Immingham Green Energy Terminal

9.3 Applicant's Responses to the Examining Authority's First Written Questions

(Responses to "Q1.8. Flood Risk and Coastal Change")

Infrastructure Planning (Examination Procedure) Rules 2010

Volume 9

March 2024

Planning Inspectorate Scheme Ref: TR030008

Document Reference: TR030008/EXAM/9.3

Table of contents

Chapter **Pages**

1 Introduction 3

2 Applicant's Responses to the Examining Authority's First Round of Written Questions 4

Q1.8.1 Sequential Test, Flood Risk Assessment and Sustainable Drainage 4
Q1.8.1.1 4
Q1.8.1.3 4
Q1.8.1.4 5
Q1.8.1.5 6
Q1.8.1.6 7
Q1.8.1.7 9
Q1.8.1.8 12
Q1.8.1.9 13
Q1.8.2 Dredging and Physical Processes 13
Q1.8.2.1 13
Q1.8.2.2 14
Q1.8.2.3 15
Q1.8.2.4 16
Q1.8.2.5 18
Q1.8.2.6 19
Q1.8.2.7 20
Q1.8.2.8 21
Q1.8.2.9 22
Q1.8.3 Climate Change Adaptation 25
Q1.8.3.1 25
Q1.8.3.2 26
Q1.8.3.3 32

1 Introduction

Overview

1.1 This document has been prepared to accompany an application made to the Secretary of State for Transport (the "Application") under section 37 of the Planning Act 2008 ("PA 2008") for a development consent order ("DCO") to authorise the construction and operation of the proposed Immingham Green Energy Terminal ("the Project").

1.2 The Application is submitted by Associated British Ports ("the Applicant"). The Applicant was established in 1981 following the privatisation of the British Transport Docks Board. **The Funding Statement [APP-010]** provides further information.

1.3 The Project as proposed by the Applicant falls within the definition of a Nationally Significant Infrastructure Project ("NSIP") as set out in Sections 14(1)(j), 24(2) and 24(3)(c) of the PA 2008.

The Project

1.4 The Applicant is seeking to construct, operate and maintain the Immingham Green Energy Terminal, comprising a new multi-user liquid bulk green energy terminal located on the eastern side of the Port of Immingham (the "Port").

1.5 The Project includes the construction and operation of a green hydrogen production facility, which would be delivered and operated by Air Products (BR) Limited ("Air Products"). Air Products will be the first customer of the new terminal, whereby green ammonia will be imported via the jetty and converted on-site into green hydrogen, making a positive contribution to the UK's net zero agenda by helping to decarbonise the United Kingdom's (UK) industrial activities and in particular the heavy transport sector.

1.6 A detailed description of the Project is included in **Chapter 2: The Project** of the Environmental Statement ("ES") **[APP-044]**.

Purpose and Structure of this Document

1.7 This document contains the Applicant's responses to those of the Examining Authority's Written Questions 1 **[PD-008]** grouped under the theme "Q1.8. Flood Risk and Coastal Change". It represents one of a collection of eighteen such documents, each of which addresses a different theme.

1.8 Responses are ordered ascendingly by reference number, replicating the structure of the Examining Authority's Written Questions 1.

1.9 Responses are provided in a table. The text of the question appears on the lefthand side, with the Applicant's answer to its right.

1.10 Further materials pertinent to the Applicant's response are included at the end of the document as appendices where necessary.

2 Applicant's Responses to the Examining Authority's First Round of Written Questions

Q1.8. Flood Risk and Coastal Change	
Q1.8.1 Sequential Test, Flood Risk Assessment and Sustainable Drainage	
Q1.8.1.1	
Question	**Response**
Flood Defence Legal Agreement The EA [RR-010, Paragraph 4.1] sets out that the Applicant should enter into a legal agreement to ensure the flood defence impacted by the Proposed Development would be constructed and maintained to the required standard. When responding to the EA on this point, can the Applicant comment on whether such a legal agreement is necessary and otherwise meets the relevant tests, and therefore whether you intend to engage with the EA about entering into such an agreement?	It is currently the responsibility of the EA to maintain its flood defence works at the Immingham foreshore, including within the Order limits pursuant to licences granted by the Applicant in 1980 and 1999. The Applicant is content with the principle that the width of flood defence works crossed by permanent works comprised in the authorised project should be maintained by ABP following construction. The Applicant is content that a further legal agreement is necessary to secure this but considers that there is no necessity for the scope of such an agreement to be any wider, given matters already to be secured by the protective provisions. The Applicant therefore continues to engage constructively with the EA on (i) an appropriate set of protective provisions to be placed on the face of the dDCO and (ii) an agreement of appropriate scope in respect only of that part of the existing flood defence works to be crossed by the authorised project.
Q1.8.1.3	
Question	**Response**

Safe Refuge The FRA [APP-209, Section 6.6] makes provision for the safe refuge of personnel within buildings. Can the Applicant explain where personnel would seek safe refuge if they were outside and without immediate access to buildings?	In the event that personnel are on site that are not able to reach the designated safe refuge points described in **section 6.6** of the **FRA [APP-209]**, there would be other raised structures that are accessible where temporary refuge could be taken during a breach flood event. Severe weather planning involves limiting on-site activities, with the hydrogen production facility proposed to close when an Environment Agency Flood Risk Warning is in place. Specific flood emergency response procedures and contingencies, including alternative refuge areas and other possible options, will be further considered as detailed design progresses and will be covered in the Flood Emergency Response Plan (required by **Paragraph 6.7.3** of the **FRA [APP-209]** to be prepared in consultation with the Environment Agency and Lead Local Flood Authority). Compliance with the FRA is secured by **Requirement 13** of the **draft DCO [PDA-004]**.
Q1.8.1.4	
Question	**Response**

Work No 9 Flood Risk The ES [APP-060, Paragraph 18.6.55] identifies a small part of Work No. 9 as residing in Flood Zone 2. However, the implications of this finding are unclear and therefore it would be helpful if the Applicant could expand.	The **Outline CEMP [APP-221]** (at Table 15) states that no temporary buildings, plant or materials within Work No. 9 will be located within Flood Zone 2. This will allow storage of flood water should high flows occur on the North Beck. This reflects the position set out in **Paragraph 5.4.6** of the **Environmental Statement ("ES") Appendix 18.A: Flood Risk Assessment ("FRA") [APP-209]** which similarly confirms that during the construction phase, no temporary buildings and plant or materials stored within Work No. 9 will be located within the Flood Zone 2 extent. The **FRA [APP-209]** has assessed the possibility of Work No. 9 flooding (such assessment assumes there are no buildings within Flood Zone 2 as secured by the Outline CEMP [APP-221] and FRA [APP-209]) and concludes that the risk of fluvial flooding during the temporary construction phase is low and remains localised to the North Beck Drain. Should a 0.1% AEP flood event occur during the construction phase, flood flows would not be impeded and the connection of the fluvial floodplain with Stallingborough North Beck is maintained. As a consequence, there would be no loss of floodplain storage and therefore no increase in fluvial flood risk both to and from Work No. 9.
Q1.8.1.5	
Question	**Response**
Tide Locking The ES [APP-060, Paragraph 18.6.67] states that areas of the site are located directly adjacent to Habrough Marsh Drain and at residual risk of fluvial flooding during tide locking	Information regarding the tide locking of Habrough Marsh Drain is provided in the **Environmental Statement ("ES") Appendix 18.A: Flood Risk Assessment ("FRA") [APP-209]**. Specifically, **Paragraphs 4.4.22 to 4.4.23** outline the connectivity of Habrough Marsh Drain with the Immingham Pump Drain (a pumped catchment) and Stallingborough North Beck Drain.

events. Can the Applicant better quantify and expand on the residual risk?	**Paragraph 4.4.24** of the **FRA [APP-209]** then states, "*The* [drainage] *system serving the areas north and west of Immingham discharges into the Habrough Marsh Drain which has a gravity outfall into the Humber Estuary. During periods of high tide, relief can be given to this drain by opening the Habrough Slide which allows flow to enter the pumped catchment. Likewise, should there be particularly high-water levels in the pumped catchment during periods of lower water levels in the Habrough Marsh Drain then relief flows from the pumped catchment can enter the Habrough Marsh Drain via the Slide*". Ordnance Survey mapping indicates Habrough Marsh Drain, at its closest point, is located approximately 30m west of Work No. 5 (East Site – Hydrogen Production Facility), 23m west of Work No. 3 (East Site – Ammonia Storage), 90m south-west of Work No. 7 (West Site), and 36m north of Work No. 6. Given that water levels within the catchment are actively managed during high tide events when tide locking can occur, the distance of the drain from the site boundary and ground levels, particularly within Work No. 5 (East Site – Hydrogen Production Facility) and Work No. 3 (East Site – Ammonia Storage), it is considered that only an extreme tide locking event would have potential to flood any part of the site. If such an event was to occur then the mitigation measures, as set out in **Section 6** of the **FRA [APP-209]**, in place for the tidal flooding scenarios, will be sufficient to keep the staff and any infrastructure sensitive to flooding safe. The residual risk of flooding from a tide lock event along the Habrough Marsh Drain is therefore considered to be low.
Q1.8.1.6	
Question	**Response**

Temporal Scope of Assessment The ES [APP-060 Paragraph 18.6.109] uses 75 years for its temporal scope. PPG [Paragraph: 006 Reference ID: 7-006-20220825] sets out that the lifetime of a non-residential development depends on the characteristics of that development, but a period of at least 75 years is likely to form a starting point. Where the lifetime significantly exceeds 100 years, such as some major infrastructure projects, it may be appropriate to consider a longer period. Justify why a longer period was not used in the ES [APP-060] given that the jetty infrastructure would remain in perpetuity.	Although the nominal design life of the hydrogen production facility is 25 years, the **ES Appendix 18.A: Flood Risk Assessment (FRA) [APP-209]** acknowledges that development may still be *in situ* beyond this lifetime and, in line with the PPG, uses a lifetime of the development as a whole of 75 years, taken from the year 2025. Therefore, the future baseline year used in the assessment of flood risk is 2100. The Planning Practice Guidance ("PPG") [Paragraph: 006 Reference ID: 7-006-20220825] states "*The lifetime of a non-residential development depends on the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment. Where development has an anticipated lifetime significantly beyond 100 years such as some major infrastructure projects … it may be appropriate to consider a longer period for the lifetime of development when assessing the potential impacts of climate change.*" The assessment of climate change is based on the climate change allowances presented in the Environment Agency Flood Risk Assessments: climate change allowances guidance which is considered as best practice for determining climate change for flood risk assessments. This guidance is also referenced in the North East Lincolnshire Strategic Flood Risk Assessment ("SFRA"). Climate change allowance data, as set out in the Environment Agency guidance is provided up to the following years: • Sea Level Allowances – provided to the Year 2100 (75 year lifetime from 2025) • Peak River Flow Allowances – provided to the Year 2115 (90 year lifetime from 2025) • Peak Rainfall Intensity Allowance – Future baseline Year 2115 (90 year lifetime from 2025)

	In addition, mitigation for the Project has been based on the 0.1% Annual Exceedance Probability breach of defences flood event water level for the year 2115, as provided by the Environment Agency (see **Annex A** in the FRA **[**APP-209**]**), and in line with the requirements of the North East Lincolnshire SFRA. Climate change allowances outlined in the Environment Agency Flood Risk Assessments: climate change allowances guidance do not extend beyond the year 2115 to allow for the assessment of flood risk beyond this date. However, the H++ scenario, which represents an extreme worst case climate change scenario and allows for a 1.9m increase in tidal water levels, as detailed in the Environment Agency climate change guidance, has been taken into consideration in the FRA **[**APP-209**]**. Using the Environment Agency climate change guidance and the best currently available information, provided by the Environment Agency, the assessment of flood risk for the Project has been undertaken beyond the required minimum 75 year lifetime of the development as outlined in the PPG [Paragraph: 006 Reference ID: 7-006-20220825]. The assessment of flood risk over the time periods stated above is, therefore, considered appropriate to provide a conservative assessment of flood risk for the Project based on the best current information available to date, and is in line with current best practice.
Q1.8.1.7	
Question	**Response**

Jetty Temporal Scope Reference Point Provide further information regarding the history of the Port of Immingham and how long a jetty would typically remain in situ, in order to create a reference point to inform the temporal scope of the Applicant's EIA assessment. For example, if the Port of Immingham opened circa 1912, and most jetties have remained in situ for over 100 years, then the ExA would like to see how this has informed the temporal scope of the EIA assessment.	The Applicant's ports have generally evolved over time with iterative and ongoing redevelopments and extensions added over the years. Ports generally reflect the ongoing changes in the global economy and need to be able to alter and grow their infrastructure in response to these changes, in order to stay relevant and competitive in a constantly shifting marketplace. This point is embedded within the National Policy Statement for Ports, which states for example, at Paragraph 3.3.1, that "*…the Government seeks to:…allow judgments about when and where new developments might be proposed to be made on the basis of commercial factors by the port industry or port developers operating within a free market environment*". The Applicant's ports generally have an element of original development which is often focussed around an enclosed dock basin system connected to deeper water in a river or estuary. The Port of Immingham is such a port, with original statutory powers to construct the enclosed dock dating from the early 1900s in the form of the Humber Commercial Railway and Dock Act 1904. This enabling legislation gave the Applicant's predecessor the powers to 'make and maintain' its own infrastructure and this is completely normal for such statutory instruments. It is therefore normal for ports to retain and maintain legacy infrastructure with a view to ensuring that, via a process of maintenance and renewal, it can continue to facilitate the modal shift of cargo between land and sea. The oldest infrastructure still in regular operational use on the south bank of the Humber is actually at the Port of Grimsby, just downstream of Immingham, and can be seen in the form of the Grade II listed Rennie's Lock, the original lock entrance and surrounding quaysides for the port dating back to the 1790s. At Immingham the lock and most of the enclosed dock quaysides date back to the early 1900s. These are mainly masonry structures, so have

	specifically been designed to last for considerable periods of time, but even for jetties of similar construction to that proposed as part of the Project, clear evidence can be found of these structures outlasting a nominal design life with careful and targeted maintenance and renewal projects. In particular, the Immingham Bulk Terminal jetty dates back to 1970, the statutory powers for which are enshrined within the South Killingholme Jetty Empowerment Order 1968 and which contains powers to "*make and maintain, extend, enlarge, alter and replace the works*". This therefore contains the usual provisions to maintain and renew the infrastructure over time. The facility has been maintained and updated over the years and is considered to be in good condition; indeed, British Steel have just taken delivery of new cranes to ensure that operations can continue to support steel milling activity in Scunthorpe. The Immingham Oil Terminal was built in 1969 and authorised via the Immingham Dock Revision Order 1966. This statutory instrument grants powers to "*make and maintain*" the infrastructure, as well as the ability to "*extend, enlarge, alter and replace the works*". Again careful maintenance of this structure has ensured that it will continue to be in operational use beyond any nominal '50 year' design life. When considering the erection and maintenance of marine infrastructure the concept of decommissioning is not normally factored into the Applicant's considerations as it is considered that, via a process of careful maintenance, replacement and renewal, infrastructure can continue to be used over considerable periods of time and effectively become a 'permanent' part of the port infrastructure. The answer to Q1.8.3.3 sets out that the nominal design life (or design service life) of the approach jetty, jetty head loading platform and mooring/breasting dolphins is 50 years, as is appropriate for structures of this type. They are designed for extreme events with return periods greater than 50 years and with an allowance for sea level rise.

	In theory there will be a nominal point at which any structure will exceed its operational or viable lifespan, but for the ports sector this interval would be a much longer period than could robustly be assessed in terms of its environmental impacts. Moreover, if the IGET jetty does, at some very distant point in the future, need to be removed then much older structures within the general port area will have had to be radically restructured before that event, meaning that the overall setting of this part of the estuary by that stage would be radically changed in any event. The **Environmental Statement ("ES")**, as set out in the **ES Chapter 2: The Project [APP-044]**, makes the assumption that the jetty (other than the jetty top side infrastructure associated with the hydrogen production facility), would become a 'permanent' part of the port infrastructure. As set out above, this is entirely typical for a new port development. This assumption is made as relevant within the technical marine assessments in the **ES** and the appropriate operational periods are used to assess the marine impacts.
Q1.8.1.8	
Question	**Response**
Sequential Test The FRA [APP-209, Paragraph 3.2.27] states compliance with the Sequential Test is demonstrated in the Planning, Design and Access Statement. However, there is no such document title in the EL. It is presumed that the document referred to was meant to be the Planning Statement [APP-226]. Confirm and amend if necessary.	The reference to the Planning Design and Access Statement is an error. The cross reference should have been to **the Planning Statement [APP-226]**. This correction has been noted in the **Table of Errata [PDA-010]** filed at Procedural Deadline A.

Q1.8.1.9	
Question	**Response**
The Environment Agency Flood Model Updates Anglian Water Services [RR-001] notes the planned updates to the EA flood models in 2024 will include revised climate change allowances. Applicant and the EA provide a joint note advising on when these updates are likely to come forward in the context of Examination and whether it is envisaged that the ES [APP-060] would be materially affected by the changes.	The Environment Agency are currently updating their National Flood Risk Assessment ("NaFRA") model(s) as part of their NaFRA2 Project. The NaFRA model will be updated to reflect the current flood risk from surface water, fluvial and tidal sources to gain a better understanding of flood risk. As work is still progressing, the Environment Agency does not anticipate the NaFRA2 modelling outputs to be available by the end of 2024, and therefore they will not be available during the Examination Period. The Environment Agency stated at Issue Specific Hearing 3 **[**EV5-002**]** that the "*Environment Agency has no material concerns about the outcome of the NaFRA2 outputs on the FRA [APP-209] outcomes, as the same Environment Agency local hydraulic modelling used to inform the FRA [APP-209] for both the Project Site is the same as those used in the NaFRA2 updates*". It is envisaged that the conclusions of the **Environmental Statement Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [APP-060]** will not be materially affected by any possible future changes.
Q1.8.2 Dredging and Physical Processes	
Q1.8.2.1	
Question	**Response**

Integrity of Sea Defences The EA [RR-010] wanted the Applicant to consider whether the changes to physical processes would have an impact on sea defences through changes to wave patterns or sedimentation. The ES [APP-058, Paragraphs 16.8.69 to 16.8.70] refers to marine infrastructure and facilities, is this inclusive of sea defences?	The Applicant can confirm that the assessment of infrastructure is inclusive of sea defences. The assessment described in **Paragraphs 16.8.69 to 16.8.72** of **ES Chapter 16: Physical Processes [APP-058]** relates to predicted changes to flows, waves and sediment transport patterns and their potential impacts on existing marine infrastructure (along with outfalls and estuary banks and channels). The term 'marine infrastructure' here is inclusive of existing jetties and piers, berth pockets at the marine terminals (Immingham Oil Terminal), Humber Sea Terminal, Immingham Eastern and Western Jetties, Immingham Outer Harbour and Immingham Gas Terminal) and coastal defence structures. With distance from the Project, the impacts are reduced further and are not predicted across the far-field region.
Q1.8.2.2	
Question	**Response**
Temporal Scope of Assessment Comment on whether the temporal scope the ES [APP-058] is sufficient to assess the permanent effects of the Proposed Development, given the jetty would remain in perpetuity and likely exceed 50 years.	Overall, the predicted changes as a result of the Project are minor/negligible and not significant in the context of projected impacts of future climate change (i.e. the future changes to water levels, associated flows, storminess and the resultant combined impacts to sediment transport, etc. anticipated to arise as a result of climate change, are much greater than the small magnitude and limited extent of the predicted impacts arising from the Project). In the future, higher sea levels (associated with climate change) will reduce the associated relative impacts on physical processes – i.e. the same dredge in deeper water will mean a smaller relative change to overall water depths (noting that deeper water depths might negate the need for a dredge entirely). With higher sea levels, waves can approach closer to the coast, but the assessment described in the **Environmental Statement Chapter 16: Physical Processes [APP-058]** (**Paragraphs 16.8.57** to **16.8.68** and in **Figures 16.15** to **16.17**) indicates the Project

	will result in slightly lower wave heights at the coast, providing a slight potential benefit in terms of coastal erosion or overtopping. A design life of 50 years has been assumed in order to define a future baseline and to provide context to the magnitude and extent of predicted impacts. Whilst the assessment has covered the predicted impacts under present-day and future periods, it is considered that changes to physical processes (as a result of the Project) over a longer timeframe will be no greater than those described in **ES Chapter 16 [APP-058]**.
Q1.8.2.3	
Question	**Response**
Dredging Assumptions The ES [APP-058, Paragraph 16.4.6] makes assumptions about dredging, including the type of equipment and approach to it. a) Should the definition of what constitutes dredging be included within the dDCO? b) Should the specific details of dredging assumptions, such as the model of dredging vessel, need to be secured by the dDCO in order to create certainty about the conclusions within the ES [APP-058]?	a) The Applicant does not consider it necessary to define dredging within the **draft Development Consent Order ("dDCO") [PDA-004]**. There is no purpose in doing so because that would only serve to constrain the activities which may be carried out within the confines of dredging activity in circumstances where the **Environmental Statement ("ES")** chapters in any event frame the reasonable worst case scenarios relevant to dredging **[APP-051, APP-058, APP-187]** and their assessments are carried out accordingly. The Applicant notes that dredging operations are regulated and controlled by the Marine Management Organisation ("MMO") as it considers appropriate in its capacity as the relevant specialist authorising body through marine licences granted or (in the case of the dDCO deemed to be granted) pursuant to the Marine and Coastal Access Act 2009. The MMO has not considered such a definition appropriate or necessary but stipulated a number of conditions relevant to dredging in the deemed marine licence at Schedule 3 of the dDCO (the

	"DML") as described more particularly in paragraph (b) of the response to this question. b) As outlined at part (a) of the response to this question, the Applicant does not consider it necessary to secure further detail related to dredging within the **dDCO**. The **ES** chapters **[APP-051, APP-058, APP-187]** define the parameters of the assessment by reference to reasonable worst case assumptions. The MMO control the dredging activities through the DML (Schedule 3 of the **dDCO**) which sets out parameters in which the dredge will be controlled: • Condition 4 provides the licence to dredge and deposit and controls the volume of material that can be dredged, the final dredge depth and the disposal sites to be used. • Condition 5 controls the area within which the dredge may take place.
Q1.8.2.4	
Question	**Response**

Alternative Uses for Dredged Material The ES [APP-058, Paragraph 16.4.6] talks about disposing of dredged material at designated disposal sites within the estuary. a) Has the Applicant explored the beneficial reuse of the dredged material in accordance with the NPSfP (Paragraph 5.1.25)? b) Would this be desirable in the context of potential contaminants within the dredged material, or in the interests of maintaining the estuary's sediment budget?	a) The potential beneficial reuse of the dredged arisings has been considered within **Environmental Statement ("ES") Appendix 2.A: Waste Hierarchy Assessment ("WHA") [APP-172]**. In summary, the WHA has not identified any immediate opportunities for the reuse of the dredge material needed to be removed for the Project other than the sustainable relocation within the estuary, a practice that already occurs as part of ongoing maintenance dredging in the estuary. Nevertheless, ABP regularly engages with stakeholders regarding potential beneficial uses for the maintenance dredged material taken from the Humber. Without any alternative uses available at the present time, disposal in the marine environment at a licensed disposal ground is considered the Best Practical Environmental Option. b) In February 2023 the Marine Management Organisation ("MMO"), in consultation with the Centre for Environment, Fisheries and Aquaculture Science ("Cefas"), provided a Sample Plan (SAM/2022/00110) in relation to the sediment sampling campaign for the Project. In February 2023 sediment samples were collected from eight stations (1 to 8) across the proposed dredge area, including subsurface samples (see **ES Figure 17.3: Water Sampling Location [APP-145]**) and analysed for a range of contaminants, as specified by the MMO. Overall, sediment contaminant concentrations within the dredge area are relatively low and are generally either below, or marginally exceed, Action Level 1, with no exceedances of (or contaminant concentrations close to)

	the respective Action Level 2. Therefore, sediment contamination results suggest the material would be considered acceptable for disposal in the marine environment. The disposal of dredge arisings at licensed disposal sites within the same sediment system within the estuary, as proposed for this Project, is considered an overall benefit to the system, with dredged material maintained within the wider estuary sediment budget. In this context, modelling of the dispersal from the deposit grounds indicates that the material relocated in these areas contributes to the general sediment supply across the study area, including the intertidal areas throughout the estuary (see **ES Chapter 16: Physical Processes [APP-058]** and **ES Figures 16.6 [APP-131]**, **16.7 [APP-132]** and **16.8 [APP-133]**).

Q1.8.2.5	
Question	**Response**
Capacity of Dredging Disposal Sites The ES [APP-058, Paragraph 16.7.2] notes standard mitigation would involve even disposal of deposition at the existing disposal sites. a) Do these disposal sites have a finite capacity that would affect how the Proposed Development is delivered? b) Is it a matter that needs to be assessed cumulatively in the context of existing and future dredging commitments?	a) It is estimated that dredging of approximately 4,000m^3 of material would be required as part of the Project. This *in situ* volume is predominantly flat alluvial deposits such as unconsolidated material (silts, sands and gravel) of up to 3,900m^3, and consolidated material (e.g. glacial till with limited chalk inclusion) of up to 100m^3. Disposal site HU056 (Holme Channel) will be used to dispose of consolidated material and HU060 (Clay Huts) will be used to dispose of unconsolidated material for the capital dredge (see **Environmental Statement Chapter 2: The Project [APP-044]**).

	HU060 is a dispersive site and as such material placed in this location does not remain *in situ*. For context the Applicant currently holds a Marine Licence (L/2014/00429/5) which permits the disposal of 7.5 million wet tonnes (approximately 5.8 million m^3) per annum of maintenance dredging arisings at this site. The disposal site is surveyed annually, the latest results of which were used to confirm the existing capacity at HU056 was sufficient to meet the requirements of the Project. The current capacity of the site is estimated to be approximately 270,000m^3 to ensure compliance with a bed level of -5mCD (a restriction that is typically applied at this site to ensure that prevailing bed level in that part of the estuary is maintained). b) The dredge disposal requirements have been fully assessed in the context of the existing maintenance dredging requirements and known capital dredge proposals on the estuary. Furthermore, the scale of the dredging associated with the Project is insignificant in the context of the dredging that routinely takes place on the estuary.
Q1.8.2.6	
Question	**Response**

Plume Types Explain the difference between a passive plume and a dynamic plume, as referenced in the ES [APP-058, Paragraph 16.8.20].	There have been recent studies investigating the behaviour of dredge disposal material (e.g. Becker, J., van Eekelen, E., van Wiechen, J., de Lange, W., Damsma, T., Smolders, T., van Koningsveld, M. (2015) Estimating source terms for far field dredge plume modelling. Journal of Environmental Management. Volume 149 pp. 282-293). When released from a dredger or barge at a disposal site, dredged material can typically be considered to fall to the bed as part of either a 'dynamic' phase or a 'passive' phase. The majority of the material is realistically considered to descend directly to the bed in the dynamic phase, as (effectively) a single mass of sediment, which, in itself, does not contribute to the addition of material into suspension. The remaining material is considered to be entrained into the water column at the point of release, resulting in sediment particles being placed into suspension and with the potential to remain there for a longer period of time (as they settle and are transported by the local and regional current field). This material forms the 'passive' phase of the disposal plume.
Q1.8.2.7	
Question	**Response**
Dissipating Hydrodynamic Effects In a general sense, would it be accurate to describe hydrodynamic effects identified in the ES [APP-058] as dissipating to negligible levels by the time they reach nearby receptors beyond the immediate vicinity of the Proposed Development?	The Applicant can confirm that it would be accurate to describe hydrodynamic effects identified in **ES Chapter 16: Physical Processes [APP-058]** as dissipating to negligible levels by the time they reach nearby receptors beyond the immediate vicinity of the Project. The results of the assessment indicate that the predicted impacts of the Project are highly localised to within the Project footprint and immediately adjacent areas. Magnitude of change in hydrodynamics, waves and sediment transport reduces with distance from the marine elements of the

	Project and would be considered as dissipating to negligible levels by the time they reach nearby receptors.
Q1.8.2.8	
Question	**Response**
Need for Maintenance Dredging The ES [APP-058] is not definitive about the need for maintenance dredging. Clarify how this has been considered when assessing the worst case scenario. In the event maintenance dredging is required, would the Proposed Development enter into, or be subject to, existing maintenance dredging regimes operating within the estuary?	During operation of the Project, maintenance dredging will potentially be required in the same way as currently occurs at the Port of Immingham. The modelling of the scheme (as reported in **Environmental Statement Chapter 16: Physical Processes [APP-058]**) indicates that the berth pocket, once dredged, will remain swept clear of deposited material by the flood and ebb tidal flows (in much the same way the existing Immingham Oil Terminal berths are). Consequently, the need for future maintenance dredging within the new berth pocket is expected to be very limited (if required at all). The frequency will be dictated by operational requirements but it is anticipated there could be several years or more between maintenance dredge campaigns. To ensure a worst-case scenario has been considered within all of the environmental assessments it has been assumed that maintenance dredging will be required at infrequent intervals. The Applicant already has statutory powers to carry out maintenance dredging within the statutory harbour authority area for the Port of Immingham. There is a Marine Licence in place for the disposal of these dredged arisings at the Clay Huts disposal site (MMO reference HU060 (marine licence reference L/2014/00429/1)). The position is acknowledged in Articles 4(3) and (5) of Schedule 3 (Deemed marine licence) of the **draft Development Consent Order [PDA-004]**. Should maintenance dredging be required, it is proposed to be incorporated within the

	maintenance dredge licence for Immingham as part of the renewal of the licence at the end of 2025.
Q1.8.2.9	
Question	**Response**
Important and Relevant NPS’s other than the NPSfP Can the Applicant advise whether there are other important and relevant designated or draft NPS’s in relation to Flood Risk and Coastal Change and whether they are satisfied that their assessment is robust in this context. For example, NPS EN-3 addresses sediment transport and other physical processes associated with the marine environment but is not covered within the ES [APP-058].	The assessments in **Environmental Statement (“ES”) Chapter 16: Physical Processes [APP-058]**, **ES Chapter 18: Water Use, Water Quality, Coastal Protection, Flood Risk and Drainage [APP-060]** and the **Flood Risk Assessment (“FRA”) [APP-209]** have been undertaken in accordance with the National Policy Statement for Ports (“NPSfP”) (2012), the National Planning Policy Framework (“NPPF”) and the Planning Practice Guidance (“PPG”). However, other national policy statements may also be considered to be important and relevant, and in this regard, the Overarching National Policy Statement ("NPS”) for Energy (“EN-1”) is considered important and relevant in that it sets out the Government’s current policies as to, amongst other things, the need for and benefits of new energy infrastructure, including facilities for hydrogen production and carbon capture and storage. National Policy Statement EN-3 is, however, not considered to be either important or relevant in respect of the Project. This is because, by reference to Section 1.6 of EN-3, the Project does not contain infrastructure of any type that is renewable electricity generation covered by that policy statement. Section 5.6: Coastal Change and Section 5.8: Flood Risk of EN-1 (2024) set out generic considerations that applicants should take into account in

	order to manage coastal change and flood risks. This NPS also takes account of the NPPF and the PPG, where appropriate. In relation to Section 5.6, Paragraph 5.6.10 of NPS EN-1 states that applicants should, where relevant, "*undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures*". **ES Chapter 16: Physical Processes [APP-058]** provides this assessment, which is based on numerical modelling of the dredge and disposal as well as the marine infrastructure. Effects on hydrodynamics, sediment transport, plume dispersion and waves are all assessed as small in both magnitude and extent and the resultant exposure to change is therefore considered low. Paragraph 5.6.17 of NPS EN-1 notes that "*the Secretary of State should not normally consent new development in areas of dynamic shorelines where the proposal could inhibit sediment flow or have an adverse impact on coastal processes at other locations*". This is not the case in respect of the Project. A site-specific **Flood Risk Assessment [APP-209]** has been provided in line with the requirements in the NPSfP, in NPS EN-1 and in accordance with the Flood Risk and Coastal Change guidance contained within the PPG (August 2022). The **FRA [APP-209]** identifies and assesses the risks of all forms of flooding to and from the Project and demonstrates how these flood risks will be managed, taking climate change into account in line with the latest Environment Agency Flood risk assessments: climate change guidance (May 2022).

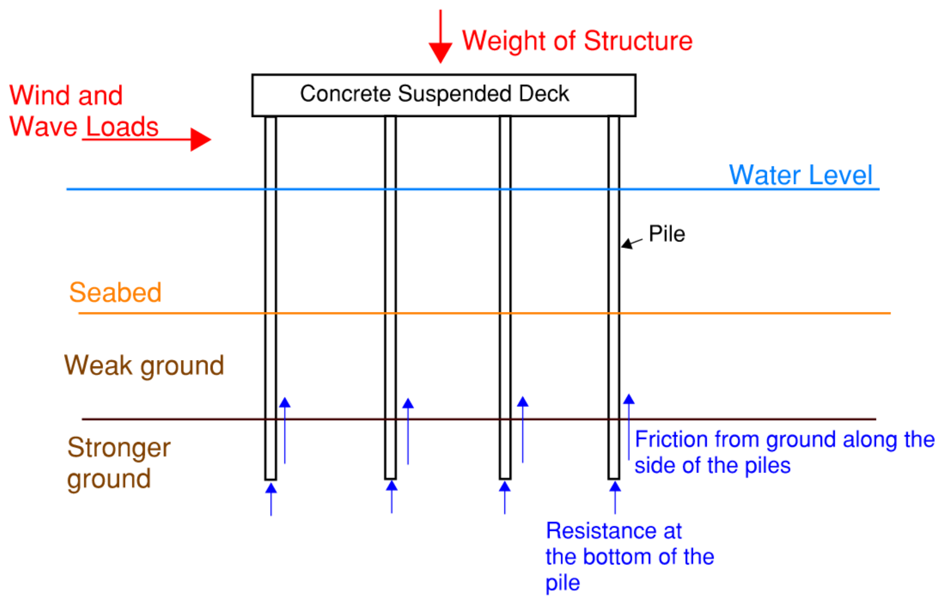
	The **FRA [APP-209]** and **ES Chapter 18 [APP-060]** address all of the relevant requirements of NPS EN-1, including the sequential and exception tests (which are supported by **ES Chapter 3: Need and Alternatives [APP-045]**, the **Planning Statement [APP-226]** and its associated appendices **[APP-227 to APP-233]**), development vulnerability and lifetime of the development, flood risk from all sources, both to and from the Project, including residual risks, and outlines the mitigation proposed to manage flood risk so the development remains safe over its lifetime. The supporting **Drainage Strategy [APP-210]** outlines proposals for managing and discharging surface water from the site using sustainable drainage systems and accounting for the predicted impacts of climate change. Designed in consultation with the North East Lindsey Internal Drainage Board, who have jurisdiction over the watercourses the site will discharge in to, it is considered that the **Drainage Strategy** satisfies the requirements presented in Paragraphs 5.8.15 and 5.8.25 of the NPS EN-1. The assessment presented in **ES Chapter 16: Physical Processes [APP-058]** uses numerical modelling tools and conceptual analyses to predict coastal processes and hydrodynamic effects by comparing the baseline and future environmental conditions created by the Project. This includes predicting the changes to tidal water levels, currents, and waves which may impact the foreshore and associated flood risk management infrastructure. The assessment also includes modelling of sediment transport pathways (including assessment of potential changes to erosion and accretion patterns) and the fate of sediment plumes from marine construction and maintenance dredging and disposal activities.

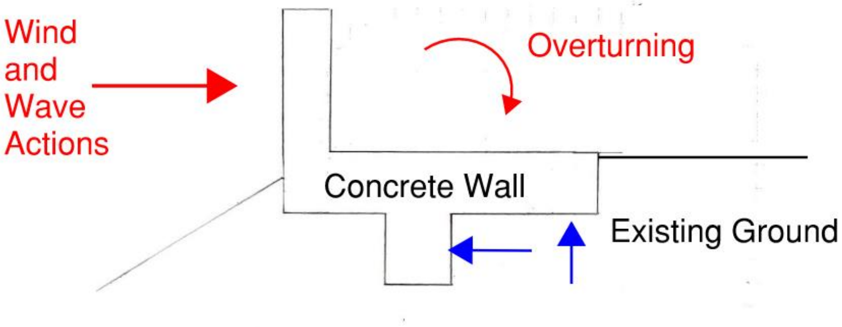
	The assessment concludes that as the local hydrodynamics will remain comparable to the baseline scenario it is considered that there will be negligible changes to wave heights, tidal water levels and the rates of erosion or accretion on the foreshore (above natural variations) both on-site (along the frontage of the Project) and off-site (along the wider frontage of the Port of Immingham) for both the construction and operational phases of the development. The outcomes of the numerical modelling and associated assessment undertaken in **ES Chapter 16: Physical Processes [APP-058]** were used to inform the **FRA [APP-209]**. When considering the assessment in line with the requirements of NPS EN-1, which generally align with the NPSfP, NPPF and PPG, the assessment of flood risk, which takes account of the assessment outcomes presented in **ES Chapter 16: Physical Processes [APP-058]**, is considered appropriate and robust. This is also the case for numerical modelling of both the dredge and disposal of dredge arisings to confirm the low magnitude of change resulting from these activities. The Marine Management Organisation has confirmed that the coastal process assessment is comprehensive and detailed **[RR-016]**.
Q1.8.3 Climate Change Adaptation	
Q1.8.3.1	
Question	**Response**

Projection Data The ES [APP-061, Paragraph 19.4.27] states the future baseline has been established using UK Climate Projection 2018. Confirm whether your assessment uses the latest projections, including any subsequent updates to UK Climate Projection 2018 that may have occurred since your assessment was conducted.	Confirmed. The future baseline, used within the climate change resilience assessment ("CCRA"), was established using the Met Office's 'UK climate averages' tool. This tool uses the most up-to-date climate projection data (i.e. UKCP18). Since the conduction of CCRA data collection in early 2023, there has been no subsequent updates to the UK climate projections. Flood risk for the future baseline scenario has been assessed using the Environment Agency Flood risk assessments: climate change allowances guidance (May 2022) which provides climate change allowances for sea level, peak fluvial flow and peak rainfall intensity based on the relevant Environment Agency operational management catchments. This guidance is based on the most up-to-date climate projection data (i.e. UKCP18).
Q1.8.3.2	
Question	**Response**

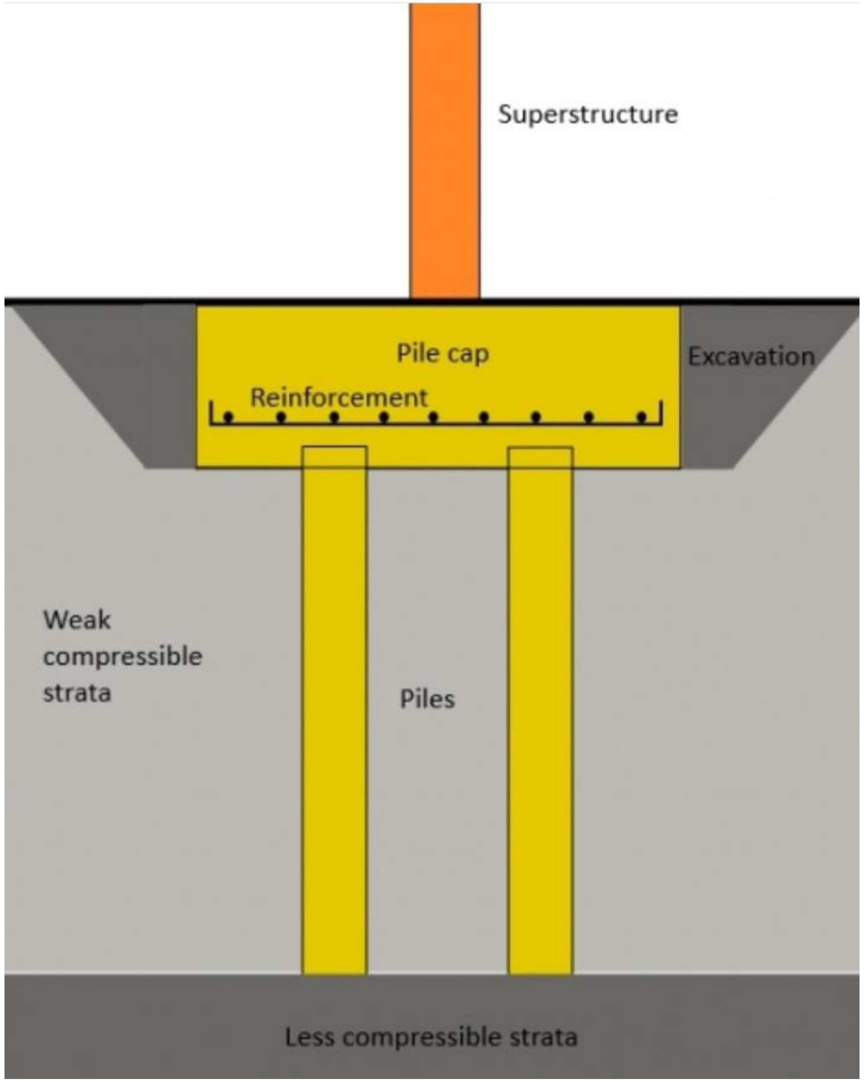
Wind and Wave Effects on Tall Structures
 	
The Scoping Opinion [APP-168, ID 3.14.2 and Page 3] refers to guidance from the EA, which advises on wind. The ES [APP-061, Paragraph 19.7.7] states the design of tall structures and jetties will be reviewed to ensure stability in stronger wind and wave actions. Provide illustrative information on the types of design solutions that might be available in this regard.
	Types of design solutions that are available for implementation in the sea to ensure stability in strong wind and wave actions are:
	
	• Piled suspended decks – as per the Application design
	    ○ Design may have vertical or raking piles
	    ○ Design may have 'jacket' substructures with bracing between piles
	• Concrete Gravity structures
	
	Wind and wave actions act on the vessels, which transfer loads to the structure via contact with fenders and mooring points and act directly on the structures themselves.

	The jetty is also designed for direct wind and wave loads in the design in line with the European and British Standards for structural design of maritime structures. Wave loads and associated water levels have been derived for present day and future events in line with EA Flood Risk Assessment – Climate change guidance (Environment Agency, 2022). These are global destabilising forces which are counteracted by the weight of the structures and their embedment in the ground, e.g. in the case of piles. An illustration of load transfer to piles and supporting resistance is given below:

	 Tall structures associated with the jetty (i.e. in comparison to height of approach jetty) include: • The Approach Jetty's ramp, which is mainly subject to wind load, and which may be a suspended deck on piles, as per the Application design, or a gravity structure, rubble mound or steel sheet piled structure. • The flood defence wall, which would be primarily subject to wave load, and which is proposed to be a gravity structure with a structural key into the top of the existing embankment but which

	may instead be on piles (sheet pile or tubular piles) embedded in the embankment. • Marine Loading Arms. • Gangway Towers. Gravity structures largely resist wave and wind destabilising forces by their weight and the ability of their footprint to transfer the loads to the underlying strata through sliding and bearing without causing failure. An illustrative example of the concrete flood defence wall which is acted upon by wind and wave loads, which cause sliding and overturning is below. The resistance is provided by the weight of the structure inducing sliding resistance and support from the existing ground.  The marine loading arms and gangway towers will be supported by bolted connections to the concrete deck. Tall structures associated with the hydrogen production facility include: • Marine loading arms (at jetty head)

	• Ammonia storage tank • Ammonia storage tank flare stack • Hydrogen production unit (furnace, flue stack and flare stack) • Liquefier (cold box) • Hydrogen storage area vent stack For all structures, design for wind loading is conducted in accordance with Eurocode 1 BS EN 1991-1-4 and the appropriate National Annex. The wind values used in the design calculations are in accordance with that design code and the structures, foundations and piles are designed accordingly to consider the wind loads imposed on the structure. The requirements of BS EN 1991-1-4 requires the designer to apply safety factors to the design, such as a 1.5 multiplier for wind loads or a 1.5 strength reduction for concrete, therefore the design is inherently conservative beyond the 'worse-case' wind speeds specified within the standard. An illustration of typical foundation detail is given below:

	 Superstructure Pile cap Reinforcement Excavation Weak compressible strata Piles Less compressible strata

Q1.8.3.3	
Question	**Response**
Temporal Scope of the Assessment The ES [APP-061, Paragraph 19.6.13] talks about design life and climate change resilience scenarios. a) Given the jetty infrastructure would remain in perpetuity, are the design life assumptions sufficient and should they extend beyond 25 years? b) In other words, is the temporal scope of the ES [APP-061] assessment sufficiently robust and based on the worst case scenario?	As agreed with the ExA at Issue Specific Hearing 2, a note on the approach to design life and operational life of the Project is appended to the response to Q1.15.1.1 This note prepared by the Applicant reviews the approach used for temporal scope by individual topic areas in the Environmental Statement ("ES"). A response to the specific question asked here in relation to the jetty is provided below. The design service life of the approach jetty, jetty head loading platform and mooring/breasting dolphins is 50 years, as is appropriate for structures of this type. They are designed for extreme events with return periods greater than 50 years and with an allowance for sea level rise. In the climate change resilience ("CCR") assessment in the **Environmental Statement Chapter 19: Climate Change [APP-061]**, climate change projection data from the UKCP18 for the two time periods 2020–2049 and 2040–2069 has been used to identify climate hazards within the 25 years of design life for the landside infrastructure. Considering that components of the Project could remain in perpetuity, the Applicant has extracted and shown below a sensitivity test with UKCP18 projection data for 2070–2099 (the latest time period availability). This period covers a 75-year lifetime from 2025 in line with the timeline considered by the **ES Appendix 18.A: Flood Risk Assessment [APP-209]**. **ES Appendix 19.B [APP-213]** summarises climate change risk assessed up to 2070 with projected changes in climate parameters. Extending the risk assessment framework to the period of 2070–2099, it is identified that with changes in rainfall intensity, increases in temperature

	and rise in sea level, the key risks would remain in flood risk and the potential damage to structure. Climate change allowance has been included in the flood risk assessment conducted in the **ES Chapter 18 [APP-060]**. As detailed in the response to Q1.8.1.6, climate change allowance data has been accounted for as far as is possible with current data in line with Environment Agency guidance: 2100 for sea level and 2115 for river and rainfall allowances, with an additional consideration of 1.9m increase in tidal storm levels. These mitigations have been considered in **Paragraph 19.7.4** of the **ES Chapter 19 [APP-061]**. Therefore the mitigations associated with the main risks of flooding, sea level and increased rainfall are in line with best practice and adjusted for data as far as is feasible. Major storm incidents that could be caused by climate change have also been considered and sufficiently mitigated under Risk Event 10 in **Table 22-5** of the **ES Chapter 22 [APP-064]**. Mitigations and resilience measures to address climate related impacts are in place as detailed in **ES Appendix 19.B [APP-213]**, as well as the interaction between risks from other chapters in **ES Appendix 19.C [APP-214]**. It is concluded that the existing mitigations provided in response to climate risks are sufficient, particularly considering the main risk of flooding being assessed up to 2100–2115 in Q1.8.1.6 and the **ES Chapter 18 [APP-060]**. The Project will not be subjected to any additional climate change impacts to those already outlined within the **ES**.

Table 1: Projected changes in temperature variables (°C), 50% probability (10% and 90% probability in parentheses)

Climate Variable	Time Period		
	2020–2049	2040–2069	2070–2099
Mean annual air temperature anomaly at 1.5m (°C)	1.04 (0.49, 1.61)	1.82 (0.95, 2.73)	***3.49 (2.04, 5.02)***
Mean summer air temperature anomaly at 1.5m (°C)	1.25 (0.45, 2.02)	2.20 (0.99, 3.41)	***4.30 (2.22, 6.46)***
Mean winter air temperature anomaly at 1.5m (°C)	0.92 (0.17, 1.72)	1.62 (0.49, 2.82)	***2.98 (1.20, 4.94)***
Maximum summer air temperature anomaly at 1.5m (°C)	1.37 (0.28, 2.37)	2.39 (0.85, 3.95)	***4.71 (2.10, 7.42)***
Minimum winter air temperature anomaly at 1.5m (°C)	0.94 (0.11, 1.87)	1.72 (0.42, 3.14)	***3.14 (1.05, 5.54)***

Table 2: Projected changes in precipitation variables (%), 50% probability (10% and 90% probability in parentheses)

Climate Variable	Time Period		
	2020–2049	2040–2069	2070–2099
Annual precipitation rate anomaly (%)	0.50 (-6.63, 7.52)	-2.36 (-11.3, 6.73)	***-1.58*** ***(-13.08, 10.20)***
Summer precipitation rate anomaly (%)	-4.04 (-21.43, 14.36)	-14.31 (-36.47, 8.49)	***-29.36*** ***(-53.48, -3.46)***
Winter precipitation rate anomaly (%)	4.13 (-4.29, 13.37)	7.32 (-4.23, 20.52)	***17.59*** ***(-0.92, 38.88)***

Table 3: Projected changes in sea level variables, 50% probability (10% and 90% probability in parentheses)

Climate Variable	Time Period		
	2020–2049	2040–2069	2070–2099
Time-mean Sea level anomaly (m)	0.18 (0.13, 0.23)	0.29 (0.22, 0.41)	***0.58*** ***(0.43, 0.77)***