Environment Agency

Water Quality Operations Catchment Services
Influencing Investment
Driving Performance
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Marine Modelling comments on			
Doc no:	60675797		
Title:	Net Zero Teesside - Water Quality Assessment Intermediate Design Stage		
Reviewer(s):	GAW and TC		
Received for review on:	August 2022		
EA comment number	**Page/ Paragraph**	**Reviewer's Comment**	**Update comment**
EA // 1	2.2.2	We do not understand what this condensed water is, or how it may be possible to re-use it. What is the flow rate for it? It would be useful to include a flow-process diagram.	
EA // 2	3.1	Please include the definition of a 'thin dam' structure within this report.	
EA // 3	4.1	Please clarify how the pipe size will be reviewed in the existing outfall tunnel? Will another pipe be run through the existing outfall?	
EA // 4	4.1	What is the final exit velocity?	
EA // 5	table 5.1	It is assumed that a, b, c refer to the dimensions indicated in Figure 4.1, 4.2. It would be very helpful to include this info in the table caption.	
EA // 6	table 5.1	How can this plume fail to reach the water surface? Typically, effluent plumes are trapped at intermediate layers where they have elevated salinity, so that as the temperature drops they reach a position of neutral buoyancy. Or else where there is a pycnocline in the ambient water. Neither of those conditions applies (so far as we understand). Therefore, please can you provide some narrative on this and what is happening. Without an answer to this question, the results cannot be verified.	
EA // 7	6.1	"A continuous flow rate and DIN concentration…" Do you mean "constant"?	
EA // 8	6.2	"it is recommended that the Delft3D model is revised to include wave action" We do not support this recommendation. Dispersion modelling with waves is not a well-proven technology. If your outfall requires wave mixing to provide sufficient dilution, design a better outfall.	
EA // 9	6.2	Which level of your colour scale corresponds to the EQS?	
EA // 10	6.2	You have presented results at sigma=0.35, 0.90, 0.98. How many layers does the model use for it internal calculations? And where are they? How / why have you selected a subset of layers for the results presentation? It would make the report easier to read if you adopted a consistent figure format, displaying all layers - these individual frames could be much smaller to ensure they all fit on one page. Further - 35% is not particularly close to the seabed. How represenative is this of impacts on benthic organisms?	
EA // 11	6.2	The model cells at the outfall location seem very large. In light of the CORMIX predictions, it is not clear that this configuration will give sufficient accuracy to capture the effluent plume. Please comment on the effect this may have on the concentrations / extent of the plume, and whether mesh refinement would change the predictions.	
EA // 12	fig 6.7 - 6.9	We note your comment about wave action increasing mixing, and agree this makes your prediction conservative. Nevertheless - what size is the predicted mixing zone?	
EA // 13	fig 6.7 - 6.9	We note these are mis-referenced in the text.	
EA // 14	6.2 ff	What is the time dimension on these plots? Max / average / snapshot?	
EA // 15	7	"The near field modelling shows that the impacts of the discharge is small for all four assessed discharge Options at all stages of the tidal cycle." Given what you proceed to discuss about DIN, this statement is misleading.	
EA // 16	7	"DIN emissions … are not sufficient to cause ... no impacts on water quality in the Tees Estuary." This sentence needs to be relooked at.	
EA // 17	7	"restricting DIN effluent DIN concentrations to 890 µmol/l would result in a mixing zone of acceptable size." Definition of "acceptable" has not been agreed.	
EA // 18	7	As noted above, you should not rely on wave mixing to solve the dilution. You have noted elsewhere in the report that the outfall configuration is more sketched than designed - this would be a more appropriate task to prioritise.	
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