Breathe London response to address QA/QC audit nonconformities

As detailed in section **4.2 Nonconformity evidence** of the *NPL audit on Breathe London Fixed Sensor Network Data Quality and Control Procedures* ("QA/QC Procedures"), evidence was found that demonstrated nonconformity with four stages of the QA/QC Procedures. The table below outlines the four nonconformities, supporting nonconformity evidence (NCE), and the project consortium's response to address and correct each nonconformity.

TABLE 1
Evidence of the four nonconformities and corresponding response from Breathe London project consortium.

	Requirement description	Evidence description / comments	Response to address nonconformity
Conflicting information about the QA/QC (stage 1.1)	Slope and offset statistically equivalent to 1.0 and 0.0 + scaling factors were not applied	NCE1: NO2 scaling factors for pod 132245 were considered -999 and the scaling method was filled in as 'None (don't publish)	Pod 132245 was listed in DC18 as "do not publish" as it was determined that the data was not credible due to its proximity to a vent at the hospital, which was not discovered until a site investigation. The pod was moved, and the data subsequently marked as OK. The conflicting information cited was a result of changing circumstances over time within these "living" documents. The conflicting information was corrected.
	Slope and offset statistically equivalent to 1.0 and 0.0 + scaling factors were not applied	NCE2: Pod 132245 status was considered 'Online' its Data status considered 'All good', which disagrees with NCE1	
	Slope and offset statistically equivalent to 1.0 and 0.0 + scaling factors were not applied	NCE3: NO_2 and PM 2.5 time series results suggest that pod 132245 appears to be normal	
Colocation with reference instruments (stage 1.2)	Co-location with reference instruments should last from three to seven days	NCE4: Pod 37245 was not found in colocation history in C40 Master Doc	Pod 37245 was at height and only reachable by hydraulic lifts via a contractor. It was decided by the project consortium that it would not be practicable to carry out a co-location. Instead, it was calibrated using the network calibration method. A typo was found in the DC1 document. Dates of initial co-location for this pod at Elephant & Castle reference site in DC1 were corrected to those in DC18.
	Co-location with reference instruments should last from three to seven days	NCE5: Co-location period for the pod 37245 was 06-10/10/2019, whilst DC1 states different period (06-08/10/2018)	
Gold pod co-location scaling method (stage 1.3)	Application pod scaling factors (slope and offset) statistically different to 1.0 and 0.0, obtained by co-location with gold pods	NCE6: PM 2.5 Slope and offset scaling factors for pod 87245 were both assigned -999 value, and the co-location information stated the absence of such scaling factors due to unacceptable covariance for network calibration - what differs from DC 25 cited in CE16	DC16 was valid for an earlier version of the dataset (10/08/20), where network calibration factors were used for PM2.5 for all pods, and then the factors for pod 87245 could not be used due to unacceptable covariance. DC25 was produced with a later version of the dataset (14/09/20), when gold pod calibration factors had been allowed to be used for $PM_{2.5}$ where available.
	Application of scaling factors (slope and offset) statistically different to 1.0 and 0.0, obtained by co-location with gold pods	NCE7: NO_2 Slope and offset values for pod 64245 differ from DC24 cited in CE15	The slope and offset applied for pod 64245, as specified in DC24, are consistent with the scaling results obtained in the DC7 document for Pod 64 (2450064, within DC7). DC7 calibration results were obtained in 2019. The DC2 document contains independent calibration results that were obtained at a later stage of the project (2020), and they have not been applied retroactively to replace 2019 results.
Network calibration method (stage 1.4)	Network calibration scaling factors were applied	NCE8: NO_2 network calibration slope and offset values for pod 74245 were both considered -999 and flagged as 'covariance too low' - criterion not described in QA/QC	A statistical criterion was applied to network calibration results, where scaling factors were only applied with sufficiently high covariance (covariance > 0.5). A description of this requirement has been added to the QA/QC document under Stage 1.4.
	Hybrid scaling method for NO with network offset and generic average slope of 0.81	NCE9: NO average slope applied for pod 21245 was 0.805, instead of 0.81 (CE32)	The 0.805 came from the ReadMe tab of the '1-14 NO Calibration Factors.xlsx' document CERC was sent by Dan Peters on 15/1/2020. The 0.81 generic slope is the rounded equivalent of the 0.805 slope that was applied.