



**APPLICANT'S RESPONSE TO THE ANGLIAN
WATER INFORMATION PROVIDED ON 16 AND
21 JUNE 2022**

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Comments from the Applicant on the Information provided by Anglian Water on 16 and 21 June 2022

Information provided by Anglian Water on 16 June 2022	Summary comments from the Applicant	Actions arising
<p>Tables 1 and 2 regarding the proposed scoping and risk assessment scenarios were provided to Anglian Water on 29 April 2022 and submitted to the Examination on 11 May 2022 [document reference 12.2.8.5] [REP5-007]. Anglian Water provided their comments on the proposals in Tables 1 and 2 on 16 June 2022 and full copies of the responses are provided in document reference 15.2.6.1. The information in the left hand column is extracted from the responses from Anglian Water and their comments are in red text. The comments from the Applicant in response is provided in the middle and right hand columns in purple text.</p>		
<p>Table 1. Scoping Table of Scenarios for Risk Assessment – annotations (Word file 2MB)</p>		
<p>Similarly it is considered that a suitable crossing over the pipelines can be constructed that will protect the integrity of the pipelines. This may take the form of placement of additional thickness of material over the pipeline and/or the use of steel road plates or other structures to spread the load. A specification for design of the crossing is needed and we understand that it is for Anglian Water to provide the specification. This risk is therefore not included in the assessments below. Your risk assessment – is based on what width of easement?</p>	<p>The results of the risk assessments set out in the Pipeline Risk Assessment [14.6.2.2] and the pipeline engineering report [14.6.2.3] submitted with the request for a non material change demonstrate that the proposed development will not result in any material change to the risks to the stability of the pipes. It is also demonstrated that there will be no significant environmental risks as a result of failure of the pipes due to the presence of the proposed development.</p> <p>The assessment of the access needs to carry out maintenance and repairs provided in the same reports referred to above, demonstrates that access can be safely accommodated at distances from 8.5m and up to a maximum 'ideal' distance of 20m from the side of each pipe.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p>The two water pipes are each understood to be formed of steel 800mm in diameter with approximately 4.5m between the two pipe centres. The tops are approximately 1.2m below the ground level. The pipe bedding is likely to be Type S aggregate to half or two thirds the diameter of the pipe covered with backfill. Anglian Water are seeking as built drawings of the installed pipes. We are seeking a scan of the existing drawing data. Our</p>	<p>As no detailed information on the as-built data had been provided by Anglian Water at the time of finalisation of the reports, the risk assessments carried out to date have been based on information provided in the April [REP4-013] and May 2022 [REP5-011] statements and on reasonable worst case assumptions.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>

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<p>pipelines are digitised and maintained within our GIS model as previously indicated. We maintain information of over 80,000km of pipeline and maintenance of traditional drawings is not possible. We will however keep combing the archives we still maintain for some detailed information.</p>		
<p>The nearest isolation valves are 1km [where?] for the southern pipe and 5km [where?] for the northern pipe. It has been suggested that it could take up to 4 hours [Anglian to confirm/update] for isolation following a failure of the pipe. We have previously identified the location of isolation valves in the north and south lines (see attachment for further detail) Anglian have been requested to provide any internal (or other) references or guidance used for the prediction of pipe blow outs.</p> <p>The assessment of failure assumes a number of conditions; soils, hydrology, material and loading. Equally we have advised that, although theoretical research has been done on failure analysis and determination of erosion / crater formation we have extensive experience of dealing with pressure pipeline failure and the aftermath of major burst events. Catastrophic failure events often deliver significant material damage to the local area due to the volume of water emitted before resolution (attached picture Horstead tower main, 450mm, taking above a 2m deep swathe)</p>	<p>It is noted from the information provided that there is an upstream isolation valve at the western boundary of the proposed western extension for the southern pipe whereas the closest isolation valve for the northern pipe is approximately 1.4km west of the western site boundary, however the information provided is limited (see 'Pipeline isolation points' file referenced below.)</p> <p>The water release and containment calculations reported in the Pipeline Risk Assessment Report [14.6.2.2] are carried out based on the information provided by Anglian Water in [REP5-011] regarding the duration and water flow rate before shut off.</p> <p>Anglian Water state that there is no standard reference or guidance that they use to predict crater formation following pipe catastrophic failure. The risk assessment and crater size estimate presented in the pipeline engineering report [14.6.2.3] is based on the expertise and experience of a specialist pipeline engineer. The calculated crater size is in keeping with the typical standoff easements required by the various water utility companies as summarised in the Pipeline Risk Assessment report [14.6.2.2]. The assessments presented with the request for a non material change demonstrate that the proposed development will not result in any change to the risks to the stability of the</p>	<p>No change needed to the submitted risk assessments and non material change request.</p> <p>Any agreement over the provision of leak detection monitoring at the site will managed with Anglian Water through the Protective Provisions.</p>

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 <p>However, our assessment for the potential for failure is based on a steady state condition and does not allow for additional localised loading, impacts of nearby excavation, exposure of previously buried materials and differentially loaded areas. A recent review undertaken on our behalf (see attached Map) suggests a likelihood of circa 20-50 years although I am seeking to understand this further. It is noted that we have already</p>	<p>pipes. It is also demonstrated that there will be no significant environmental risks as a result of failure of the pipes due to the presence of the proposed development. It is demonstrated in the risk assessments that the presence of the proposed development will not affect the likelihood or consequences of a failure in the pipes compared with their current situation. Similarly, the proposed development will not change any effects on the pipeline as a result of extreme cold or dry weather.</p> <p>An example has been provided by Anglian Water of an erosion feature which is stated to be approximately 2m deep resulting from a leak from a 450mm diameter mains. No further details are provided. It is clear from the photograph that the erosion feature is in easily eroded loose sand deposits, rather than in clay. The natural soils at the location of the proposed development comprise stiff clay which is significantly more robust and stable and less vulnerable to erosion than sand. The nature of a pipe failure would be that the water under pressure would travel along the route with the least resistance which would be upward through the backfilled as-dug material over and around the pipes and not sideways through the adjacent in-situ stiff clays. There is therefore no realistic potential for the creation of such an erosion feature at the location of the proposed development.</p> <p>While the probability of a leak is considered low, as explained in the Pipeline Risk Assessment report [14.6.2.2], adequate space is available for safe access to</p>	

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<p>attended to a leak on the pipeline immediately adjacent to the Western boundary where it enters the proposed development.</p> <p>Our concern remains the proposed easement, its long-term exposure, lack of monitoring and potential to resist extreme weather events of cold weather or drought periods which increases our risk significantly. In addition, the phased delivery of excavation and fill, including crossing of our pipelines to achieve this also contribute to undefined loading and therefore risk.</p> <p>Any resulting failure from the impact of that described places significant risk of customer supply, reputation and cost to Anglian Water. We remind you that this is not a small service easily re-zoned but a major trunk main providing water to the city of Peterborough hence our view to remove this from the development area, as per the previous pipeline relocation.</p>	<p>carry out repairs. The risk of significant leaks can be reduced further by the maintenance of the existing cathodic protection and by monitoring for leaks as suggested by the Applicant.</p> <p>The issues of “long term exposure”, “extreme weather events of cold and drought” are not influenced by the development. There will not be “undefined loading” as a result of the development as the impacts of excavation and fill and crossing have been defined. Nevertheless, the consequences of failure have also been assessed.</p>	
<p>Agreement is needed on what activities by Augean are acceptable in the standoff area.</p> <p>Specify the easement width assessed? AW has made its minimum position clear.</p>	<p>The intention of this information request is to obtain details from Anglian Water regarding what types of landscape planting, such as hedges and trees, are acceptable within specified distances of the water pipes. These details will be agreed with Anglian Water for the standoff area prior to finalisation of the standoff details.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p><i>Anglian are requested to confirm whether</i> the pipes deliver treated water directly to supply or whether the water is directed to a blending/treatment facility before entering supply. The pipes deliver clean and wholesome drinking water into to the distribution system for consumption – no further treatment is provided.</p>	<p>This information is helpful confirmation but does not affect the approach to or conclusions of any of the risk assessments presented with the request for a non material change.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p>The scenarios for which the risks need to be assessed are set out in the table below. The scenarios are divided into the following categories:</p> <ul style="list-style-type: none"> • Long term stability in temporary position of easement with respect to adjacent works impact and the effect of protracted periods of extreme cold weather such as another ‘Beast from the East’ or extended period of drought? 	<p>The results of the risk assessments set out in the Pipeline Risk Assessment [14.6.2.2] and the pipeline engineering report [14.6.2.3] submitted with the request for a non material change demonstrate that the proposed development will not result in any change to the risks to the stability of the pipes. It is also demonstrated that there</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>

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	<p>will be no significant environmental risks as a result of failure of the pipes due to the presence of the proposed development. Similarly, the proposed development will not change any effects on the pipeline as a result of extreme cold or dry weather.</p>	
<ul style="list-style-type: none"> access needs under normal circumstances, Assessment of crossing of construction and operational traffic and impact of phased loading / excavation to the corridor as phases are opened/ filled and closed 	<p>It is concluded in the pipeline engineering assessment [14.6.2.3] that the original design stand-off dimension proposed by Augean of 7m from the fence line and a total of 9.5m from the landfill excavation is more than adequate in all cases to make sure that the pipelines will be unaffected by any excavations taking place, and the presence of the excavation activity will not increase the likelihood of pipe failure from the shrink/swell effects associated with the excavation of the clay.</p> <p>The pipeline engineering report includes a risk assessment of the effect of crossings over the pipes and concludes that a suitable crossing over the pipelines can be constructed readily, using standard methods that will protect the integrity of the pipelines.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p> <p>A specification for design of the crossing will be discussed and agreed with Anglian Water pursuant to paragraph 4 of the proposed Protective Provisions for the benefit of Anglian Water. Anglian Water have stated [REP4-014] that they do not require a separate crossing agreement.</p>
<p>Table 2 Proposals to address the key risk scenarios. Annotations (Word file 2MB)</p>		

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<p>1. As built information regarding the pipelines. We are recalling records, but all pipelines are digitised and added to our GIS model. Holding paper records of over 80,000km of pipes has led us to a digital approach. However, we do hold some scanned information which we are still combing records and will advise accordingly.</p>	<p>As no detailed information on the as-built data has yet been located by Anglian Water, the risk assessments carried out to date have been based on information provided in the April [REP4-013] and May 2022 [REP5-011] statements and on reasonable worst case assumptions.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p>2. Tolerances for movements and strains of the pipeline including in particular at the location of the pipeline bends and the ground stresses that need to be maintained at the bends. All areas of pipeline, Bends and Valve points and crossing of pipe need assurance – we do not believe that this has been assessed.</p>	<p>The structural calculations presented in the pipeline engineering assessments [14.6.2.3] are based on reasonably worst case assumed values.</p> <p>When a new pipeline is designed, thrust restraint is provided at bends and valves to resist the forces created (which in this case we understand is a fully welded pipeline). The proposed development will not affect the internal pressure in the pipelines. If the proposed excavations were very close to the pipelines (within 2-3 pipe diameters), it could be the case that stability would be affected, and possibly thrust restraint compromised, but the location of the excavations are at a distance which is well clear of this dimension.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p>2. Depending on the sensitivity of the outcome based on the short and long term (total and effective stress) shear strength data that is available already for the in situ geology at the site and the possible need for additional parameter information, it may be necessary to obtain more data close to the pipelines The clay surround has been previously re-worked and replaced as excavated fill and may no longer be representative of virgin material. Monitoring of bank stability would be required due to risk of long term exposure and impact of extreme weather events on banking and differential loading conditions</p>	<p>It is agreed that the material immediately around and above the pipelines is disturbed and this is taken into account in the assessments. It is concluded in the pipeline engineering assessment [14.6.2.3] that the original design stand-off dimension proposed by Augean of 7m from the fence line and a total of 9.5m from the landfill excavation is more than adequate in all cases to make sure that the pipelines will be unaffected by any excavations taking place, and the presence of the excavation activity will not increase the likelihood of pipe failure from the shrink/swell</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>

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	<p>effects associated with the excavation of the clay. Monitoring of bank stability is a requirement of the landfill Environmental Permit.</p> <p>The proposed development will not change any effects on the pipeline as a result of extreme cold or dry weather.</p>	
<p>3. It is considered that no additional information is necessary.</p> <p>This was not questioned; our concern was the impact of any burst breaching the containment then filling your basin system. Waters within this may, therefore, be contaminated with material from the land fill to a level above the required leachate control. If filled to the level of the breach there is also the potential to drain back to our required repair area via the breach.</p>	<p>This relates to the Applicant's understanding that Anglian Water were concerned that contamination from the landfill could migrate to and affect the quality of the water in the pipes. It is helpful that Anglian Water have now confirmed that they are not concerned regarding this potential risk.</p> <p>The concern that the landfill areas may not have the capacity to manage the volumes of water released into the cell in the very unlikely event of a catastrophic failure of both pipes is addressed in the Pipeline Risk Assessment report [14.6.2.2]. It is concluded that in the highly unlikely event that if all the water from two failed pipes entered the adjacent landfill void, there would be no significant unacceptable environmental consequences. The depth of water in the adjacent open cell would not result in an overflow of contaminated water to the area in which the pipe is located and repairs are being carried out.</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>
<p>4. It is considered that no additional information is necessary</p> <p>In the event of critical failure and breach as described above and the possibility of filling a cell with water the potential to backflow – however slight – remains as does AW's residual risk from such an event. A risk which we do not currently have.</p>	<p>The probability of such an occurrence is extremely low.</p>	
<p>5. It is considered that no additional information is necessary</p>	<p>It is demonstrated in the Pipeline Risk Assessment report [14.6.2.2] that in the event of a catastrophic failure of the</p>	<p>No change needed to the submitted</p>

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<p>By creation of the 'corridor' or concern related to ground drain age / topography to the open ends being concentrated to the pipe trench rather than natural dissipation as is currently the situation.</p> <p>Any associated swale or drainage channel should not encroach on easements.</p>	<p>pipes there will be no flooding of the pipeline area that will restrict access to the area for repairs.</p> <p>The locations of the swales in relation to the pipeline corridor is not a factor of concern as they will not affect or restrict access. The swales are designed to be dry for most of the time, they will only function as attenuation basins immediately after heavy rainfall and will be fully drained shortly thereafter.</p>	<p>risk assessments and non material change request.</p>
<p>6. Identify methodology for prediction of the crater and calculate the size. As described previously there are several research papers and methodologies to assess the impact of energy release and water flow. However, Anglian water does not have a mechanism of assessment yet has significant experience is dealing with burst mains and the impact of such events. Large mains at the pressure this main operates at is expected to give both a significant erosion of the surrounding area.</p>	<p>The potential size of a crater has been calculated as presented in the pipeline engineering report [14.6.2.3]. A reasonable worst case calculation shows that at the current design standoff distances to the excavation boundary of 9.5m and to the fence line boundary of 7m, such an extremely unlikely, worst case catastrophic failure would not affect the integrity of the landfill engineering. There would remain a significant buffer distance between the extent of any ground disturbance resulting from the failure and the landfill structure.</p> <p>As explained in the pipeline engineering report [14.6.2.3] it is considered likely that the pipeline pressure stated is representative of the pressure at Peterborough, and is unlikely to represent the pressure in the pipe at the site.</p> <p>The natural soils at the location of the proposed development is stiff clay. The nature of a pipe failure would be that the water under pressure would travel along the route with the least resistance which would be upward through the backfilled as-dug material over and around the</p>	<p>No change needed to the submitted risk assessments and non material change request.</p>

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	pipes and not sideways through the adjacent in-situ stiff clays. There is therefore no realistic potential for the creation of significant erosion of the in situ materials at this location.	
<p>6. Confirm the nature of potential failures. The nature of failures is calculated and assessed by our risk model (see attached) however these assessments assume steady state conditions. Our models whilst they take account for ground conditions, pressure and materials they do not take account for additional loading, excavation loadings, exposure of stable soil structures. Our concern is the impact of long term and differential loading to the route through the landfill area (example of failure of a 10" main) Photo as in T1</p>	<p>These points are discussed above and addressed in the risk assessments.</p> <p>It is noted that it is stated here that the failed pipe referenced in the comments on Table 1 is 10" in diameter whereas it is identified as 450mm in diameter above.</p>	As above
<p>6. Confirm the pipeline pressure of 8bar. The pipe line is operating around the 8 bar g range.</p>	<p>As explained in the pipeline engineering report [14.6.2.3] it is considered likely that this pipeline pressure (head) is representative of the pressure at Peterborough, and is unlikely to represent the pressure in the pipe at the site. Nevertheless this assumption does not affect the risk assessment conclusions.</p>	No change needed to the submitted risk assessments and non material change request.
<p>7. Confirm the rate of flow from the pipeline and the length of time until the pipeline is isolated. As previously described in earlier communications</p>	<p>The water release and containment calculations reported in the Pipeline Risk Assessment Report [14.6.2.2] are carried out based on the information provided by Anglian Water in [REP5-011] regarding the duration and water flow rate before shut off.</p>	No change needed to the submitted risk assessments and non material change request.
<p>8. No additional information needed The quantity of flowing water within the corridor, whilst flowing to a position, will still be channelled through the access and repair area. The Narrower the corridor the greater the influence during the term of the event – remembering we do not turn off supply until we are able to achieve either</p>	<p>It is demonstrated in the Pipeline Risk Assessment report [14.6.2.2] that in the event of a catastrophic failure of the pipes there will be no flooding of the pipeline area that will restrict access to the area for repairs.</p>	No change needed to the submitted risk assessments and non material change request.

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local isolation and flushing for fear of interruption to supply and potential of contaminating the main		
9. No additional information needed. Refer to above	This relates to the Applicant's understanding that Anglian Water were concerned that contamination from the landfill could migrate to and affect the quality of the water in the pipes. It is helpful that Anglian Water have now confirmed that they are not concerned regarding this potential risk.	No change needed to the submitted risk assessments and non material change request.
Pipeline isolation points. (Word file 884KB)	<p>The document is headed 'Pipeline isolation points and failure data' but there is no failure data included.</p> <p>It is noted from the information provided that there is an upstream isolation valve at the western boundary of the proposed western extension for the southern pipe whereas the closest isolation valve for the northern pipe is approximately 1.4km west of the western site boundary, however the information provided is limited.</p> <p>The water release and containment calculations reported in the Pipeline Risk Assessment Report [14.6.2.2] are carried out based on the information provided by Anglian Water in [REP5-011] regarding the duration and water flow rate before shut off.</p>	No change needed to the submitted risk assessments and non material change request.
Stantec PR24 likelihoods. (Pdf file 6MB)	This document comprises a better resolution version of the plan provided with the Statement of Mark Froggatt on 11 May 2022 [REP5-011]. No additional information is provided regarding how the plan is derived.	No change needed to the submitted risk assessments and non material change request.
Information provided by Anglian Water on 21 June 2022		

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Provision of "as built" information	The information provided comprises a GIS plan showing the locations of the pipes together with attribute tables listing some construction details. The Applicant is seeking clarification from Anglian Water regarding the interpretation of the legend with the attribute tables so that the information is understood.	The initial review suggests that there are no changes needed to the submitted risk assessments and non material change request.