakdown products is subject to considerably more uncertainty than PM2.5. **Additional Comments:** The applicant has not explained why modelling results, which Defra considers inadequate for the assessment and enforcement of environmental targets, are adequate to assess the proposal's impacts and provide protection of human health and the environment.	Biofuelwatch has failed to emphasise the section of the Defra quote in their paragraph 182 which states '*There was a clear view from experts that modelling is a vital tool in estimating concentrations at locations that are not monitored*'. In relation to modelling in general, and in particular with reference to PM2.5, the primary uncertainty lies in the specification of emission rates. This is not the case for modelling emissions from the Proposed Scheme since the emission rates are well understood and constrained. Therefore, Biofuelwatch are not justified in suggesting that Defra a) considers modelling inadequate for the assessment of impacts and/or b) suggesting that modelling undertaken for the assessment of compliance with an air quality standard is equivalent to the modelling undertaken for a single, well described emission to air. The latter, and the Proposed Scheme emissions, are most appropriately assessed with reference to model outputs.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.77	**REP2-073 Para 214** **Issue:** The breakdown rate also depends on the source with synthetic amines taking longer to breakdown. Consideration must be given to whether the breakdown figures used reflect the proprietary solvent used.	The reaction rates used in the amine chemistry module have been provided by the technology supplier and are all technology specific.
5.78	**REP2-073 Para 215** **Issue:** Biofuelwatch considers the applicant has provided insufficient evidence and especially insufficient consideration of uncertainties and the limitations of current scientific knowledge, to be confident that such impacts are of "minor magnitude" and "reversible". **Additional Comments:** Biofuelwatch is unaware of any amendment to the ecology assessment or the HRA that takes the cumulative uncertainty of the applicant's modelling predictions into consideration.	The Applicant disagrees, and considers that the Ecology chapter of the ES (APP-044), the HRA Report (REP6-021), and associated supporting documents provide a robust and appropriately precautionary assessment.
5.79	**REP2-073 Para 217** **Issue:** There is a risk that chemically produced N-nitrosamines and N-nitramines can accumulate in the surrounding environment and endanger human health. It is therefore unclear that air dispersion modelling alone (even if the chemistry and the solvents under	Environment Agency guidance on the assessment of amines and degradation products makes no reference to significant bioaccumulation potential and does not require its assessment. Indeed the relatively high solubility of amines and degradation products implies that their bioaccumulation

Response Ref.	Comment (including location in original submission)	Applicant's Response
	consideration were fully understood) would be able to fully assess the risks to human health and the environment.	potential is low since they will not readily leave any solution to accumulate in the cells of organisms.
5.80	**REP2-073 Para 226-234** **Issue:** The proposal can be expected to harm Thorne Moor and other important ecological sites (evidence given).	The Applicant refers the ExA to the response at row titled 'REP2-073, para 225 REP4-020, ref 9.25'
5.81	**REP2-073 Para 231** **Issue:** The consideration of impacts of the applicant's ecology report does not appear to have been based on cumulative impacts with the section on cumulative effects limited to just one paragraph. The cumulative impacts are greater than considered in the ecology report and shown above. However, despite this, the ecology report still considers that the proposed mitigation does not bring all impacts below the insignificance threshold.	The Chapter 8 (Ecology) of the ES (APP-044) considers effects from the Proposed Scheme alone. As per paragraph 8.12.1 of Chapter 8 (Ecology), the full cumulative assessment is presented in Chapter 18 (Cumulative Effects Assessment) (REP4-035), with detailed cumulative assessments specific to Ecology provided in Appendix 18.5 (Cumulative Assessment Matrix) (REP4-017). The cumulative assessment presented in these documents also informs the Habitats Regulations Assessment (REP6-021).
5.82	**REP2-073 Para 245** **Issue:** In Landelijke Vereniging tot Behoud van de Waddenzee v Staatssecretaris van Landbouw, Natuurbeheer en Visserij (Case C-127/02) [2005] 2 CMLR 31, the Grand Chamber of the European Court of Justice considered that the Habitats Directive must be interpreted in accordance with the Precautionary Principle. Harris & Anor v Environment Agency [2022] EWHC 2264 (Admin)	Although not explicit, we assume Biofuelwatch are referring to dispersion (air quality) modelling here. As referred to in paras 6.5.55 – 6.5.60 of Chapter 6 (Air Quality) (APP-042) the Applicant's previous responses, the Applicant's dispersion modelling includes a number of elements of conservatism, to address the uncertainties inherent in such modelling. The Applicant's dispersion modelling is therefore robust. The key elements of

Response Ref.	Comment (including location in original submission)	Applicant's Response
	(06 September 2022) established that the Habitats Directive has continuing "direct effect" meaning that it continues to stand independently of the Conservation of Habitats and Species Regulations 2017. Biofuelwatch considers that the applicant's air quality predictions are not sufficiently precautionary for compliance with the Habitats Directive. Biofuelwatch requests that all sources of uncertainty are listed and quantified to support a quantified estimate of the cumulative uncertainty of the modelling predictions.	conservatism are set out in paragraphs 6.5.55 – 6.5.60 of Chapter 6 (Air Quality) of the ES (APP-042). The Applicant's HRA Report (REP6-021) has also taken a precautionary approach, informed by relevant guidance. The Applicant would also note that the findings of the HRA Report (REP6-021) have also now been agreed with Natural England, as set out in the Statement of Common Ground Between Natural England and Drax Power Ltd (REP5-017).
5.83	**REP2-073 Para 249-256** **Issue:** Non Statutory Designated Sites: **Additional Comments:** The applicant has made no comment on the likely impact on non-statutory designated sites nor the lack of protection provided by the Environment Agency and Natural England to such sites.	The dispersion (air quality) modelling completed by the Applicant has considered statutory designated sites (SAC, SPA, Ramsar, NNR, SSSI) up to 15 km from the Main Stack, with non-statutory designated sites considered up to 2 km from the Main Stack in accordance with current EA guidance. It can be seen from Table 1.11 of Appendix 6.5: Operational Phase Air Quality Results Tables: Ecological Receptors (REP2-034), that impacts of the Proposed Scheme alone on nitrogen deposition onto locally designated sites are a maximum of 0.5% of critical load after application of operational emissions abatement. Table 1.17 shows that the maximum cumulative nitrogen deposition (the maximum impact of the Proposed Scheme and other plans and projects) is up to 1.7% of critical load.

Response Ref.	Comment (including location in original submission)	Applicant's Response
		Acidity critical loads are not available for non-statutory sites and therefore these cannot be assessed as explained in paragraph 8.9.116 of Chapter 8 (Ecology) of the ES (APP-044). However, as explained in that paragraph 'The air quality modelling does however demonstrate that the Proposed Scheme has comparable impacts in terms of the quantum of acid deposition onto non-statutory designated sites, to that experienced at more sensitive habitats within statutory designated sites.' The statutory sites assessed up to 15 km from the Main Stack support some of the most sensitive habitat to air quality effects in the study area, particularly Thorne Moor which has a lower critical load of 5 kgN/ha/yr for nitrogen deposition and a critical load for acid deposition of 0.4263 keq/ha/yr. These are lower than for any other designated site and therefore represent the upper bound for sensitivity within the Study Area. As can be seen from Table 11 in REP2-034, the non-statutory designated sites included in the dispersion modelling have critical loads for nitrogen deposition of 10 kgN/ha/yr or higher. Non-statutory-designated sites beyond the 2km Study Area for non-statutory designated sites will therefore not receive nitrogen deposition doses that are significantly different to those that have been modelled (in terms of percentages of critical load). The assessment of air quality effects on non-statutory designated sites, on the basis of the maximum

Response Ref.	Comment (including location in original submission)	Applicant's Response
		cumulative dose of 1.7% of critical load and individual doses under the 1% significance screening threshold, has concluded there would be no significant operational air quality effects on non-statutory designated sites. This is set out between paragraph 8.9.116 and 8.9.117 of Chapter 8 (Ecology) of the ES (APP-044).
5.84	**REP2-073 Para 270-273** **Issue:** The need for new surveys rather than the outdated surveys used.	The scope of ecological surveys was agreed with the NYC Ecologist prior to the DCO Application being submitted, including those surveys which would be carried out to inform the Application and those surveys from the Drax Repower DCO Application which would continue to be relied upon. To reconfirm, surveys completed to inform the Application for the Proposed Scheme included: a. Extended Phase 1 habitat surveys b. Badger surveys c. Wintering bird surveys d. Amphibian surveys e. Terrestrial invertebrate surveys Additional UKHab surveys and protected species assessments were completed in support of the Proposed Changes for Work No. 7 (Flood Compensation Area) and

Response Ref.	Comment (including location in original submission)	Applicant's Response
		Work No. 8 (OHL and TCL modifications) following submission of the Application. The scope of ecological surveys required to inform the Application is a matter of agreement between the Applicant and NYC (see the Statement of Common Ground Between the North Yorkshire Council and Drax Power Ltd (REP5-015)) and the Applicant and Natural England (see the Statement of Common Ground Between Natural England and Drax Power Ltd (REP5-017).
5.85	**REP2-073 Para 274** **Issue:** As many of these species are mobile, there are concerns that the development could impact in some cases on populations of local or county value and the mitigation proposed may not be sufficient for all species.	Please refer to Row 5.11 in Table 5.1 of the Applicant's Responses to Issues Raised at Deadline 1 (REP2-067).
5.86	**REP2-073 Para 277, 292** **Issue:** The proposal will lead to the disturbance and degradation of vital habitats and so risk harming a wide range of protected species. The proposal is therefore not a sustainable development as defined by the National Planning Policy Framework. The proposal is also not a sustainable development as defined by the National Planning Policy Framework	Please refer to Row 5.9 in Table 5.1 of the Applicant's Responses to Issues Raised at Deadline 1 (REP2-067).

Response Ref.	Comment (including location in original submission)	Applicant's Response
	because it fails to protect the natural environment or enhance biodiversity by "minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.	
5.87	**REP2-073 Para 277 – 278, 293** **Issue:** It fails to protect the natural environment or to enhance biodiversity, and is incompatible with: a. Commitments made in the Environment Act 2021 to support the "conservation and enhancement of biodiversity in England" b. The aims of the Defra Nature Recovery Green Paper (March 2022) "to address the drivers of nature's decline including habitat deterioration, loss and fragmentation". The proposed development will adversely impact nationally- and internationally- designated areas that cannot be adequately mitigated or compensated for.	Please refer to Row 5.9 and 5.10 in Table 5.1 of the Applicant's Responses to Issues Raised at Deadline 1 (REP2-067).
5.88	**REP2-073 Para 280** **Issue:** In reference to 2.1.4 Table 12.6 Surface Water Features within the study area that have the Potential to be Affected by the Proposed Scheme, we echo concerns raised by the EA regarding the recorded presence of Great Crested Newt, a protected species and therefore a	Great crested newts have been identified as an 'Important Ecological Feature' and therefore subject to detailed assessment in Chapter 8 (Ecology) of the ES (APP-044). The Ecology chapter of the ES identifies that with the application of mitigation measures, there would be no significant negative effects on this species (see

Response Ref.	Comment (including location in original submission)	Applicant's Response
	'sensitive receptor' in contrast to Drax's statement that these ponds are not considered 'sensitive receptors'. We are concerned about this downgrading of habitat for protected species, and would welcome comments from the Wildlife Trust on this issue.	paragraphs 8.11.9 and 8.11.21 of the ES Ecology chapter). The Applicant and Natural England are in the final stages of securing strategic mitigation for great crested newts through the local District Level Licence. Natural England have confirmed in their Response to the Examining Authorities Second Written Questions (see row BIO2.2 in Table 2a, REP6-050) that this is in the course of being processed so that the Applicant can make the necessary payment to secure use of the DLL.
5.89	**REP2-073 Para 281** **Issue:** Biofuelwatch concur with the points made in Part 1 of the Natural England response. In particular the lack of certainty as to impacts on Internationally and Nationally Designated sites due to loss of functionally connected land and potential impacts due to traffic emissions.	These points from Biofuelwatch refer to Natural England's position prior to Deadline 2. Both the matters referred to by Biofuelwatch (loss of functionally connected land and potential impacts due to traffic emissions) are now agreed between Natural England and the Applicant, as set out in the Statement of Common Ground between Natural England and Drax Power Ltd (REP5-017).
5.90	**REP2-073 Para 282** **Issue**: Natural England requested "Clarification on scenarios used to assess the impacts from aerial emissions". An updated comment/detailed advice from Natural England on aerial emissions does not appear to be available.	This matter is now agreed between Natural England and the Applicant, as set out in row 4.2.2 of the Statement of Common Ground between Natural England and Drax Power Ltd (REP5-017).

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.91	**REP2-073 Para 386** **Issue:** Within table 12.2 of the Environment Statement [APP-048], Elements Scoped Out of the Assessment it is stated that for Foul Water Treatment: No discharge to Yorkshire Water sewers during construction and / or operational phases is proposed. As the EA notes in paragraph 2.1.2 of [RR-051], this is in conflict with document 3.1 Draft Development Consent Order Schedule 1 [AS-076] - Work No. 1 (f) (viii) Work No. 1D "common supporting infrastructure including – (aa) a wastewater treatment plant". We agree with the EA that Drax should not be allowed to scope out the drains listed in 2.1.3 of [RR-051].	This was addressed in Section 4.2 of the Applicant's Responses to Relevant Representations and Additional Submissions (AS-038), which demonstrates that the new waste water treatment works is part of the process equipment for the BECCS plant. The Environment Agency are satisfied with these watercourses being scoped out from further assessment, particularly as the risks during the construction phase are managed via WE14, the Watercourse Pollution Prevention Plan (AS-092), which has been updated at this deadline.
5.92	**REP2-073 Para 388** **Issue**: In reference to 2.1.5 of [RR-051], section 12.9 [APP-048] Preliminary Assessment of Likely Impacts and Effects should clarify why from the surface water receptors identified as 'sensitive', only three are assessed in relation to increased pollution from silt and sediments.	This has been agreed with the Environment Agency and addressed through the inclusion of WE14 of the REAC (REP6-015) an updated version of which has been submitted at this deadline.
5.93	**REP2-073 Para 389** **Issue:** We echo the EA in asking for clarity as to whether Drax is implying that none of the other waterbodies will be affected, or they are omitted because they have not been assessed. Moreover, the changing weather patterns	As detailed in the response to REP2-073 para 386 above and the clarification provided in response to the earlier question titled REP2-073, paras 275-76, 394-397, REP4-020, ref 9.31 in relation to the containment of leaks.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	already experienced through climate change mean that extreme rainfall events are more intense, more protracted and increasingly frequent. Risk assessment of the site run-off needs to model widely anticipated extreme weather events and flooding around the site. Prolonged heavy rain could easily carry toxic matter or contaminated water between drains. We are currently not confident that the site bunds are sufficient to isolate the site from flooding from the Ouse and Aire river systems between now and 2050.	The LLFA have approved the Proposed Surface Water Drainage Strategy (REP2-043) which has been developed using the Environment Agency's climate change allowances which are based on the latest predictions by the scientific community. The Surface Water Drainage Strategy will be developed during detailed design to ensure that appropriate measures are in place to prevent pollutants from being discharged to the water environment. The Environment Agency have approved the hydraulic model which demonstrates that the site flood risk to the site is acceptable, this model also uses the Environment Agency's latest climate change allowances as confirmed in the SoCG between the Applicant and the Environment Agency (4.4.5 in Table 4.4 of (REP5-016)).
5.94	**REP2-073 Para 391** It is also of note that there is no reference in Drax's application to occupational exposure (either by water, aerosol or air) to amines and its degradation products. This is concerning given Drax is currently being taken to court by the Health and Safety Executive regarding exposing its workers to wood dust.	Drax is required to comply with a number of regulatory regimes which control exposure of staff to specific chemicals which would include amines and degradation products. Drax is required to comply with The Health and Safety at Work Act, 1974 (HASWA). The Act requires employers to protect the health and safety and welfare at work of all their employees, as well as others on their premises. In addition, Drax is required to comply with the Control of Substances hazardous to Health (COSHH) regulations. COSHH regulations are regulated by the Health and Safety Executive.

Response Ref.	Comment (including location in original submission)	Applicant's Response
5.95	**REP2-073 Para 398** **Issue:** Some desiccants are extremely reactive and toxic. Further information is needed on the desiccant and any potential risks arising from its delivery, use and destruction.	Drax is required to comply with a number of regulatory regimes which control exposure of staff to specific chemicals which would include amines and degradation products. Drax is required to comply with The Health and Safety at Work Act, 1974 (HASWA). The Act requires employers to protect the health and safety and welfare at work of all their employees, as well as others on their premises. In addition, Drax is required to comply with the Control of Substances hazardous to Health (COSHH) regulations. COSHH regulations are regulated by the Health and Safety Executive.
5.96	**REP2-073 Para 401 a, 402-403** **Issue:** Biofuelwatch asks the Examining Authority to give consideration to: … a. whether the applicant's assessment of risks arising from increased temperatures and weather events have been appropriately assessed and considered given the high temperatures recorded in 2022	The future projections used in the climate resilience assessment use the UK Climate Projections data. These projections are the most up to date and widely recognised for UK infrastructure and are considered appropriate for assessing the Proposed Scheme's resilience to climate impacts.
5.97	**REP2-073 Para 401 b** **Issue:** Biofuelwatch asks the Examining Authority to give consideration to: … b. Whether sufficient consideration has been given to the mitigation of these risks, for example, the "Increased wind loading on Main Stack compromising the structural integrity" is considered a "Significant" risk but no mitigation appears to be stated. The Scoping Opinion specifically mentioned that if "further	The text provided in Section 14.10.7a of Chapter 14 (Climate Resilience) of the ES (APP-050) states that the BS EN design codes will be considered during the Proposed Scheme design and that changes in wind frequencies will be accounted for as set out below. This is secured through Requirement 6 (Detailed Design Approval) of the dDCO (REP6-005) (see Register of

Response Ref.	Comment (including location in original submission)	Applicant's Response

	works/mitigation would be required" then these should "be described in the ES and cross-reference provided to any relevant documents, including to where they are secured"	Environmental Actions and Commitments Ref ID CC2 (REP6-015)).
		
		To reduce the potential effects of wind loading on the Main Stack:
		
		a. The structures shall be designed in accordance with UK Building Regulations and BS EN design codes. For structural system design purposes, wind loads will be considered according to the provisions of BS EN 1991-1-4 + NA with the following parameters for the Site:
		
		i. vb,0 = 22.7 m / s (fundamental basic wind velocity);
		
		ii. Calt = 1.01 (altitude factor);
		
		iii. Cseason <= 1.0 (seasonal factor);
		
		iv. Cdir <= 1.0 (directional factor); and
		
		v. Terrain category: "country terrain".
		
		14.10.8. These account for increases in wind event frequencies and magnitudes due to
		
		climate change via the various nationally defined parameters.
		
		14.10.9. Although the Applicant has specified the codes which were current at the time of writing the design parameters for the Proposed Scheme, these may need to be realigned to any changes to UK Regulations and BSI updates to codes during subsequent design phases.

Response Ref.	Comment (including location in original submission)	Applicant's Response
		This is deemed sufficient to mitigate potential climate impacts against future projections. Detailed design of the Proposed Scheme was not completed at the time the environmental impact assessment was carried out and therefore the mitigation identified will be implemented through a rigorous detailed design process.
5.98	**REP2-073 Para 405** **Issue:** Biofuelwatch notes Drax has been accused of health and safety breaches which raises questions over whether operational procedures, and governance are adequate to protect human health. It is alleged that these breaches occurred over an extended period,. Since HSE brought the case against Drax, it would appear that the HSE must consider that regulation, and how it is enforced, did not (and perhaps could not) prevent ongoing breaches over many years. **Additional Comments:** Whilst Biofuelwatch understands HSE have now dropped the case, the concerns remain over whether operational procedures, and governance are adequate to protect human health.	Drax is required to comply with a number of regulatory regimes which control exposure of staff to specific chemicals which would include amines and degradation products. Drax is required to comply with The Health and Safety at Work Act, 1974 (HASWA). The Act requires employers to protect the health and safety and welfare at work of all their employees, as well as others on their premises. In addition, Drax is required to comply with the Control of Substances Hazardous to Health (COSHH) regulations. COSHH regulations are regulated by the Health and Safety Executive. These regulatory requirements are considered a robust mechanism for protecting human health.
Summary of Comments	It has recently come to light through media reports (although this information was already publicly available)	The Proposed Scheme seeks consent to retrofit a carbon capture plant at Drax Power Station.

Response Ref.	Comment (including location in original submission)	Applicant's Response
	that Drax's own scientific advisory board made a number of recommendations including that Drax move away from stating that biomass is carbon neutral. This may already have been partially addressed by the Applicant changing its terminology from 'carbon neutral' to 'zero rated'.	As such considerations of the use of biomass are outside the scope of the application. Notwithstanding this, the Applicant has identified in previous submissions (Table 11.1 of REP4-020) the derivation and use of the term 'zero rated' is consistent with IPCC accounting terminology.

6. BDB PITMANS ON BEHALF OF NATIONAL GRID CARBON LIMITED

Table 6-1 – Representation from BDB Pitmans on Behalf of National Grid Carbon Limited

Response Ref. (location in original submission)	Comment	Applicant's Response
6.1	At Deadline 6 BDB Pitmans LLP on behalf of National Grid Carbon Limited (NGCL) submitted NGCL's preferred form of protective provisions to the Examination.	The Applicant does not now consider that protective provisions for NGCL should be included in the draft DCO. As the Applicant has already set out in its submissions (paragraph 4.20.3 of REP4-034 and response to CA.2.2 in REP6-033) NGCL are a party who do not yet hold apparatus, a right in apparatus or any land and generally do not yet have a 'statutory undertaking'. As such they are neither a section 127 nor a section 138 party for the purposes of the Planning Act 2008. Based on current circumstances, NEP and bp are in the same position, and the Applicant's view is that those parties are also not section 127 nor 138 parties. As noted at Deadline 6, NGV are in commercial discussions with NEP partners on the sale of Humber onshore pipeline proposals, and subject to completion of the discussions, NGV will transition the Humber onshore carbon dioxide system assets to the NEP. Whilst the Applicant recognises that the promoter of the DCO for the Humber Low Carbon Pipeline (HLCP) will

		have future interests and that the Proposed Scheme interlinks with that proposed project, given the points set out above, the Applicant does not consider protective provisions for NGCL are required in the draft DCO for the Proposed Scheme. When the DCO for the HLCP comes forward, protective provisions can be progressed by the promoter of the scheme, and can be imposed on the Proposed Scheme via that DCO (there is precedent for modification of a development consent order by a subsequent development consent order in The Immingham Open Cycle Gas Turbine Order 2020 (which inserted protective provisions in The Able Marine Energy Park Development Consent Order 2014), as well as Millbrook Gas Fired Generating Station Order 2019 (which inserted protective provisions in The Rookery South (Resource Recovery Facility) Order 2011). This approach has also been agreed between parties and proposed in the draft DCO for Net Zero Teesside, where it has been agreed between the Applicant and the undertaker of the York Potash Harbour Facilities Order 2016 that protective provisions can be inserted into the 2016 Order by the Net Zero Teesside Order (if made)). The Applicant therefore considers the HLCP DCO to be the appropriate mechanism by which to secure any required protective provisions.

7. JAMES HEWITT

Table 7-1 – Representation from James Hewitt

Response Ref. (location in original submission)	Comment	Applicant's Response
Response to ExQ2: 19 April 2023 GEN.2.5 **Additional Text to Support Submission made at deadline 5**	**Deadline 5 Submission** In relation to the DCO for the Net Zero Teesside project, ClientEarth has raised concerns about carbon capture rates under different circumstances. **Additional Deadline 6 Submission** It seems to me that they are very relevant to the DCO for the Drax Bioenergy with Carbon Capture and Storage Project. They are similar to the ClientEarth quotes (presented in my Response to ExQ2: 19 April 2023 GEN.2.5) concerning the Net Zero Teesside project.) '*We understand from the application, including the Environmental Statement, that the Applicant's proposal is to operate the power plant commercially only when the associated carbon capture, transport and storage infrastructure are also in commercial operation, with the effect that at least 90% of the carbon emissions generated by the power plant will not be emitted into the atmosphere and stored permanently underground. However, we are concerned that the terms of the proposed draft DCO do not adequately ensure that this minimum*	ClientEarth's suggestion for a requirement was not adopted on Keadby, and there is no specific requirement within the relevant schedule of the DCO for the Keadby DCO which requires the proposed development to meet a specific capture rate of 90%. The relevant interpretation in part 1 of The Keadby 3 (Carbon Capture Equipped Gas Fired Generating Station) Order 2022 DCO which Mr Hewitt has referred to only requires the design of the relevant infrastructure identified in work no. 1C and work no. 7 to meet a minimum rate of capture of 90%. There is nothing in the order which specifically precludes a capture rate when operational of below 90%. The actual operation of the plant at Drax Power Station, as with Keadby 3 including precise controls relevant to the operation of each individual plant relating to the capture rate, will be

	level of emissions will be captured and permanently stored and that the carbon capture, transport and storage infrastructure will be used throughout commercial operations. We would therefore suggest that the proposed scope of para 33 of the Requirements Schedule to the draft DCO should be expanded to include clear requirements that: *(i) At least 90% of the total carbon emissions generated by the plant must be captured at all times during its commercial operation, and* (ii) *Captured emissions will be stored permanently in the proposed offshore geological storage site.'* In respect of ClientEarth's proposed condition to ensure a minimum capture rate during commercial operation: a. ClientEarth acknowledges the Applicant's clarification that a capture rate of 90% may not be possible at all times of operation – for example during start up – and that the environmental permit to be issued by the Environment Agency will "control the capture rate and how this is to be delivered, measured and monitored, including any limited operating exceptions." b. However, it is not clear why such limited operating exceptions cannot be reflected and incorporated in a DCO condition. For example, a condition can require a minimum 90% capture rate during commercial operation "subject to any specified operating exceptions or lower capture rates in any environmental permit in place for the authorised development" – such an approach (as per the Annex) would be acceptable to ClientEarth. c. In this context, ClientEarth is also not aware of any indication, much less assurance, that the project's environmental permit will	controlled by the Environment Agency and the regulatory regime under the Environmental Permitting Regulations which will be used to regulate the capture rate.

	require that the project's generating capacity is operated only when the project's carbon capture infrastructure is also in operation (at a particular capture rate or otherwise). Rather the environmental permit will regulate the operation of the capture and related infrastructure when such infrastructure is in operation. It is therefore of critical importance that these aspects of the Proposed Development – which underpin its planning merits – are secured by the terms of the DCO. At Deadline 6 the Applicant proposed a number of changes to the definitions in the draft Development Consent Order intended to "address all concerns articulated by ClientEarth" (REP6-017, p. 11; see also the updated draft Development Consent Order REP6-019/020). 2. ClientEarth is satisfied that these changes address the concerns that ClientEarth has raised in the examination regarding the carbon capture and storage aspects of the proposed development. In particular, ClientEarth is content that the precise wording proposed by the Applicant serves to ensure that, subject to reasonable operating exceptions: a. the generating station will only be operated commercially with carbon capture; b. a minimum carbon dioxide capture rate of 90% will be achieved during commercial operation of the generating station; and c. all captured carbon dioxide will be supplied to the National Grid gathering network for onward permanent storage.	

8. JUST TRANSITION WAKEFIELD

Table 8-1 – Representation from Just Transition Wakefield

Response Ref. (location in original submission)	Comment	Applicant's Response
Response to PPL2.2	We note that the Humber Low Carbon Pipeline has recently stalled as National Grid Group indicated its intention to seek a buyer for the pipeline project. We can only guess that this was at least in part behind this project moving into Track 2. This instability and economic doubt at this early stage is clearly significant, including in the context of the government's responses to the Independent Review of Net Zero.	While the Proposed Scheme has not been included within Track 1 of the Government's Cluster Programme, the Applicant has entered into discussions with the Government in relation to the Proposed Scheme. The Department for Energy Security and Net Zero also announced that they will launch a process later in 2023 to enable further expansion of the East Coast Cluster, beyond the initial deployment, identifying and selecting projects for the East Coast Cluster – including from the Humber – to be operational by 2030. The East Coast Cluster aims to capture and store an average of around 23 million tonnes of CO2 per year by 2035. The announcement included within it a confirmation that a process to expand the number of Track 1 clusters would be launched by the Government later on this year. Of direct relevance to the Proposed Scheme the announcement confirmed that: "*We are also announcing the conclusion of the power BECCS project assessment process. Both projects which made submissions, Drax Power Ltd and Lynemouth Power Ltd, met the minimum criteria for deliverability by 2027. These projects have not been selected for deployment in Track-*

		1 but the Department will engage further with these projects following the assessment outcome. Track-1 is not the extent of our ambition and the Government remains committed to achieving 5Mtpa of engineered greenhouse gas removals by 2030." The Applicant remains fully committed to the Proposed Scheme and is currently engaged in bilateral discussions with the Government regarding the project's entry into the Track-1 expansion.
Response to PPL2.2	The Government explicitly asking for opinions on net negativity reinforces that Drax have now clarified that biomass is zero-rated not zero-carbon. This admission casts doubt on the ability of BECCS to engage in carbon trading through the sale of carbon credits. We also note that the government has not yet caught up with Drax's position, still basing policy on the outdated view that biomass is zero-carbon not zero-rated. Because this admission was made during the enquiry, it is unlikely that government policy will have caught up within the release of the Biomass Strategy. Therefore we can expect further policy review in a relatively short timeframe.	The Proposed Scheme seeks consent to retrofit a carbon capture plant at Drax Power Station. As such considerations of the use of biomass are outside the scope of the application. Notwithstanding this, the Applicant has previously identified (in Table 11.1 of document reference REP4-020) the derivation and use of the term 'zero rated' is consistent with well established IPCC accounting terminology. Although not relevant to the determination of the application, the suggestion that Drax cannot engage in carbon trading through BECCS technology is not correct. The Applicant welcomes the anticipated publication of the Government's Biomass Strategy, and notes that the Government's Energy Security Plan (published in March 2023) confirms on Page 39 that the Biomass Strategy will: *'establish the role which BECCS can play in reducing carbon emissions across the economy and set out how the technology could be deployed.'*

APPENDIX A – CONSIDERATION OF ENVIRONMENTAL FACTORS FOR ALTERNATIVES

Consideration of Environmental Factors for Alternatives

DATE:	05 May 2023	**CONFIDENTIALITY:**	Confidential
PROJECT NAME:	Drax BECCS DCO	**PROJECT NUMBER:**	EN010120
DOCUMENT NO. | REV. NO:	01	**DOCUMENT OWNER:**	WSP UK Ltd
AUTHOR:	LI	**APPROVER:**	NA
SUBJECT: Drax BECCS | Consideration of Environmental Factors for Alternatives			

LOCATION

As the Proposed Scheme involves retrofitting post-combustion Carbon Capture technology to existing Biomass units at the Drax Power Station Site, other power station sites were not considered viable. As such, the installation of post-combustion Carbon Capture technology would mean there is little material change to the land use. The Drax Power Station Site is a brownfield site and has existing electrical and transport connections. Using an off-site solution may require the use of greenfield land and would require additional infrastructure, such as cooling water systems and electrical connections due to potential distances from the existing infrastructure at the Site.

Two potential locations for the Proposed Scheme were considered on the Drax Power Station Site itself. The first is the northern solution, which is shown in **Appendix 1**. This is the layout which formed the DCO Application submission to PINS in May 2022, with the equipment located immediately west of the northern cooling towers.

The second option that was considered was the southern solution. This is shown in **Appendix 2**. Within this option, the Flue Gas Treatment and CO_2 removal infrastructure would be located further south on the Drax Power Station Site, to the west of the southern cooling towers.

ENVIRONMENTAL APPRAISAL

As detailed in Chapter 3 (Consideration of Alternatives) of the ES (APP-039) the overarching reasons for selecting the northern solution include the following:

NORTHERN SOLUTION

Reasons for selecting the northern solution are set out below:

- The northern set of cooling towers would be the focus of this option. This would be beneficial as the southern cooling towers form part of the current operations at the Site. The northern cooling towers are associated with units 5 and 6, which currently use coal. These units will cease operations prior to the construction of the Proposed Scheme, so the northern cooling towers can be used for BECCS without impacting wider site operations;

- The northern solution allows the re-use of existing infrastructure such as piling from the Flue Gas Desulphurisation (FGD) plant which would be demolished prior to construction of the Proposed Scheme. This would reduce the materials required and waste generated as the infrastructure is already in place;
- The use of the northern solution minimises pipe runs, in particular the high-pressure carbon dioxide pipeline, given the reduced area required to be covered; and
- The close proximity of the main flue gas stack to the northern solution improves the flue gas supply and return tie-in locations.

SOUTHERN SOLUTION

Reasons for not selecting the southern solution are set out below:

- The southern solution would cause greater disruption to the operation of the Drax Power Station infrastructure, as it would be required to tie into the southern cooling towers, which are currently in use;
- The southern solution would not be able to use the existing infrastructure for the FGD plant, due to be demolished, and would therefore cause greater impacts and disruption;
- The use of the southern solution would require longer pipe runs to be constructed; and
- The southern solution would be located further away from the main flue gas stack and would therefore need to occupy a greater area of the Site.

ENVIRONMENTAL APPRAISAL

The environmental features of the two solutions are similar as they both centre on the Existing Drax Power Station Site, which is a brownfield site. **Table 1** below provides a high level qualitative environmental appraisal of the northern solution and the southern solution.

Table 1 – Environmental Appraisal of the Northern & Southern Solutions

Topic	Northern Solution	Southern Solution
Transport	Transport routes to the Site would be the same for both options. PRoW 35.6/11/1 would be affected due to the presence of construction plant and equipment.	Longer pipe runs could mean that additional construction materials may be required for the southern solution. As a result there could be slightly more construction traffic movements in relation to this option. Works could be programmed so traffic volumes would be within the limits assessed. Transport routes to the Site would be the same for both options. PRoW 35.6/11/1 would be affected due to the presence of construction plant and equipment.

Topic	Northern Solution	Southern Solution
	There would be very little difference between the options with regard to transport impacts. As the infrastructure for both options is located on the Existing Drax Power Station Site, no additional transport routes into the Site would be used. With mitigation included in a Construction Environmental Management Plan these effects would be not significant. Environmental effects during operation would be not significant. There is no preferred solution in terms of transport.	
Air Quality	There would be similar effects during construction and operation. The effects during the construction phase for both scenarios would include dust deposition, which has the potential to cause dust soiling of properties and / or impact human health at sensitive receptor locations. These effects would be mitigated through measures included in the REAC which includes a requirement for a CEMP to be produced. During operation, the emissions would be from the Main Stack, which would remain in the same location in both scenarios, and would therefore affect the same sensitive receptors. There is no preferred solution in terms of air quality.	
Noise	The assessment completed in Chapter 7 (Noise and Vibration) of the ES (APP-043) identified the sensitive receptors as isolated properties and showed that noise effects due to traffic movements and activities such as piling, during the construction phase would be not significant. During construction, vibration impacts from piling were modelled and it was determined that the impact would be not significant on the nearest sensitive receptor (Wren Hall), located 900m north of the Site. Operational vibration impacts were scoped out of the assessment. During operation, noise-emitting plant, e.g. pumps would be located north of the existing main stack and	During construction, the southern solution may require more piling activities as the FGD piles cannot be reused and the proposed Flue Gas Treatment and CO_2 removal infrastructure would be located further south on the Drax Power Station Site, to the west of the existing southern cooling towers. This could lead to increased noise impacts for receptors in Camblesforth and Camela Lane however mitigation such as acoustic screening would help to reduce these. Vibration impacts during construction have not been modelled for the southern solution, however there are sensitive receptors slightly closer to the site, including Station Cottage (R5) which is located approximately 650m from the noise emitting plant.

Topic	Northern Solution	Southern Solution
	immediately west of the existing northern cooling towers. This increases distances to sensitive receptors located in Camblesforth and on Camela Lane compared with the southern solution, and reduces their likelihood of experiencing noise-related impacts. The assessment completed in Chapter 7 (Noise and Vibration) of the ES (APP-043) identified the sensitive receptors as isolated properties and identified that during operation noise emitting plant such as pumps or compressors may contribute to noise levels. Operational noise was found to be not significant for these receptors.	During operation, it is more likely that there would be greater impacts (compared with the northern solution) to properties in Camblesforth and along Camela Lane as there would be more noise-emitting plant e.g. pumps, located nearer to the southern cooling towers. During operation there may still be noise impacts to isolated sensitive receptors to the north of the Site as the high pressure compressors would be located here but as detailed in the assessment presented in Chapter 7 (Noise and Vibration) effects would not be significant.
	Similar construction activities would take place for both the northern and southern solutions. Whilst the effects are similar in relation to noise it is anticipated that the environmental effects of the northern option could be slightly less due to the requirement for more piling for the southern option, which could lead to increased noise impacts for receptors in Camblesforth and Camela Lane. The locations of the nearest sensitive receptors are shown in ES Figure 7.3 (Operational Predicted Mitigated Noise Levels) (APP-091), provided in **Appendix 3**. The environmental effects of the northern solution during operation are anticipated to be slightly less than the southern option. This is due to a greater number of sensitive receptors (in Camblesforth and along Camela Lane) potentially being impacted for the southern option as there would be more noise-emitting plant e.g. pumps, located nearer the southern cooling towers. Whilst the environmental effects during construction and operation of the northern option may be slightly less than the southern option it is not anticipated that this would be significant. There is no preferred solution in terms of noise.	
Ecology	Construction of the Proposed Scheme and associated site and vegetation clearance work is expected to lead to both temporary and permanent removal of a	The footprint of the southern solution would be slightly larger than the northern solution as the southern solution uses the southern cooling towers which are located further away from the Main Stack.

Topic	Northern Solution	Southern Solution
	proportion of habitats within the Drax Power Station Site and East Construction Laydown Area. Works would be carried out in the Woodyard for the northern solution, which could lead to effects on habitats as a result of dust deposition and disturbance during construction. These effects would be mitigated through measures identified in the REAC which includes the requirement to produce a CEMP for the Proposed Scheme. Figure 8.3 (Phase 1 Habitats) o the ES (APP-094) highlights the existing habitats present within the Order Limits and around the wider Drax Power Station Site. Small amounts of vegetation clearance may be required for the works. Some habitat would be lost temporarily within the East Construction Laydown Area. Operational impacts would be the same for both options as the Main Stack would remain in the same place.	Works would be carried out in the Woodyard for the southern solution, which could lead to effects on habitats as a result of dust deposition and disturbance during construction. These effects would be mitigated through measures identified in the REAC which includes the requirement to produce a CEMP for the Proposed Scheme Figure 8.3 (Phase 1 Habitats) of the ES (APP-094) highlights the existing habitats within the Order Limits and around the wider Drax Power Station Site. Although the potential order limits for the southern location were not progressed far enough to be defined, a small amount of vegetation clearance may be required for the works. Some habitat would be lost temporarily within the East Construction Laydown Area. Operational impacts would be the same for both options as the Main Stack would remain in the same place.
	There is no preferred solution in terms of ecology.	
LVIA	With the northern solution, construction activity would be visible from viewpoints 2, 3, 6 and 7 due to the presence of tall construction plant and the emergence of the Absorber Columns and Regenerators. (see Chapter 9 (Landscape and Visual Amenity) of the ES (APP-045)). Some low level activities would be partially filtered by intervening tree planting at viewpoint 2, whilst at viewpoint 3	The location of some of the tall infrastructure in the southern solution may have a slightly different placement within views. The differing placement would mainly be visible from viewpoints 1, 2, 3, 4, 9 and 10 (see Figure 9.6 (Viewpoint Photography) of the ES (APP-103)), with the new infrastructure for the southern solution visible near the south cooling towers. Despite this, the cooling towers would still be taller than the new infrastructure and remain the dominant feature within associated views. From

Topic	Northern Solution	Southern Solution
	existing vegetation and earthworks would help to filter views. The other viewpoints are likely to have some awareness of the northern solution but would be substantially screened by adjacent built form already present within views. During operation, there are no significant effects anticipated with the northern solution.	viewpoint 3 (from the PRoW) the southern solution is less visible due to the presence of existing buildings within the site that would partially screen views. The other viewpoints are likely to have some awareness of the southern solution but would be substantially screened by adjacent built form already present within views.
	There would be minimal differences between either option with regard to landscape character, as the sites would be perceived within the context of the existing Site. The differences between the solutions would be not significant. There is no preferred option in terms of landscape.	
Heritage	There would be no difference between the solutions. Due to previous ground disturbance across the entire Site, no impacts within the Drax Power Station Site would be anticipated as any Historic Assets within the Site would have been removed previously during construction. There is no preferred option in terms of Heritage.	
Ground Conditions	The northern solution has a reduced footprint due to the location of the equipment nearer the northern cooling towers. There would also be fewer piling activities required as existing piles from the FGD plant would be reused. The assessment already produced for the northern solution found that with mitigation measures, such as a pre-construction ground investigation, a Piling Risk Assessment and a Materials Management Plan, the impacts from the northern solution are anticipated to be neutral for controlled waters, neutral for health impacts on construction workers, and slight	The southern solution has a slightly larger footprint due to longer pipe runs required, particularly for the high-pressure carbon dioxide pipeline. There would also be additional piling required for the southern option as the FGD infrastructure would not be reused. The Phase 1 Preliminary Risk Assessment (see ES Appendix 11.1 (APP-156 and APP-157)) covered the Drax Power Station Site (including the area where the southern solution would be constructed). The conclusions and recommendations of this assessment remain valid for the southern solution too. With mitigation measures, such as a pre-construction ground investigation, a Piling Risk Assessment and a Materials Management Plan, the impacts from the

Topic	Northern Solution	Southern Solution
	adverse (not significant) on agricultural land.	southern solution are anticipated to be similar to the northern solution.
	There are some slight differences in the amount of piling required for the northern and southern solutions however with mitigation measures, these differences are not significant. There is no preferred option from a ground conditions perspective.	
Water Environment	The footprint of the northern solution would increase the impermeable area on the Site slightly. This is because the new BECCS infrastructure will have a slightly larger footprint than the FGD infrastructure to be demolished. The BECCS infrastructure would result in a loss of floodplain. Details of the Floodplain Compensation Area to be created have been included in the Flood Risk Assessment (REP2-039 and REP2-041). A new system of surface water drains would be required to collect surface water runoff. This would be directed to a new sump and pump arrangement which would direct these waters to the existing northern cooling water reservoir, to be utilised as cooling water. After this water is used for cooling, it is then directed to the 'purge' and pumped into the River Ouse.	The footprint of the southern solution would have a greater increase in the impermeable area on the Site compared to the northern solution. This is because the new BECCS infrastructure would have a slightly larger footprint than the existing built footprint to be demolished to facilitate the Proposed Scheme. The BECCS infrastructure would result in a loss of floodplain. It is envisaged that a greater floodplain compensation area than that detailed in the Flood Risk Assessment (REP2-039 and REP2-041) would be required. It is not certain where this could be located due to the flat nature of the catchment. A new system of surface water drains would be required to collect surface water runoff. This would be directed to a new multiple sump and pump arrangements which would direct these waters to the existing northern cooling water reservoir, to be utilised as cooling water. After this water is used for cooling, it is then directed to the 'purge' and pumped into the River Ouse. However, the southern solution would introduce longer pipe runs for the drainage system and the connection to the WWTP which would create a more complex system and increase risk of leakages and adverse impacts on the water environment.

Topic	Northern Solution	Southern Solution
	The significant difference between the two options is that the southern solution would require greater floodplain compensation (which could be difficult to provide) and longer pipe runs, along with greater impermeable area, the northern solution would be the preferred option in terms of the water environment.	
Materials and Waste	The northern solution allows the re-use of existing infrastructure such as piles from the FGD plant. This would reduce the materials required and waste generated as the infrastructure is already in place. Additionally, the northern solution requires less material for pipe runs, in comparison with the southern solution, for example for the high-pressure carbon dioxide pipeline and for drainage infrastructure.	The southern solution would occupy a greater area of the site as it would be located further away from the Main Stack. This means that longer pipe runs would be required, in particular the high pressure carbon dioxide pipeline, which would increase the quantity of construction materials required. With the northern solution, piles from the FGD plant will be reused, however as the southern solution would not overlap with the footprint of the FGD plant, more primary resources would be required during construction. It is anticipated that the amount of earthworks would be similar to that produced for the northern option.
	The northern solution is preferable from a materials and waste perspective.	
Climate Resilience	A Floodplain Compensation Area has been identified for the northern solution, which would mitigate flood risk at the Site. The infrastructure would be built to the required standard to withstand temperature increases and other extreme weather events.	The southern solution would introduce more impermeable area to the Site when compared to the northern solution and it is therefore anticipated that a greater floodplain compensation volume would be required. It may not be possible to find an area of sufficient size to provide the required floodplain compensation due to the flat topography of the area. Due to the increase in impermeable surfaces, the southern solution may increase flood risk if suitable floodplain compensation is unable to be identified. This could mean that sensitive equipment is at risk during extreme events. The infrastructure would be built to required standards to withstand

Topic	Northern Solution	Southern Solution
		temperature increases and other extreme weather events.
	Due to the potential that the southern solution would have a greater impermeable area and that the corresponding floodplain compensation required would also be greater, the northern solution would be the preferred option for climate resilience.	
GHG	Whilst the longer pipe runs for the southern solution have the potential to have greater GHG emissions, the difference between the northern and southern solutions would be small and would not be significant. During operation, the two options would be similar as the Site uses the same equipment. There is no preferred option in terms of Greenhouse Gases.	
Population and Health	With regards to accommodation and community facilities for construction workers, there would be no difference between the two solutions as the same number of construction workers would be required in each solution as the same infrastructure is to be built. During construction, PRoW 35.6/11/1 would be affected by both options as there would be works to similar areas of the sites which would be visible from the footpath. In terms of job creation during operation, the same infrastructure will be built and will require the same number of workers. For this reason there is no difference between the options. In terms of operational air quality impacts on human health, there would be the same effects for both solutions as the Main Stack remains in the same location. There is no preferred solution in terms of Population and Human Health.	
MA&D	There would be no difference between the two solutions, as both options would be located with the Drax Power Station Site and the same equipment would be used. The potential MA&D events considered for the northern solution would also be applicable to the southern solution. There would be no additional MA&D events associated with the southern solution.	
Cumulatives	There would be no difference between the options, as these have a similar footprint and the same equipment would be used. **Intra-project effects**: Whilst there are some slight differences between effects for certain topics (Climate Resilience, Materials and Waste, Water Environment and Noise), these are not anticipated to be significant. The intra-project effects assessment would therefore be the same for both options.	

Topic	Northern Solution	Southern Solution
	Inter-project effects: The construction programme would be the same and the construction effects would be comparable for both solutions. As a result, any cumulative effects with other developments are not anticipated to differ between the northern and southern solutions. The operation of the two solutions would be similar. In terms of air quality impacts, these would remain the same as the Main Stack is in the same location in both solutions. As a result, cumulative effects with other developments are not anticipated to differ between the northern and southern solutions. There is no preferred option in terms of cumulative effects.	

Additional Information in Relation to Noise and Vibration

A call was held on the 24 April 2023 between the Applicant and NYC and one of the points discussed was the likely noise impacts arising from the southern layout, an alternative presented in Chapter 3 (Consideration of Alternatives) (APP-039), compared to the final selected northern solution for the Drax BECCS Proposed Scheme.

The EHO at NYC has requested that the Applicant provide further detail on the option selection process, in particular distances of each option to sensitive receptors. The information set out above was used in preparation for the first set of hearings. This section provides further detail as requested by the EHO at NYC.

The text set out in relation to Noise and Vibration in **Table 1** above is all based on acoustics first principles; that a sound level decreases as the distance from the sound source increases. Consequently, as the noise sources associated with the northern solution are located further from sensitive receptors than the southern solution, noise levels would be lower for the northern solution (all else being equal).

Table 2 shows the distances from the proposed equipment to the residential noise sensitive receptors. The table shows that the shortest distance to noise sensitive receptors is greater in the northern layout compared to the southern layout. The locations of the nearest sensitive receptors are shown in ES Figure 7.3 (Operational Predicted Mitigated Noise Levels) (APP-091), provided in **Appendix 3**.

It is also noted that the Barlow Mound provides noise attenuation for noise sensitive receptors to the west of the Site and that this is more effective in the northern layout compared to the southern layout.

Table 2 - Distances to Nearest Noise Sensitive Receptors

Layout Option	Shortest distance	Noise sensitive description
Northern	1000m	Houses in Forest Grove, Barlow
Southern	800m	Grange Lodge on Brigg Lane, Camblesforth

The adoption of the northern solution was driven by technological reasons (e.g. larger pipe runs) rather than environmental issues. Consequently, the southern solution has not been modelled in detail; however, acoustics has been considered throughout the DCO process and the wider consideration of alternatives.

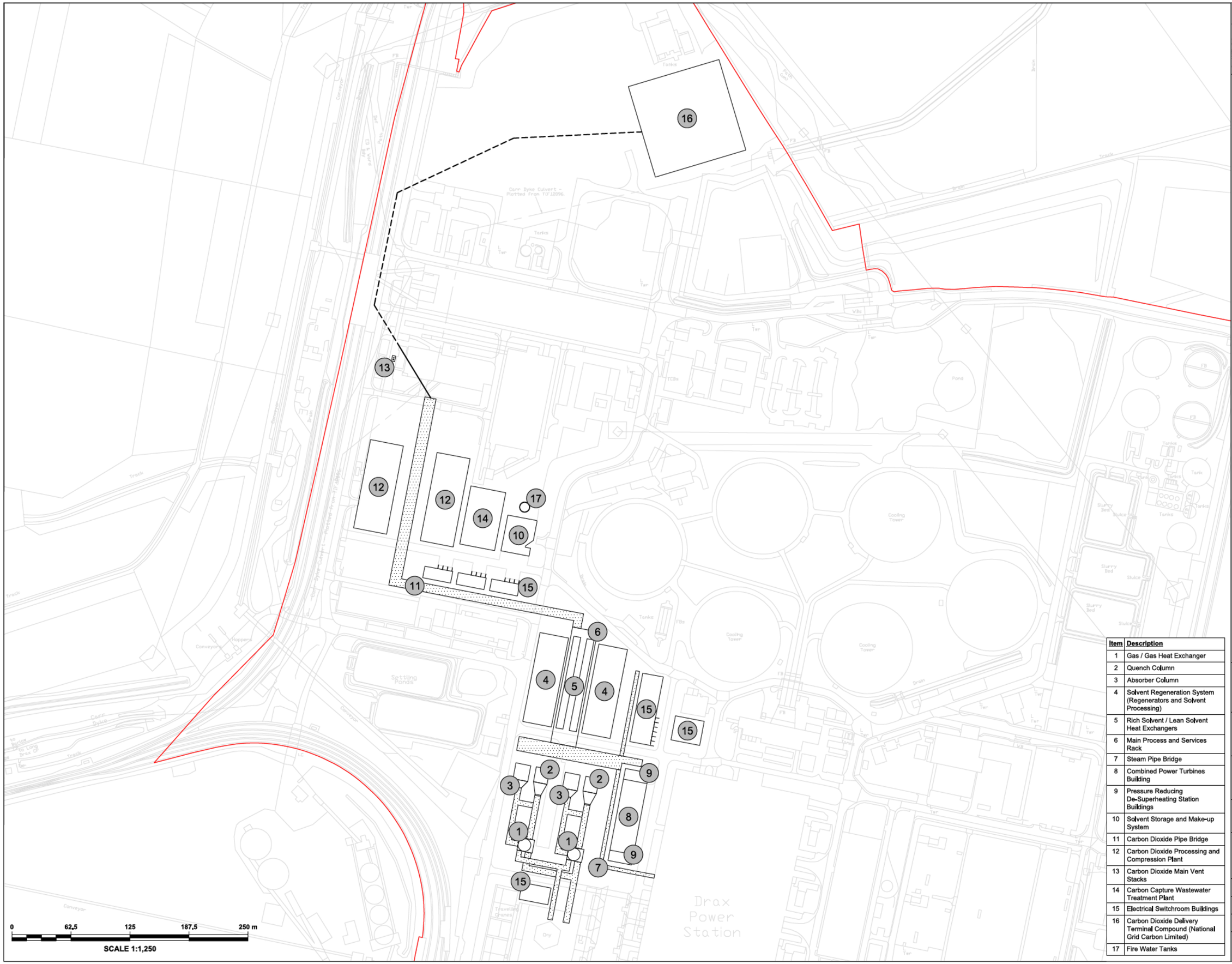
SOLVENT TECHNOLOGY AND SELECTION

In the Carbon Capture Process, a solvent is used to absorb the CO_2 from the untreated flue gas. The carbon dioxide-rich solvent solution is then heated to reverse the original reaction and separate the CO_2 from the solvent. Following the removal of contaminants, the solvent can then be reused. There are broadly two types of solvent that were considered for the Proposed Scheme. The first is amine based, and the second is non-amine based.

Non-amine solvent technology is not yet sufficiently technologically advanced nor has been demonstrated at scale to be a viable technology option which could be utilised for the BECCS development, as it would be required by 2027. It has therefore not been selected as a technology option for pre-Front-End Engineering Design (Pre-FEED) or FEED. Drax continues to support the development of such technologies, including the enabling of research into engineering solutions of the first non-amine solvent based pilot plant installed at the Site in 2018.

A Feasibility Study, which included a comparison of solvents, was carried out by the Applicant's Technical Supplier. This study identified the technical advantage of the selected amine solvent, as the chosen option reduces steam demand and increases Regenerator pressure (i.e. reducing the compressor power requirement). It is also expected to result in reduced degradation of the solvent and reduced solvent emission levels (as a result of lower steam demand). The use of amine-based solvent may release nitrosamines and nitramines into the atmosphere. In large concentrations these can be damaging to human health. However, the increase in ground level concentrations represents a small proportion of the Environment Agency environmental assessment level (EAL) for nitrosamines (as NDMA) and the EALs for emitted amines, proposed by the Applicant (which are more stringent than the EALs set by the Environment Agency). As a result, the assessment included in Chapter 6 (Air Quality) of the ES (APP-042) concluded that there are no significant health effects as a result of the operation of the Proposed Scheme.

APPENDIX 1: NORTHERN SOLUTION LAYOUT (ES FIGURE 2.2 (INDICATIVE PLANT EQUIPMENT LAYOUT))



Key:

- Order Limits
- Pipe Bridges and Ducting
- Aboveground Carbon Dioxide Pipeline
- Underground Carbon Dioxide Pipeline

Notes:

1. This drawing includes only the main plant equipment / buildings as referenced in Schedule 14 of the draft DCO.
2. Although the layout configuration, dimensions and number of plant equipment / buildings presented should be considered indicative, it represents the current concept design which has been developed from thorough and detailed engineering work with consideration given to the deliverability and integration with the existing Drax Power Station. For reference of the maximum parameters used for the environmental assessment, please refer to Schedule 14 of the draft DCO.
3. 7 metre easement from the culvert walls of Carr Dyke required. Route and width of culvert indicatively shown on plan but to be confirmed during surveys at Detailed Design.
4. Any works associated with replacements, upgrades or modifications of existing plant equipment / buildings have not been shown in this drawing. However, specific details for each of these works have been outlined below for reference, and details of all works have been included in Chapter 2 - Project Description of the Environmental Statement and Schedule 1 of the draft DCO:
   - 4.1. An alternate secondary electrical supply for the BECCS equipment would be provided from the existing 132 kV air insulated switchgear through upgrade works on the existing 400 kV National Grid substation, the existing 132 kV air insulated switchgear, replacement of existing 132 kV underground cabling and restringing of existing 132 kV overhead powerlines, and installation of new distribution voltage infrastructure.
   - 4.2. Cooling requirements would be provided using the existing northern cooling towers. Modification works would be required to the existing cooling water pumps and reconfiguration of the cooling water discharge manifold.
   - 4.3. Modification, upgrade and extension works would be required to the existing Unit 1 and Unit 2 to enable steam extraction and supply to the BECCS equipment.
   - 4.4. Modification and refurbishment works would be required to the existing Unit 1 and Unit 2 electrostatic precipitators.
   - 4.5. Replacement and upgrade works would be required to the existing main generator transformers for Unit 1 and Unit 2.
   - 4.6. Retrofitting works would be required to the existing Sedimentation Tanks to ensure suitable quality of circulating water through the BECCS plant.

Item	Description
1	Gas / Gas Heat Exchanger
2	Quench Column
3	Absorber Column
4	Solvent Regeneration System (Regenerators and Solvent Processing)
5	Rich Solvent / Lean Solvent Heat Exchangers
6	Main Process and Services Rack
7	Steam Pipe Bridge
8	Combined Power Turbines Building
9	Pressure Reducing De-Superheating Station Buildings
10	Solvent Storage and Make-up System
11	Carbon Dioxide Pipe Bridge
12	Carbon Dioxide Processing and Compression Plant
13	Carbon Dioxide Main Vent Stacks
14	Carbon Capture Wastewater Treatment Plant
15	Electrical Switchroom Buildings
16	Carbon Dioxide Delivery Terminal Compound (National Grid Carbon Limited)
17	Fire Water Tanks

drax

wsp

PROJECT TITLE
DRAX BECCS DCO

DRAWING TITLE
FIGURE 2.2:
INDICATIVE PLANT EQUIPMENT LAYOUT

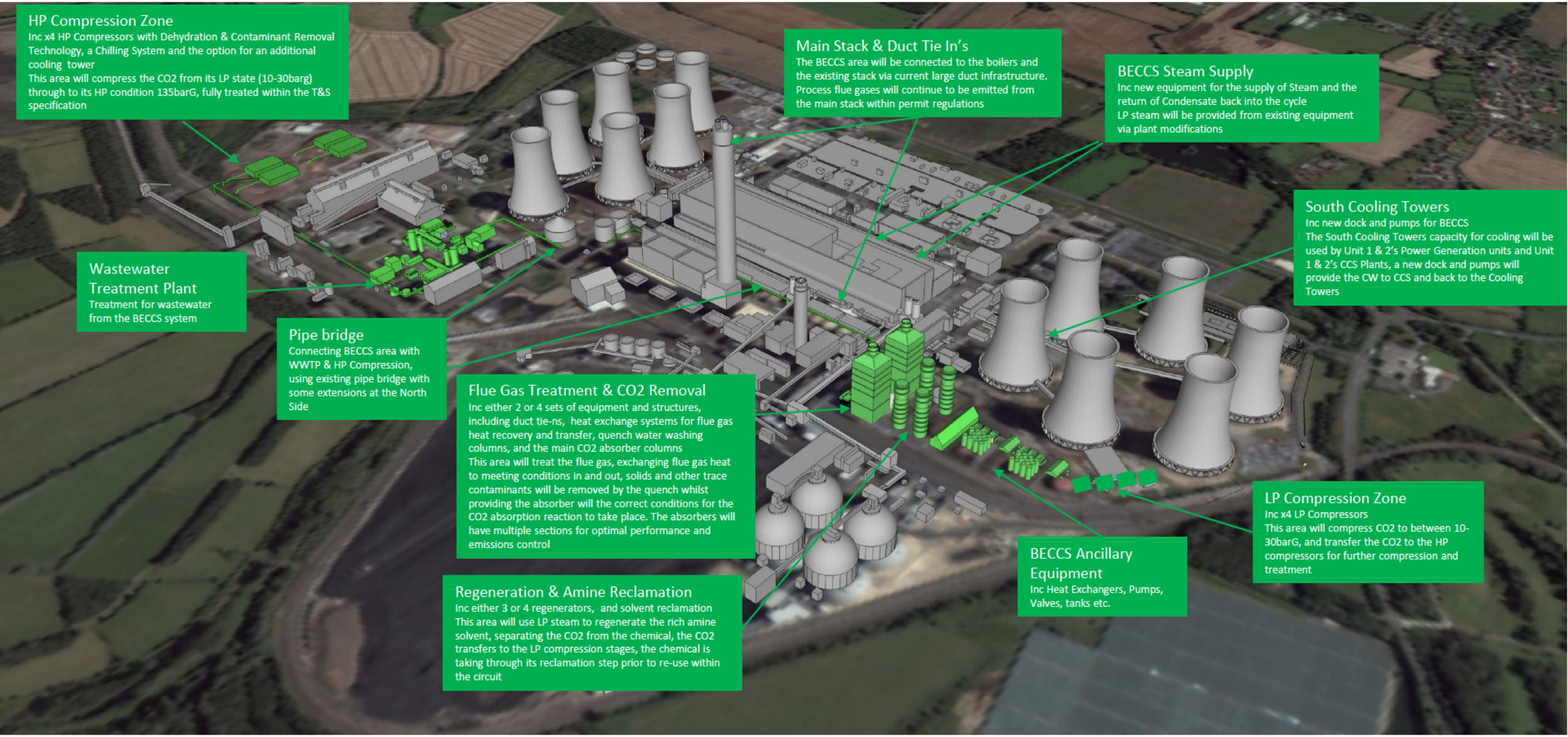
DRAWING STATUS
FOR ISSUE

DRAWN	CHECKED	APPROVED	AUTHORISED
CH	RM	MM	NA

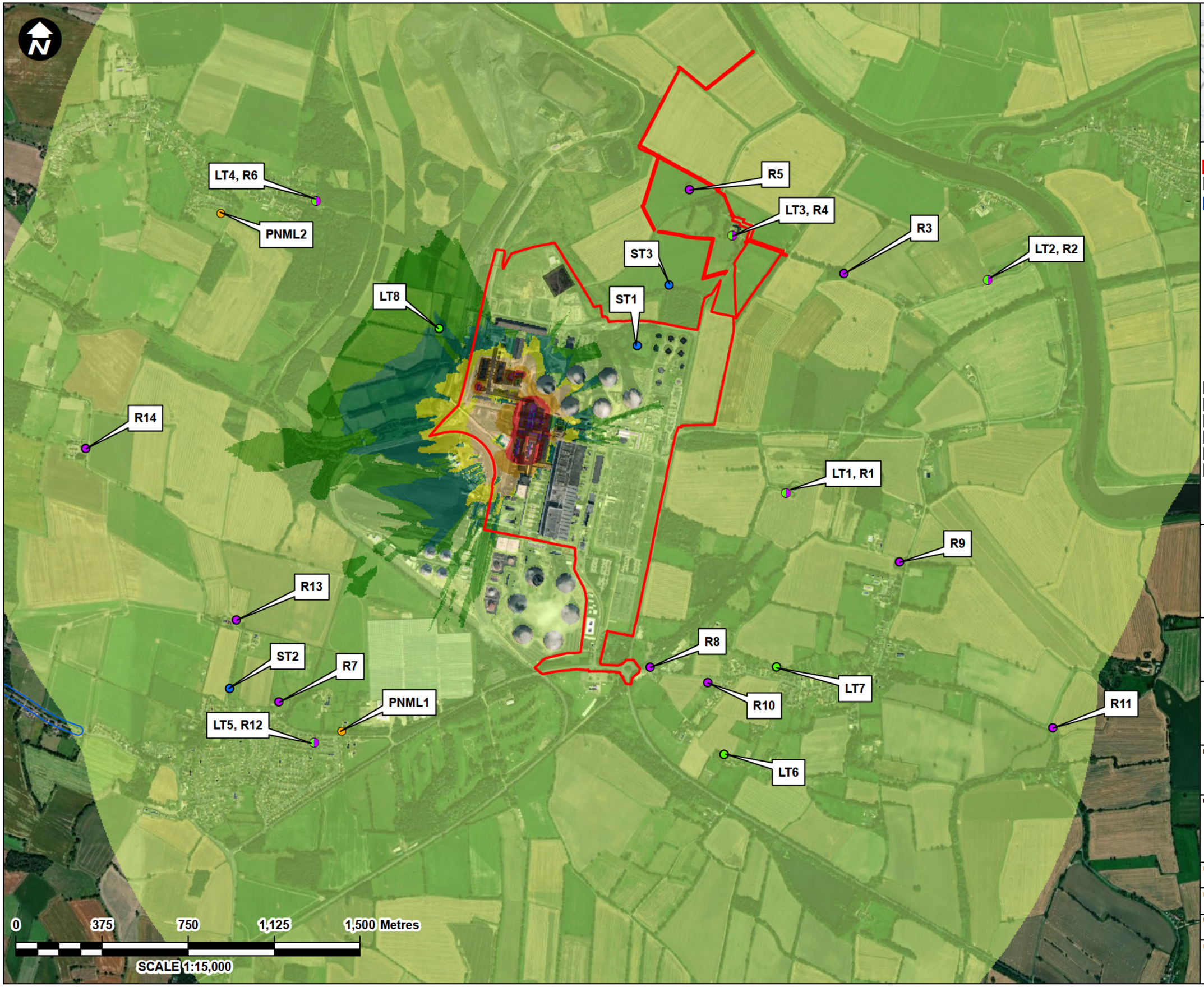
SCALE @ A0 SIZE	DATE	REVISION
1:1,250	06/05/2022	P01

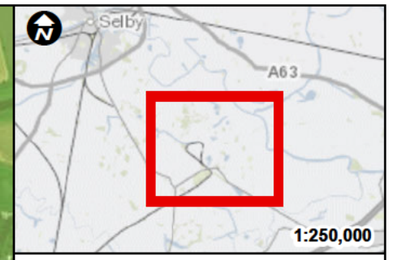
DRAWING NUMBER
EN010120-PA-ES-6.2.2.2

APPENDIX 2: SOUTHERN SOLUTION LAYOUT


HP Compression Zone
Inc x4 HP Compressors with Dehydration & Contaminant Removal Technology, a Chilling System and the option for an additional cooling tower
This area will compress the CO2 from its LP state (10-30barg) through to its HP condition 135barG, fully treated within the T&S specification
Main Stack & Duct Tie In's
The BECCS area will be connected to the boilers and the existing stack via current large duct infrastructure. Process flue gases will continue to be emitted from the main stack within permit regulations
BECCS Steam Supply
Inc new equipment for the supply of Steam and the return of Condensate back into the cycle
LP steam will be provided from existing equipment via plant modifications
South Cooling Towers
Inc new dock and pumps for BECCS
The South Cooling Towers capacity for cooling will be used by Unit 1 & 2's Power Generation units and Unit 1 & 2's CCS Plants, a new dock and pumps will provide the CW to CCS and back to the Cooling Towers
Wastewater Treatment Plant
Treatment for wastewater from the BECCS system
Pipe bridge
Connecting BECCS area with WWTP & HP Compression, using existing pipe bridge with some extensions at the North Side
Flue Gas Treatment & CO2 Removal
Inc either 2 or 4 sets of equipment and structures, including duct tie-ns, heat exchange systems for flue gas heat recovery and transfer, quench water washing columns, and the main CO2 absorber columns
This area will treat the flue gas, exchanging flue gas heat to meeting conditions in and out, solids and other trace contaminants will be removed by the quench whilst providing the absorber will the correct conditions for the CO2 absorption reaction to take place. The absorbers will have multiple sections for optimal performance and emissions control
LP Compression Zone
Inc x4 LP Compressors
This area will compress CO2 to between 10-30barG, and transfer the CO2 to the HP compressors for further compression and treatment
BECCS Ancillary Equipment
Inc Heat Exchangers, Pumps, Valves, tanks etc.
Regeneration & Amine Reclamation
Inc either 3 or 4 regenerators, and solvent reclamation
This area will use LP steam to regenerate the rich amine solvent, separating the CO2 from the chemical, the CO2 transfers to the LP compression stages, the chemical is taking through its reclamation step prior to re-use within the circuit

APPENDIX 3: ES FIGURE 7.3 (OPERATIONAL PREDICTED MITIGATED NOISE LEVELS





Key:

- Order Limits
- New Equipment Footprints
- Noise Action Planning Important Areas (NIA) Round 3 (Eng)
- Short Term Noise Measurement Location
- Sensitive Receptor Location
- Long Term Noise Measurement Location
- Long Term Noise Measurement and Sensitive Receptor Location
- Permanent Noise Measurement Location

LAeq,T dB

<35	60-65
35-40	65-70
40-45	70-75
45-50	75-80
50-55	80-85
55-60	

Infrastructure Planning (Applications: Prescr bed Forms and Procedure) Regulations 2009 - Regulation 5(2)(a)

drax

wsp

PROJECT TITLE

DRAX BECCS DCO

DRAWING TITLE

FIGURE 7.3:
OPERATIONAL PREDICTED MITIGATED NOISE LEVELS

DRAWING STATUS

FOR ISSUE

DRAWN	CHECKED	APPROVED	AUTHORISED
LH	BS	CR	EO

SCALE @ A3 SIZE	DATE	REVISION
1:15,000	02/02/2023	P02

DRAWING NUMBER

EN010120-PA-ES-6.2.7.3-Sheet1

APPENDIX B – NATIONAL GRID FUTURE ENERGY SCENARIOS

Key statistics

	2021	2030				2035				2050				
Emissions		CT	ST	LW	FS	CT	ST	LW	FS	CT	ST	LW	FS	**Emissions**
Annual average carbon intensity of electricity (g CO_2/kWh)	156	40	47	15	106	-26	-26	-12	43	-53	-51	-19	-12	Annual average carbon intensity of electricity (g CO_2/kWh)
Electricity														**Electricity**
Annual demand (TWh)[1]	294	339	321	368	323	463	392	476	370	710	716	672	566	Annual demand (TWh)[1]
Peak demand (GW)[2]	59	69	64	63	67	87	73	82	78	113	100	98	114	Peak demand (GW)[2]
Total installed capacity (GW)[3]	107	191	171	211	156	266	225	286	190	382	318	363	276	Total installed capacity (GW)[3]
Wind and solar capacity (GW)	40	104	90	124	70	156	136	175	94	237	189	226	138	Wind and solar capacity (GW)
Interconnector capacity (GW)	6	13	13	19	13	19	13	25	13	22	16	27	13	Interconnector capacity (GW)
Total storage capacity (GW)[4]	4	20	15	30	12	36	19	51	16	63	40	71	27	Total storage capacity (GW)[4]
Total storage capacity (GWh)[5]	28	59	47	118	42	116	56	147	48	165	113	195	63	Total storage capacity (GWh)[5]
Total vehicle-to-grid capacity (GW)[6]	0	2	0	3	0	14	1	28	0	34	16	39	8	Total vehicle-to-grid capacity (GW)[6]
Natural Gas														**Natural Gas**
Annual demand (TWh)[7]	878	592	676	489	789	402	593	332	742	27	392	75	572	Annual demand (TWh)[7]
1-in-20 peak demand (GWh/day)	5555	3985	4823	3368	5331	2593	3858	1987	4950	282	2086	509	3962	1-in-20 peak demand (GWh/day)
Residential demand (TWh)[8]	340	242	292	200	314	152	213	113	284	0	1	0	142	Residential demand (TWh)[8]
Imports (TWh)	552	432	463	309	517	301	433	228	465	24	386	55	393	Imports (TWh)
Hydrogen														**Hydrogen**
Annual demand (TWh)	0	3	36	38	1	17	148	77	3	114	431	244	11	Annual demand (TWh)
Blue hydrogen production (TWh)[9]	0	0	25	7	0	1	104	26	1	1	218	26	6	Blue hydrogen production (TWh)[9]
Green hydrogen production (TWh)[10]	0	3	10	31	1	15	23	44	2	104	160	179	5	Green hydrogen production (TWh)[10]
Bioresources														**Bioresources**
Bioresource demand (TWh)	-	109	110	140	120	190	190	151	134	250	251	177	160	Bioresource demand (TWh)