

Richard Reeves, AP EI1N AFP 133 / IP 2002765

Responses, Questions, Corrections

RE The Applicants' Landfall Hydrogeological Risk Assessment 24/02/2021

Referred to below as LHRA

Comments on:

Applicants' Comments on Submissions Regarding the Landfall Hydrogeological Risk Assessment (REP6-021)

Applicant: East Anglia TWO and East Anglia ONE North Limited Document Reference: ExA.AS-26.D8.V1 SPR Reference: EA1N_EA2-DWF-ENV-REP-IBR-001018

Date: 25th March 2021 Revision: Version 01 Author: Royal Haskoning DHV

Applicable to East Anglia ONE North and East Anglia TWO

Applicants' Comments on Submissions on REP6-021 25th March 2021

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Revision Summary

Rev Date Prepared by Checked by Approved by

01 25/03/2021 Paolo Pizzolla

Lesly Jamieson / Ian MacKay

Rich Morris

1

Applicant's Comment:

"The Applicants would note that an aquifer is a body of porous rock or sediment saturated with groundwater; Mr Reeves comments appear to be based a misconception that an aquifer is an underground body of water which is incorrect."

My response:

Regarding the comment itself, Mr Pizzolla for the Applicant is correct in his description of the aquifer, but incorrect in describing my understanding of what an aquifer is. Mr Pizzolla has taken an inadvertent use of a colloquial description of the aquifer on my part, the sole example of such usage, to make this attempted criticism, while ignoring the many examples of technically correct description I habitually use in discussing this issue.

In terms of rhetoric, this is a *quibble*: typically used in legal bargains - to fulfil the exact verbal conditions of an agreement in order to avoid the intended meaning. Examples, by way of exemplification, can also be found in literature. In Shakespeare,

universally familiar, Portia, in *The Merchant of Venice*, pointing out that the agreement called for a pound of flesh, but no blood, is a classic *quibble*.

Before exposing other examples of the Applicant fulfilling merely the word, rather than substance, of agreements and statements, I will now have to quote from my previous submissions in order to provide an accurate picture of my understanding, rather than the general ignorance with which Mr Pizzolla seems to wish to characterise me. His remarks are both misleading and discourteous, and I take great exception to their being allowed to stand.

The quotes below, I believe, show that I do not picture a stand-alone underground lake in reality, and that my single use of that colloquial expression cannot stand as the sole exemplar of what I, as merely a concerned member of the public, have understood from putting much time and effort into private, unpaid research, in the face of handsomely salaried, extensive opposing teams.

From my D7 submission, Applicant's text in Italics, please note I have not sought to edit my use of a colloquial description, but that single use is far outweighed by more technically accurate description.

22. Existing BGS boreholes surrounding the landfall (see Figure 1 in Appendix 1) indicate that the London Clay is at approximately -50m Ordnance Datum Newlyn (ODN). However, this differs to the base of Crag contour map shown on the 1:50,000 series published map, which shows the base of the Crag

In referencing London Clay at this depth, and the existence of a chalk layer underlying it, the Applicant seems to be suggesting that the non-porous nature, and extreme depth of the clay seals the chalk layer from any possible damage or pollution from the HDD process. While this is true, it is of no relevance. Having seized on the word "chalk", in connection with the aquifer, the Applicant implies that as there is a single basal level of chalk below the clay that contains the aquifer. However, as the Applicant admits, in the previous paragraph

20 In East Anglia, drift deposits are variable, including pebbly sand, gravels, silts, and clays. A chalky till, known as Lowestoft Till covers much of the area

Whether in Lowestoft Till, Red Crag, or a mixture of both combined with chalk, the aquifer does not lie under the London Clay layer referred to above. The numerous ponds, wells, and boreholes within the area of the works all attest to the fact that the feature we refer to as "the aquifer" – a vast underground lake or reservoir – lies very near the surface. Whether the HDD process does or does not penetrate the London Clay level at -50m is therefore of no consequence. By the time the drill-head reaches 11m below ground at cliff base, on its way to bore through the coralline crag (Applicant's own plan, please see above) it will already have passed through the aquifer-levels responsible for widespread water supply. Hence the seemingly much vaunted paragraph:

23 Pre-construction ground investigations will confirm the true depth to the London Clay, however, unless it is significantly shallower than expected, the HDD will not be drilling within the London Clay

- far from demonstrating that the HDD process will leave the aquifer levels unaffected because the London Clay will not be impacted, in fact only serves to underline the fact that the water-bearing mix of till, crag, and chalk above the London Clay will be unavoidably compromised.

4.2 Hydrogeology

25 *The Crag and the Chalk are designated by the Environment Agency as ‘Principal Aquifers’, which can provide a high level of water storage and support water supply and base river flows on a strategic scale. However, In the study area, the Chalk groundwater below the London Clay is highly saline and potable supplies are taken only from the Crag.*

Again, the chalk groundwater below the London Clay is of no relevance as it is from the levels above the clay that drinking water is extracted or collected. It is noted that these upper levels of mixed crag are classified as a “Principal Aquifer”

2

Applicant’s Comment:

“The use of environmentally friendly drilling fluids and drilling with a minimum practical flow rate are key mitigation methods applied by the risk assessment. As noted in paragraph 15, any drilling fluid losses would be confined to a very limited area around the drill. The drilling fluid will fill in and stabilise fractures created during the drilling process so there will not be an impact on the wider aquifer or the groundwater it contains. These are routine practises when drilling through aquifers which it a regular requirement for construction projects.”

My response:

“A very limited area” – what is this area? As with so many of the Applicant’s assurances, there is no substance or detail, so no assurance can be taken. Similarly with the attempted assurance that drilling through aquifers is “a regular requirement”. Not one real-life example, with factual data collected and impartially assessed by an independent body, after the process has been completed, has been provided. Can the Applicant actually provide any data at all regarding the ability of the lost drilling fluid to instantly fill in and stabilise fractures? What account has been taken of the leeching and wicking nature of aquifers, or the rate of flow? It also must be pointed out, particularly in the light of the points I have had to illustrate by quoting previous submissions above, that Mr Pizzolla’s separation of aquifer from groundwater, in the expression “wider aquifer or the groundwater it contains” seems to imply a stratum containing an independent body of water within it, rather than a saturated crag / till / chalk layer, or layers. Perhaps he was being colloquial ...

3

Applicant’s Comment:

“The Applicants would clarify that complete avoidance of the Coralline Crag has never been proposed by the Applicants. As stated in the Outline Landfall Construction Method Statement (an updated version has been submitted at Deadline

8, document reference ExA.AS-2.D8.V3), one of the reasons for using HDD at the landfall is to “avoid direct physical disruption to the outcrop of Coralline Crag”. By ‘outcrop’, the Applicants are clearly referring to the parts of the Crag that are visible at the surface; the HDD bores as proposed pass through the Coralline Crag, but beneath its visible surface before ‘punching out’.”

My response:

This is quibble no 2 in this brief list of equivocations. The very fact that the Applicant now seeks to deny the fact that it has gone to great lengths, from live hearings, through live and written consultations with Aps, Ips, and other residents, and in response to urgent queries for clarification from ED, to demonstrate its assertion that the integrity of the coralline crag will not be compromised by the planned HDD works by now specifying that only those parts of the Coralline crag that are visible were ever presented as being considered for protection is breathtakingly disingenuous.

When so much of the focus of this aspect of the discussion has been on the possible, and now revealed to be highly probable, damage to the seabed, cliff, and aquifer stability, for the Applicant now to turn to the word “outcrop”, as if only the visible, above ground portion of the Coralline Crag is of importance, or had ever been discussed, is simply not correct.

The reason for this particular quibble is now clear: it has all along been the Applicant’s plan to drill through the Coralline Crag, while paying merely lip-service to any measures of mitigation or protection. It is a key signifier to the modus operandi of the Applicant as a whole: put together a form of words which appear superficially to give reassurance, while in reality proceeding in exactly the manner to which serious objections and concerns have been raised.

The following point therefore remains of absolute relevance, that the Applicant is now relying absolutely on the (previously accepted as fragile) coralline crag to provide stable insulation against fluid loss. So, after going to such great lengths to assert that the coralline crag would be avoided, due to fragility, now it is apparently to be relied on, and bored through, because, at the tap of a desk-based key-stroke, it is convenient to describe it as being super-strong. It very much seems that this is yet another example of the Applicant simply attempting to bend reality to suit whatever its latest argument demands. Super-strong, or fragile – which is it?

In short, the Applicant is now openly declaring that if we can’t see what it is doing, it will do whatever it wishes to.

4

Applicant’s Comment:

“The Applicants would note that they requested to attend the Access Required Site Inspections but were advised by the Planning Inspectorate that they could not due to COVID-19 restrictions.”

My response:

Had the Applicant checked facts, it would have found that COVID-19 restrictions did not at that point in time prevent people from attending work

5

Applicant's Comment:

“The drilling fluid will fill in and stabilise fractures created during the drilling process so there will not be an impact on the wider aquifer or the groundwater it contains.”

“As noted at ID1, the strata is the aquifer, it does not bear it. The Applicants acknowledge that the HDD bores will be within the aquifer; this is the basis of the risk assessment.”

My response:

The two statements by the Applicant, one of which I have already referred to above, are mutually contradictory. In the former, the aquifer and groundwater are presented as separate entities, one contained within the other. In the latter, the aquifer is described as one integral structure. As with estimated distances of works from dwellings and buildings at Ness House, referred to in previous submissions, the Applicant needs to present a coherent and through-composed account of its estimates and understanding. Could the Applicant please be encouraged to improve internal communication within its own organisation?

6

Applicant's Comment:

“‘Tied into the well’ means that whatever source of alternative water supply is provided, it will be tied into the well system so there is no change to how the Wardens Trust or surrounding properties use the existing supply. It is noted that the Applicants are seeking to reassure the Wardens Trust and surrounding properties that an alternative supply is available, and that works such as those proposed at the landfall are regular occurrences on construction projects and through the application of well established mitigation measures there will be no degradation of water supplies as a result of the Projects’ works.”

My response:

The final quibble for this initial list. “Tied into the well” means “tied into the well” – who’d have guessed – but the surrounding residents and Wardens Trust are not concerned about being able to use the same pipes and taps from which to draw water, we are concerned, perfectly obviously, about the water itself. And it will be different water. Again, the Applicant also completely fails to describe what it actually plans to do. Will mains water be connected at the Applicant’s expense? Again, has Anglian Water been contacted if this is the plan? If other temporary measures, such as water bowsers, tanks, or bottles are to be suggested, the Applicant is already aware that both the residents and Dr Gimson on behalf of Wardens have declared those measures to be unacceptable. Does the Applicant actually have any estimate

of the amount of water usage that occurs at these locations? If not, what possible information can be informing the statements made regarding the provision of an alternative supply? And, in yet another startling piece of equivocation, the Applicant states definitively that there will be no degradation of water supplies, while claiming to be planning an alternative supply should such degradation happen.

I'll close this particular part of my D9 submission by predicting in advance, that in a quibble upon a quibble, the Applicant will state that while it guarantees that water **supply** will not be degraded, it is not guaranteeing that **water itself**, originating from the aquifer, drawn from our well, will not be degraded.

Many thanks to the Inspectorate for considering the points I have addressed. I would be most grateful, and I believe it would be most helpful, if the Applicant could be held to account with regard to the frequent discrepancy between the words it puts forward and the actual plans / actions it undertakes.

Kind regards

Richard Reeves.



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Responses, Questions, Corrections

RE The Applicants' Landfall Hydrogeological Risk Assessment 24/02/2021

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General Comment:

For APs and IPs, the interval of merely a few days in which to digest and respond to the Applicants' D6 LHRA desktop survey compilation is not adequate. Further detail and corrections to both factual claims and interpretation of data on the part of the Applicants will be added prior to, and at, D8, and in forthcoming ISHs.

Specific Initial Responses, referencing LHRA statements.

Quotes from the Applicants' LHRA submission are in *italics*

3 Proposed Works

10. The landfall HDD bores are likely to be located north of Thorpeness (approximately 750m south of the Wardens Trust site) with planned lengths of up to 2000m.

12. The pilot hole will be steered and surveyed using a wireline guidance tool located behind the drilling bit. The HDD will be at approximately 11m below the base of the cliffs along the coast ...

The distance quoted from Wardens site of landfall HDD bores is noted, although later in the same document a different, and even shorter, distance is quoted. In my previous submission I estimated the distance to be 1200m. The effect of this on my previous calculations regarding the depth below surface of the aquifer / water bearing stratum is to decrease its subterranean estimated depth, based on these recent actual measurements:

To refresh memories from y D6 submission:

" ... the rest water level, ie the surface of the water in the well at Ness House, lies at no more than 2.1 m / 7ft above sea-level (calculation being ground elevation @13.8m minus depth below ground-level of surface of aquifer @ 11.7m) At the proposed Landfall point, the cliff edge at Thorpeness Point, this same differential between elevation above sea-level of ground surface and rest water level of the aquifer below ground surface, (6.3m minus 11.7 m) would place the aquifer at 5.4m below sea-level at the foot of the cliff / top of the beach. Again in my previous submission at Deadline 4, in the description of the Suffolk Chalk Aquifer quoted from Natural England, the chalk layer containing the aquifer waters is described as lying on a gentle slope, running downward from NW to SE of the region, to continue its trajectory under the bed of the North Sea. The angle of this slope can be reasonably estimated by comparing the above / below sea-level figures quoted above, namely 2.1 m above sea-level at Ness House, sloping down by a net fall of 7.5m in the

course of the approximately 1200m distance between Ness House and the proposed Landfall point, a gradient of 0.625m in 100m / 0.006 in 1.”

In short, given the much lesser distance from Wardens / Ness House quoted, the very slight gradient of the aquifer has a much lesser opportunity to have effect, and the aquifer is therefore lying at an even shallower level of elevation than estimated in my previous submission. Thus, the assumed depth of the rest-water in the aquifer at the cliff-base adjacent to Landfall must now be taken to be significantly less than the 5.4m previously used in my calculations.

The Applicants’ confirmation of an even greater depth of drilling level at the base of the cliffs – 11m as opposed to the 3m assumed in my previous calculation, is also noted. At such a depth, the Applicants themselves now confirm that drilling through the water-bearing strata that contain the aquifer is unavoidable, as will be drilling through the aquifer for a second time, from below, when rising through sea-bed strata to the “punch-out” point.

15. The HDD is expected to be within the Coralline Crag beneath the cliffs, and the strength of the Coralline Crag is expected to prevent any drilling fluid breakout at this point

Over the whole course of these examinations the Applicant has gone to great lengths, from live hearings, through live and written consultations with Aps, Ips, and other residents, and in response to urgent queries for clarification from EDF, to demonstrate its assertion that the integrity of the coralline crag will not be compromised by the planned HDD works. Now, at this late stage of the Examinations, it is suddenly revealed that the HDD bore will in fact pass through the coralline crag. Furthermore, the Applicant is now relying absolutely on the (previously accepted as fragile) coralline crag to provide stable insulation against fluid loss. So, after going to such great lengths to assert that the coralline crag would be avoided, due to fragility, now it is apparently to be relied on, and bored through, because, at the tap of a desk-based key-stroke, it is convenient to describe it as being super-strong. It very much seems that this is yet another example of the Applicant simply attempting to bend reality to suit whatever its latest argument demands. Super-strong, or fragile – which is it?

4.1 Geology

21 The basal Chalk bedrock dips gently to the south-east, as do the Palaeogene strata which overlie it. In the east of the area, the Pliocene and Pleistocene Crag deposits dip eastward (Environment Agency, 1997).

22. Existing BGS boreholes surrounding the landfall (see Figure 1 in Appendix 1) indicate that the London Clay is at approximately -50m Ordnance Datum Newlyn (ODN). However, this differs to the base of Crag contour map shown on the 1:50,000 series published map, which shows the base of the Crag

In referencing London Clay at this depth, and the existence of a chalk layer underlying it, the Applicant seems to be suggesting that the non-porous nature, and extreme depth of the clay seals the chalk layer from any possible damage or

pollution from the HDD process. While this is true, it is of no relevance. Having seized on the word “chalk”, in connection with the aquifer, the Applicant implies that as there is a single basal level of chalk below the clay that contains the aquifer. However, as the Applicant admits, in the previous paragraph:

20 *In East Anglia, drift deposits are variable, including pebbly sand, gravels, silts, and clays. A chalky till, known as Lowestoft Till covers much of the area*

Whether in Lowestoft Till, Red Crag, or a mixture of both combined with chalk, the aquifer does not lie under the London Clay layer referred to above. The numerous ponds, wells, and boreholes within the area of the works all attest to the fact that the feature we refer to as “the aquifer” – a vast underground lake or reservoir – lies very near the surface. Whether the HDD process does or does not penetrate the London Clay level at -50m is therefore of no consequence. By the time the drill-head reaches 11m below ground at cliff base, on its way to bore through the coralline crag (Applicant’s own plan, please see above) it will already have passed through the aquifer-levels responsible for widespread water supply. Hence the seemingly much vaunted paragraph:

23 *Pre-construction ground investigations will confirm the true depth to the London Clay, however, unless it is significantly shallower than expected, the HDD will not be drilling within the London Clay*

- far from demonstrating that the HDD process will leave the aquifer levels unaffected because the London Clay will not be impacted, in fact only serves to underline the fact that the water-bearing mix of till, crag, and chalk above the London Clay will be unavoidably compromised.

4.2 Hydrogeology

25 *The Crag and the Chalk are designated by the Environment Agency as ‘Principal Aquifers’, which can provide a high level of water storage and support water supply and base river flows on a strategic scale. However, In the study area, the Chalk groundwater below the London Clay is highly saline and potable supplies are taken only from the Crag.*

Again, the chalk groundwater below the London Clay is of no relevance as it is from the levels above the clay that drinking water is extracted or collected. It is noted that these upper levels of mixed crag are classified as a “Principal Aquifer”

30 *It is understood that the Ness House well is located in a locked building within the bounds of the property over **400m** north of the likely location of the HDD bores. The well supplies five properties at and around Ness House, including Wardens Trust.*

My bold emphasis above – earlier in the document 750m was quoted. One wonders what figures will be plucked out of the air next by the Applicant. Ness House, Wardens, Ilex House, Ness House Cottages are at the same location. The locked building referred to is in the courtyard of my home. All of this would have been clear to the Applicant had their representatives attended the recent site visit to which they had been cordially invited.

4.3 Hydrology

31 *The landfall is not located within a catchment of any permanent surface water features and could only be affected by surface runoff.*

Again, are we to assume landfall is at 400m, 750m, or another as yet unspecified distance from Wardens / Ness House site? And the extent of landfall, predicted to require plots 4, 10 12, 13, 14 amongst others, remains unspecified as to total land area required. In terms of the statement regarding permanent surface water, this is factually inaccurate. Plots 4 and 12 contain permanent ponds, where aquifer-supplied water table sits just below ground level, and there are several boreholes and taps located in these areas which testify to permanent surface or near-surface aquifer presence. Again, had the Applicant attended the site inspection referred to above, it could have witnessed these features, rather than rely on inadequately informed speculation.

36 *As noted in Section 2, the landfall HDD bores are likely to be located approximately 750m south of the Wardens Trust site*

750m 400m ... 750m ...as previously noted, this seems to be either indecisive or a result of a lack of detailed planning of any kind. Can the Applicant please be encouraged to select a location.

38 *Existing contamination sources can include neighbouring land uses and historical activities within the onshore development area and in its surroundings. From the desk-based information and the findings of a site walkover (July 2018, see Appendix 20.4 Geomorphological Baseline of the ES (APP-498)), potential sources of contamination have been identified within the onshore development area and include:*

- *Agricultural land, which can be associated with some contaminative activities including use/storage of pesticides and herbicides and burial of wastes; and*
- *A number of historical sand and gravel pits (including Thorpe Sand Pit) present in various locations within the onshore development area have been infilled and may contain unknown and potentially contaminated fill material.*

This is pure, groundless speculation, without a scrap of actual evidence. The implication, as seen previously in the Applicant's attempt to characterise rural areas as "suburban", is that the area of the landfall and proposed cable-corridor route are already contaminated – the implied conclusion being that it would therefore not matter if they were contaminated further. What and where are the "various locations?" – and if infilled with "unknown" material, what possible knowledge could inform the assumption that the material is "contaminated"?

39 & 40

There are considered to be two key groundwater receptors linked to the landfall:

- *Lowestoft Sand and Gravel and any associated private water supplies (including the Ness House well); and*
- *Crag aquifer.*

The Chalk aquifer is not considered as a receptor in this assessment due to presence of isolating layer of London Clay and due to depth of the proposed activities

There are considered to be two key groundwater receptors linked to the landfill:

• Lowestoft Sand and Gravel and any associated private water supplies (including the Ness House well); and • Crag aquifer.

Again, this appears to be a wilful obfuscation of facts. The chalk underlying the London Clay is of no relevance. The crag, till, and mixed chalk elements bearing the aquifer that lies close under the ground level at Ness House and throughout the area of the proposed works is the source of drinking and irrigation waters, and, as has been previously identified by information provided by the Applicant above, is considered to be a “Principal Aquifer”

43 *From the 50m drilled length, up until 110m drilled length, the HDD is expected to be in the Crag Group deposits.*

The statement confirms that the HDD will pass through the strata bearing the aquifer to which we refer as the source of our water supply.

48. *The HDD is likely to be within the Coralline Crag from 110m until 1,300m of the drilling distance. The Crag is expected to provide ideal conditions for HDD.*

Further to the comments recorded above regarding the sudden disclosure that far from protecting or avoiding the previously described as fragile and unstable coralline crag, here we see the massive scope of the planned HDD intrusion. 1190m – almost four fifths of a kilometre to be drilled through. Could the Inspectorate please ensure that EDF is informed of this intrusion into the geological feature which that company has expressed deep concern regarding its stability and integrity.

49. *Previous studies for the area note the presence of vertical joints within the Coralline Crag. Some of the fractures appear to have remained open. These will not pose a problem for bore stability, being vertically oriented, but there might be temporary fluid losses as the drilling bit passes through them. When the bit has passed, the drilling fluid in the fractures will gel to seal the fractures. If persistent losses occur there is a wide range of stop-loss materials that can be added to the drilling fluid to seal the fractures.*

Again, this is based on pure speculation as to the possible size and extent of the vertical joints referenced (and as always, in historical studies carried out by, here, un-named 3rd parties). How wide a gap can the gelling lost fluid (and here we see open admission of planned fluid loss) be expected to bridge? How wide are the fractures? Could escaping fluid gel successfully enough to bridge a gap of a metre? Has this ever been attempted? Are there any examples of this gelling process actually being attempted or successfully completed?

51 & 52 *The Applicants propose to implement water quality and levels monitoring at the Ness House well during HDD activities to ensure no that the proposed mitigation is sufficient*

Monitoring as described above is already being carried out on a permanent, year-round basis by industry professionals and council authority, as detailed by Dr Gimson in both oral and written representations and submissions. It is highly unlikely that the Applicant, with no experience or knowledge of this field, will be liable to provide a more expert or reliable service in this field. As for the “mitigation” referenced in the above quotation, and also in:

Table 5.2 hydrological Risk Assessment

Provision of a temporary portable water supply tied into the well at Ness House during HDD activities at the landfall

As both Dr Gimson and I have repeatedly pointed out, no specific form of mitigation for any adverse effect to our water supply has yet been evinced. Indeed, we have both predicted, correctly, that the Applicant would use terms of such generality as to be no more than an evasion of the question. “Tied into the well”? – What will be tied into the well? Pipeline from mains water supply? Has the Applicant approached Anglian Water about this? Bottled water? A water bowser? – already declined as a viable or acceptable alternative by Dr Gimson. The only meaningful inference to be drawn from “mitigation” plans thus far put forward by the Applicant is that it seems clear that contamination of our water supply is openly expected.