Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Appendix 20.13: (Draft) Outline Water Quality Monitoring Plan

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1 Introduction

1.1 Scope of document

1.1.1 This document sets out the scope and duration of monitoring of groundwater and related surface water features in connection with the construction, operation and maintenance of the Cambridge Waste Water Treatment Plant Relocation Project (CWWTPR).

1.1.2 This document excludes:

- any monitoring requirements which may be specified in further permits, consents and licences related to construction activities;
- any surface water quality monitoring within the river Cam as specified within permits covering testing and commissioning activities; and
- operational water quality monitoring which will be specified within the final environmental permit for the operational facility.

1.2 Relationship to Environmental Statement

1.2.1 Environment Statement (ES) Chapter 20: Water Resources (App Doc Ref 5.2.20) [AS-040] states that 'The scope and duration of borehole water level and quality monitoring will be agreed with all relevant stakeholder before works commence'.

1.2.2 An initial water monitoring discussion[1] was held between the Environment Agency and Natural England, as key stakeholders, and the Applicant in August 2023. This document is an action resulting from that discussion. An initial draft of the document was reviewed by the Environment Agency. Comments on the draft by the Environment Agency, sent to the Applicant by email in October 2023, were then the subject of a further discussion[2] between the Environment Agency and the Applicant in October 2023. The document has been updated subsequently, taking into account points raised in this further discussion. It is assumed that this revised version of the document will be reviewed and, if accepted, will be approved by the Environment Agency in consultation with Natural England.

1.2.3 ES Chapter 20: Water Resources (App Doc Ref 5.2.20) [AS-040] outlines potential locations for monitoring prior to and during construction (paragraph 4.1.278 - 4.1.280) and operation (paragraph 4.2.1.141 - 4.2.145). Decommissioning monitoring with respect to contaminated land risk for the existing Cambridge Waste Water Treatment Plant (WWTP) is considered in ES Chapter 14: Land Quality (App Doc Ref 5.2.14) [AS-032].

[1] MS Teams Meeting entitled "Natural England - CWWTP Groundwater and Hydrology meeting"
[2] MS Teams Meeting entitled "CWWTPR - Monitoring Plan (Water) review following EA comments"

1.2.4 This document builds on the proposed monitoring locations outlined in the ES Chapter 20: Water Resources (App Doc Ref 5.2.20) [**AS-040**] and provides a proposed scope and duration of monitoring.

1.3 Document structure

1.3.1 The document structure and content is summarised in Table 1.1.

Table 1.1 Document structure

Section	Content
1 Introduction	Background to water quality monitoring measures Matters dealt with through other licences, and permits
2 Water monitoring approach	Approach to monitoring (locations, parameters, frequency)
3 Access	Details of agreements required, in particular in relation to locations outside of the order limits
4 Plan Update	Indicates triggers and rational for monitoring plan updates
5 Reporting	Proposed approach to reporting and providing monitoring data
Appendices	Proposed monitoring parameters

2 Water Monitoring Approach

2.1 Pre-construction monitoring

2.1.1 Pre-construction monitoring of groundwater levels and groundwater quality for 12 months prior to construction, as itemised in Table 2.1. Pre-construction monitoring of surface water features is indicated in Table 2.2.

2.1.2 The exact programme start will be defined in a Detailed Construction Water Quality Management Plan to be prepared and agreed once the construction stage programme is refined. This will be no later than 3 months prior to the start of pre-construction monitoring.

Water quality suites

2.1.3 It is assumed that comprehensive groundwater and surface water monitoring suites will be used for baseline pre-construction quality monitoring, as itemised in Appendix A - Comprehensive groundwater suite.

2.1.4 The addition of BTEX[3] to the groundwater monitoring suite was requested by the Environment Agency in an email response in October 2023 to a draft version of this document, and further discussed[4] between the Environment Agency and the Applicant in October 2023. It was agreed that BTEX could be added to the suite if there is no additional significant cost to the Applicant. If there is significant additional cost, then the Total Petroleum Hydrocarbon (TPH) suite, without BTEX, is considered suitable.

Proposed WWTP

2.1.5 For the proposed WWTP, groundwater level and quality monitoring is proposed at 7 boreholes (5 existing boreholes and 2 proposed new boreholes). The boreholes provide coverage close to the WWTP, and include what is likely to be the dominant direction of groundwater flow towards Black Ditch, based on topography and interpretation of groundwater level data.

[3] Benzene, Toluene, Ethyl Benzene, Xylene.
[4] MS Teams Meeting entitled "CWWTPR - Monitoring Plan (Water) review following EA comments"

2.1.6 In comments on the draft version of this document, the Environment Agency queried why there is no groundwater monitoring borehole proposed to the west of the WWTP, even if this is upgradient for groundwater flow. In the further discussion between the Environment Agency and the Applicant in October 2023, the Applicant explained that one of the ground investigation boreholes constructed along the proposed route of the waste water transfer tunnel was located close to the A14 about 200m west of the proposed WWTP. The borehole may already have been backfilled. Following the further discussion, the Applicant established that this borehole has been backfilled and is no longer available for monitoring of groundwater levels .

Black Ditch

2.1.7 Surface water level and quality monitoring is proposed at Black Ditch to provide baseline data from which change can be detected.

Private water sources (PWS)

2.1.8 Water levels would be monitored at the two private groundwater sources which might be impacted by construction dewatering. Installation of water level loggers at the sites would be subject to agreement with the owners and secure and reliable access for the equipment.

Designated sites for conservation

Allicky Farm Pond CWS & Stow-cum-Quy-Fen SSSI

2.1.9 Surface water levels would be monitored at Allicky Farm Pond County Wildlife Site (CWS) and in The Cut at Stow-cum-Quy-Fen Site of Special Scientific Interest (SSSI).

Wilbraham Fens SSSI

2.1.10 During the meeting on 22nd August 2023, Natural England indicated that water levels should also be monitored at Wilbraham Fens Site of Special Scientific Interest (SSSI). As for Allicky Farm Pond CWS, and in The Cut at Stow-cum-Quy-Fen SSSI, the estimated maximum impact of dewatering during construction of the Terminal Pumping Station (TPS) within the proposed WWTP is less than 1mm. However, Wilbraham Fens SSSI is located on the opposite bank of Quy Water to the proposed WWTP. As a result, any impact of abstraction may well be assimilated in minor temporary changes to flow in Quy Water, rather than extending further out into the Chalk beneath the SSSI. In addition, there are no specific chalk-fed features in the citation for the Wilbraham Fens SSSI, as is the case for Stow-cum-Quy Fen SSSI. Peat and river terrace deposits overlie the Grey Chalk (West Melbury Marly Chalk Formation) in the area of Wilbraham Fens. Geological logs available for two boreholes located near the western boundary of Wilbraham Fens indicate the presence of sandy clay to a depth of 2.5 to 3.0m. The sandy clay overlies what is described in the logs as ‘structureless chalk’ (BGS, 2023).

2.1.11 Groundwater levels have been monitored in Wilbraham Fens at TL55_177, also located near the western boundary of the SSSI (Department for Environment Food & Rural Affairs, 2020) although monitoring borehole construction details are not available. Groundwater level records are available for the site for the period from 2012 to 2020, as shown in Figure 2-1.

2.1.12 The groundwater level data is almost all classified as 'unchecked' and there are numerous anomalies, including abrupt variations in level, throughout the record. In addition, the logging device used for monitoring was not operating when water levels dropped below about 5.86 mAOD, although the minimum operating level also varied in the period of record, as indicated on Figure 2-1.

2.1.13 Despite these anomalies, the data for TL55_177 indicates a general overall variation of 0.5m or more in groundwater levels in each year. As a result of this regular annual variation, any impact on groundwater levels of 1mm (or substantially more than 1mm, were this to occur) would be undetectable at the distance of Wilbraham Fens from the proposed WWTP (>2km). It is noted again, however, that impacts on groundwater levels of more than 1mm are not predicted during construction of the TPS.

2.1.14 If the borehole remains available for monitoring, and the Environment Agency and Natural England still consider this a worthwhile requirement, then available data from TL55_177 would provide a record of groundwater levels prior to and during construction of the proposed WWTP. Otherwise, neither the construction of a new borehole to provide such records, nor surface water level monitoring, is proposed for Wilbraham Fens SSSI.

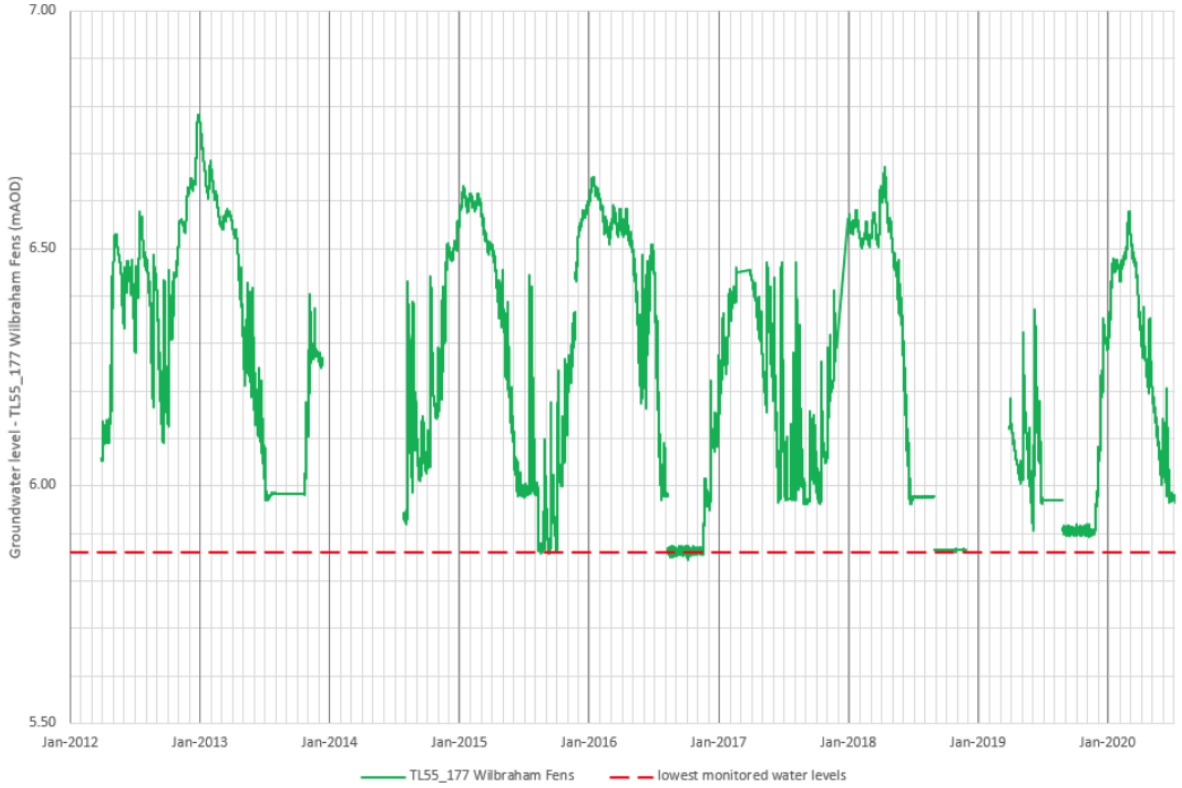

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Figure 2-1 Groundwater levels at Wilbraham Fens TL55-177.

Waterbeach

2.1.15 Pre-construction monitoring was not completed as part of the ground investigations of the Waterbeach pipeline, and the boreholes installed in 2021/22 have since been removed. However, it is understood that the Environment Agency expects that baseline conditions are established for the Waterbeach pipeline.

2.1.16 It is therefore proposed that:

- pre-construction monitoring is to be completed with a focus on areas where directional drilling activities are proposed; and,
- monitoring to commence to allow for 12 months monitoring to be completed and reported prior to the start of the Waterbeach pipelines construction to understand water levels and groundwater quality.

2.1.17 Monitoring boreholes would be:

- in the proposed launch and recovery sites for directional drilling for the River Cam; and,
- at the approximate midpoint of the directional drill around the railway crossing close to the northern end of the pipeline.

2.1.18 The area is underlain by the Gault Formation which is not classified as an aquifer. However, superficial deposits comprising alluvium and River Terrace Deposits are present locally and these are targeted for monitoring. A total of 3 locations for pre-construction monitoring are therefore proposed along the route of the Waterbeach pipeline between Waterbeach and the south-east side of the River Cam.

Table 2.1 Pre-construction groundwater monitoring

Ref	ES Link or reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
BH_STW_001	ES Ch 20 Para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months Define period in relation to potential impact	Proposed WWTP civils (ground works) construction start date minus 12 months - start of monitoring is therefore currently expected mid 2024	Provide preconstruction baseline upon which to measure temporary changes to water levels and or quality that could arise from construction activities including dewatering.	DCO Schedule 2 Requirement
	ES Ch 20 Para 4.2.143	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
BH_STW_023	ES Ch 20 Para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above
	ES Ch 20 Para 4.2.143	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
BH_STW_024	ES Ch 20 Para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above
	ES Ch 20 Para 4.2.143	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
BH_STW_025	ES Ch 20 Para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above
	ES Ch 20 Para 4.2.143	Comprehensive groundwater suite	Water quality sampling	Quarterly				
BH_STW_026	ES Ch 20 Para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above

Ref	ES Link or reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
		Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
BH_STW_027 (PROPOSED NEW BH)	ES Ch 20 Para 4.1.279	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above
	ES Ch 20 Para 4.1.279	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
BH_STW_028 (PROPOSED NEW BH)	ES Ch 20 Para 4.1.279	Water levels (m)	Dip meter	Monthly dips	12 months	As above	As above	As above
	ES Ch 20 Para 4.1.279	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months			
PWS Private water source in Horningsea	ES Ch 20 para 4.1.215	Water levels (m)	Dip meter/ Logger*	Quarterly dips	12 months	Proposed Waterbeach pipeline construction start date minus 12 months , or as agreed with source owner*	As above	Separate agreement with well owner such as no-derogation agreement
PWS Private water source near the proposed WWTP	ES Ch 20 para 4.1.105	Water levels (m)	Dip meter/ Logger*	Quarterly dips	12 months	Proposed WWTP civils (ground works) construction start date minus 12 months - start of monitoring is therefore currently expected mid 2024,	As above	Separate agreement with well owner such as no-derogation agreement

Ref	ES Link or reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
						or as agreed with source owner*		
BH_WB_01 Waterbeach (PROPOSED NEW BH) – Approximate midpoint of railway crossing directional drill targeting superficial deposits	Not specified in ES.	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months	Mid 2024	To prepare a current baseline for groundwater quality within the area of land required for the construction of the Waterbeach pipeline	DCO Schedule 2 Requirement – pre-construction monitoring
			Water levels (m)	Quarterly dips	12 months	Mid 2024	To have groundwater levels information to inform construction activities in particular directional drilling	DCO Schedule 2 Requirement – pre-construction monitoring
BH_WB_02 Waterbeach (PROPOSED NEW BH) – North of River Cam directional drill targeting superficial deposits	Not specified in ES.	Comprehensive groundwater suite	Water quality sampling	Quarterly	12 months	Mid 2024	To prepare a current baseline for groundwater quality within the area of land required for the construction of the Waterbeach pipeline	DCO Schedule 2 Requirement – pre-construction monitoring
			Water levels (m)	Quarterly dips	12 months	Mid 2024	To have groundwater levels information to inform construction activities in particular directional drilling	DCO Schedule 2 Requirement – pre-construction monitoring
BH_WB_03 Waterbeach	Not specified in ES.	Not specified in ES.	Water quality sampling	Quarterly	12 months	Mid 2024	To prepare a current baseline for groundwater quality	DCO Schedule 2 Requirement –

Ref	ES Link or reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
(PROPOSED NEW BH) South of River Cam directional drill targeting superficial deposits							within the area of land required for the construction of the Waterbeach pipeline	pre-construction monitoring
			Water levels (m)	Quarterly dips	12 months	Mid 2024	To have groundwater levels information to inform construction activities in particular directional drilling	DCO Schedule 2 Requirement – pre-construction monitoring

*Depends on what measurement methods are practical and can be agreed with the landowner.

Table 2.2 Pre-construction surface water monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW03 Black Ditch	ES Ch 20 para 4.1.281	Water levels (m)	Gauge board/dips	Quarterly	12 months	Proposed WWTP civils (ground works) construction start date minus 12 months - start of monitoring is therefore currently expected mid 2024	Provide preconstruction baseline upon which to measure change	DCO Schedule 2 Requirement
SW03 Black Ditch	ES Ch 20 para 4.1.281	Comprehensive surface water suite	Water quality sampling	Quarterly	12 months	As above	Provide preconstruction baseline upon which to measure change	DCO Schedule 2 Requirement
SW08 (PROPOSED) Allicky Farm Pond CWS	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	12 months	As above	Provide preconstruction baseline upon which to measure change	DCO Schedule 2 Requirement

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW09 (PROPOSED) The Cut at Stow-cum-Quy Fen SSSI	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	12 months	As above	Provide preconstruction baseline upon which to measure change	DCO Schedule 2 Requirement

2.2 Construction monitoring

2.2.1 Groundwater construction monitoring locations are itemised in Table 2.3. Construction monitoring of surface water features is indicated in Table 2.4.

2.2.2 The exact programme start will be defined in a Detailed Construction Water Quality Management Plan to be prepared and agreed once the construction stage programme is refined. This will be no later than 2 months from completion of pre-construction monitoring.

2.2.3 It may be the case that some existing boreholes are lost during construction during earth works. Monitoring will be completed as far as practicable in all locations. The minimum number and location to be retained / replaced will be agreed with the Environment Agency.

Water quality suites

2.2.4 Following analysis of results from the pre-construction monitoring, reduced surface water and groundwater quality suites could be used during construction. The reduced suites would include any determinands of interest identified in pre-construction monitoring.

Proposed WWTP

2.2.5 At the proposed WWTP, groundwater level and quality monitoring to continue as far as practicable at the same 7 boreholes as monitored through pre-construction.

Waterbeach

2.2.6 Groundwater quality monitoring for the Waterbeach pipeline would be discontinued on the assumption that pre-construction monitoring, as shown in Table 2.1, shows no significant contaminant exceedances.

Black Ditch

2.2.7 Surface water level and quality monitoring proposed at Black Ditch to monitor water quality data during construction and water levels during construction dewatering.

Private water supplies

2.2.8 Water levels would be monitored at the two private water supplies which might be impacted by construction dewatering. No-derogation agreements with the property owners will ensure that water supply is maintained.

Designated sites for conservation (SSSIs and CWS)

Allicky Farm Pond CWS & Stow-cum-Quy-Fen SSSI

2.2.9 During construction dewatering, surface water levels would be monitored at Allicky Farm Pond CWS and in The Cut at Stow-cum-Quy-Fen SSSI.

Wilbraham Fens SSSI

2.2.10 As indicated in Section 2.1 Pre-construction monitoring, if borehole TL55_177 at Wilbraham Fens SSSI is still available for monitoring, and if the Environment Agency and Natural England consider this a worthwhile requirement, then available data from this borehole would also provide a record of groundwater levels during construction of the proposed WWTP.

Table 2.3 Construction groundwater monitoring

Ref	ES reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
BH_STW_001	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	Entire construction period	Year 1 of construction (immediately following pre-construction monitoring)	Detection of temporary changes compared to baseline that could arise from construction activities including dewatering.	DCO Schedule 2 Requirement 8 – CoCP DCO Schedule 2 Requirement 9 – CEMP
	ES Ch 20 para 4.2.143	Reduced groundwater suite[5]	Water quality sampling	Quarterly	Entire construction period			
BH_STW_023	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period	As above	As above	As above
BH_STW_024	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period			
BH_STW_025	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period			

[5] Determinands of reduced groundwater suite dependant on outcomes of pre-construction groundwater quality monitoring

Ref	ES reference	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
BH_STW_026	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above As above	As above	As above
		Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period			
BH_STW_027 (PROPOSED NEW BH)	ES Ch 20 para 4.1.279	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above	As above	As above
		Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period			
BH_STW_028 (PROPOSED NEW BH)	ES Ch 20 para 4.1.279	Water levels (m)	Dip meter	Monthly dips	Entire construction period	As above	As above	As above
		Reduced groundwater suite	Water quality sampling	Quarterly	Entire construction period			
PWS Private water source in Horningsea	ES Ch 20 para 4.1.215	Water levels (m)	Dip meter/ Logger*	Quarterly dips	During periods of dewatering for Waterbeach pipeline where dewatering occurs within 500m radius of PWS	Year 1 of construction or as in NDA	To detect potential dewatering impacts on groundwater levels in PWS	No-derogation agreement
PWS Private water source near the proposed WWTP	ES Ch 20 para 4.1.105	Water levels (m)	Dip meter/ Logger*	Quarterly dips	During dewatering within the land required for the construction of the proposed WWTP and landscape masterplan	Year 1 of construction or as in NDA	To detect potential dewatering impacts on groundwater levels in PWS	No-derogation agreement

*Depends on what measurement methods are practical and can be agreed with the landowner.

Table 2.4 Construction surface water monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW03 Black Ditch	ES Ch 20 para 4.1.281	Water levels (m)	Gauge board and observations	Quarterly	During dewatering within the land required for construction of the proposed WWTP and the landscape masterplan	Year 1 of construction	To detect any changes as a result of dewatering and potential impacts on water levels	DCO Schedule 2 Requirement 8 – CoCP DCO Schedule 2 Requirement 9 CEMP
SW03 Black Ditch	ES Ch 20 para 4.1.281	Reduced surface water suite	Water quality sampling	Quarterly	Entire construction period	Year 1 of construction	To detect any changes in water quality as a result of dewatering and potential impacts on Black Ditch.	As above
SW08 (PROPOSED) Allicky Farm Pond CWS	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	During dewatering within the land required for construction of the proposed WWTP and the landscape masterplan	Year 1 of construction	To detect any changes as a result of dewatering and potential impacts on water levels.	As above
SW09 (PROPOSED) The Cut at Stow-cum-Quy Fen SSSI	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	During dewatering within the land required for construction of the proposed WWTP and the landscape masterplan	Year 1 of construction	To detect any changes as a result of dewatering and potential impacts on water levels.	As above

2.3 Post construction monitoring – planned

2.3.1 Post-construction groundwater monitoring will continue for 12 months following construction completion (specifically completion of major earthworks and construction of below ground structures) as shown in Table 2.5. Post construction surface water monitoring is shown in Table 2.6. Thereafter operational long-term monitoring will occur as per Table 2.7 and Table 2.8.

Water quality suites

2.3.2 It is assumed that, similar to the construction phase, reduced surface water and groundwater quality suites could continue to be used, which would include any determinands of interest as identified in results from the pre-construction monitoring stage.

2.3.3 The post construction monitoring suite will be proposed within the Detailed Operational Water Quality Monitoring Plan to be prepared and agreed prior to the start of year 1 of operation.

Proposed WWTP

2.3.4 At the proposed WWTP, groundwater level and quality monitoring to continue at the 7 boreholes monitored through pre-construction and construction periods. The post construction monitoring methods will be proposed within the updated Water Quality Monitoring Plan.

Surface water

2.3.5 Surface water quality monitoring to continue at Black Ditch. The post construction monitoring suite will be proposed within the updated Water Quality Monitoring Plan.

2.3.6 Surface water quality monitoring of the Sustainable Drainage System (SuDS) pond should commence at this stage to provide baseline water quality data for long-term operational use. However, it is recognised that the pond could be dry or contain little drainage water at times, in which case monitoring may not be possible.

Table 2.5 Post-construction groundwater monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
BH_STW_001	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	Measure change in water levels and quality compared to baseline	DCO Schedule 2 Requirement
	ES Ch 20 para 4.2.143	Reduced groundwater suite[6]	Water quality sampling	Quarterly				
BH_STW_023	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly				
BH_STW_024	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly				
BH_STW_025	ES Ch 20 para 4.1.278	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	As above	As above
	ES Ch 20 para 4.2.143	Reduced groundwater suite	Water quality sampling	Quarterly		Month 1 in year 1 of operation		
BH_STW_026		Water levels (m)	Dip meter/	Monthly dips	12 months		As above	

[6] Determinands of reduced groundwater suite dependant on outcomes of pre-construction groundwater quality monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
	ES Ch 20 para 4.1.278	Reduced groundwater suite	Water quality sampling	Quarterly		Month 1 in year 1 of operation		
BH_STW_027 (PROPOSED NEW BH)	ES Ch 20 para 4.1.279	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	As above	As above
		Reduced groundwater suite	Water quality sampling	Quarterly				
BH_STW_028 (PROPOSED NEW BH)	ES Ch 20 para 4.1.279	Water levels (m)	Dip meter	Monthly dips	12 months	Month 1 in year 1 of operation	As above	As above
		Reduced groundwater suite	Water quality sampling	Quarterly				

Table 2.6 Post-construction surface water monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW03 Black Ditch	ES Ch 20 para 4.1.281	Reduced surface water suite[7]	Water quality sampling	Quarterly	12 months	Month 1 in year 1 of operation	Identify indicator contaminants in Black Ditch	Schedule 2 DCO Requirement
SW08 (PROPOSED) Allicky Farm Pond CWS	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	12 months	Year 1 of construction	To detect any changes in year 1 post dewatering water levels	As above
SW09 (PROPOSED) The Cut at Stow-cum-Quy Fen SSSI	ES Ch 20 para 4.1.282	Water levels (m)	Dip meter/ Gauge board	Quarterly	12 months	Year 1 of construction	To detect any changes in year 1 post dewatering water levels	As above

[7] Determinands of reduced surface water suite dependant on outcomes of pre-construction surface water quality monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW05 (PROPOSED) SuDS pond	ES Ch 20 para 4.2.145	Reduced surface water suite	Water quality sampling	Quarterly, but only during monitoring when there is drainage discharge to or in the pond	12 months	Month 1 in year 1 of operation	Identify indicator contaminants within SuDS pond	As above

2.4 Long term operational monitoring

Background

2.4.1 Contaminant modelling (App Doc Ref 5.4.20.8 Contaminant Transport Note) indicates that the retarded travel time for Ammoniacal Nitrogen, from the proposed WWTP to the drain[8] leading to Black Ditch, is predicted to be 480 years. The retarded travel time for hydrocarbons from the proposed WWTP to the drain leading to Black Ditch is predicted to be 33-51 years. Annual monitoring of boreholes close to source will allow early detection of any changes. In the event that an adverse change is deemed to be related to the proposed WWTP, remediation measures would then be discussed and agreed with the Environment Agency before any downgradient receptors could be affected.

Water quality suites

2.4.2 It is assumed that reduced surface water and groundwater quality suites could continue to be used. These suites would include any determinands of interest as identified in results from the pre-construction monitoring stage.

2.4.3 The reduced surface water and groundwater quality suites would be proposed in an updated Water Quality Monitoring Plan prepared following year 1 of operation.

Proposed WWTP

2.4.4 At the proposed WWTP, groundwater level and quality monitoring to occur at the 7 sentinel boreholes monitored through pre-construction, construction and post-construction periods. As indicated in Section 2.1, the boreholes provide coverage close to the WWTP, and include what is likely to be the dominant direction of groundwater flow towards Black Ditch, based on topography and interpretation of groundwater level data.

Surface water

2.4.5 Water quality at the SuDS pond (discharge of surface water runoff from uncontaminated areas of site) should be sampled annually in the long-term. The monitoring should be coincident with times when there is drainage discharge to or in the pond.

[8] Drain is located towards the northern boundary of the land required for the landscape masterplan

Table 2.7 Operational groundwater monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
BH_STW_001	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_023	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_024	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_025	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_026	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_027 (PROPOSED NEW BH)	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement
BH_STW_028 (PROPOSED NEW BH)	Not in ES	Reduced groundwater suite	Water quality sampling	Annual	To 2050	Month 1 in Year 2 of operation	Detect changes from pre-construction baseline	DCO Schedule 2 Requirement

Table 2.8 Operational surface water monitoring

Ref	ES Link	Parameters	Method	Frequency	Duration	Estimated start	Rationale	Secured by
SW05 (PROPOSED) SuDS pond	4.2.145	Reduced surface water suite[9]	Water quality sampling	Annual with target time of year when pond is generally in active use.	To 2050	Month 1 in Year 2 of operation	Identify indicator contaminants within drainage from WWTP.	DCO Schedule 2 Requirement

[9] Reduced surface water suite to include contaminants relating to spills or leaks e.g ammoniacal nitrogen & hydrocarbons

2.5 Operational monitoring - reactive

2.5.1 In the event that contaminants are observed in long-term operation groundwater or surface water quality monitoring, increased monitoring will be required until such time as remediation is demonstrated to be effective. The scope and duration of reactive monitoring will be determined with the Environment Agency in response to the nature of the contamination and effectiveness of remediation.

2.6 Monitoring locations

2.6.1 The proposed monitoring locations for pre-construction, construction and 1 year post construction are provided in Figure 2-2. The proposed monitoring locations for operational monitoring are provided in Figure 2-3. The boreholes located within the area of land required for the landscape masterplan may alter depending on any boreholes which are lost during construction and agreed relocations /replacements with the Environment Agency.

Figure *2-2* Water monitoring locations (pre-construction, construction, and 1 year post construction)

Figure *2-2* Water monitoring locations (pre-construction, construction, and 1 year post construction)

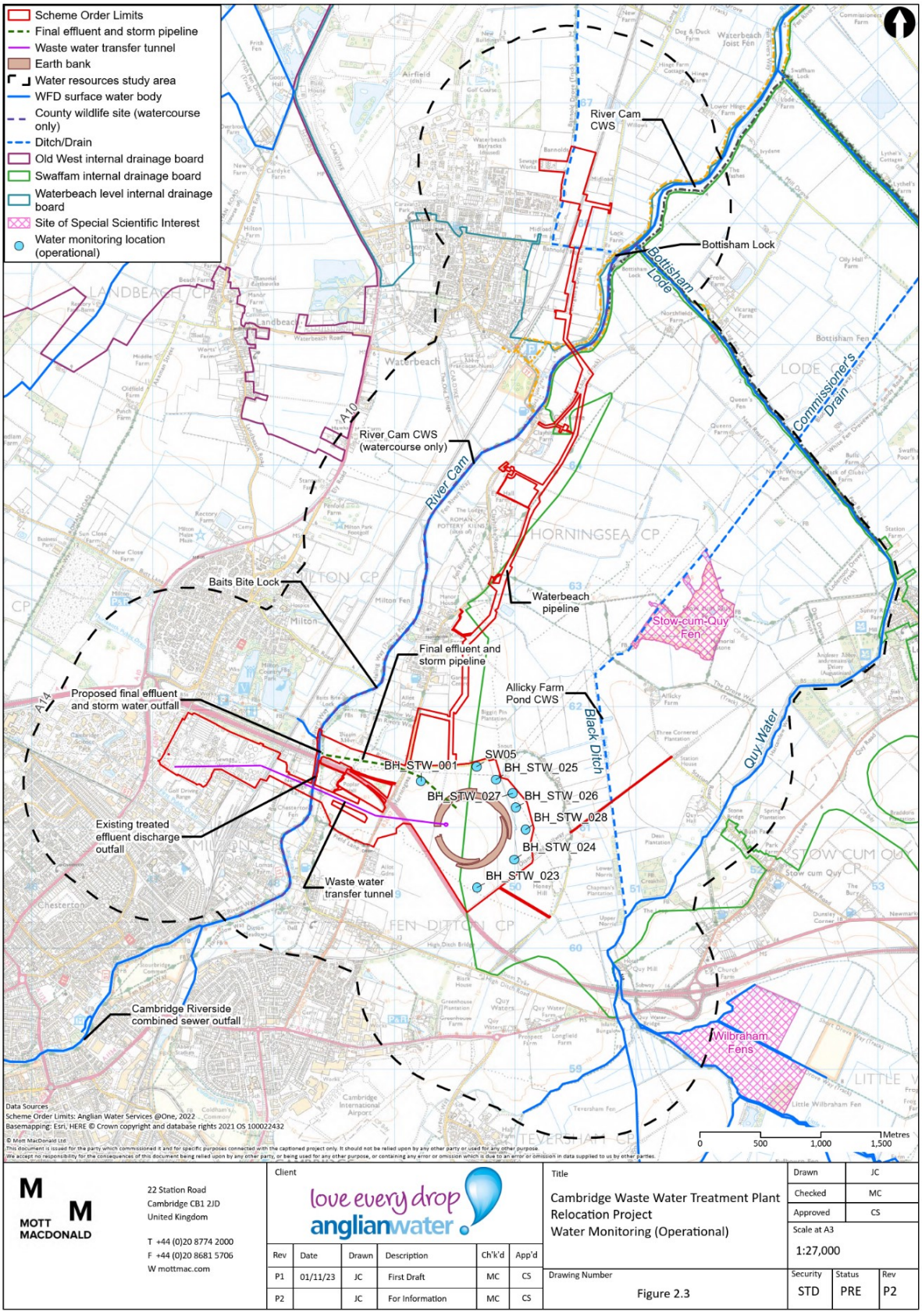

Figure 2-3 Water monitoring locations (operation)

3 Access

3.1.1 For monitoring locations outside of the order limits, and in the absence of agreement for access from landowners, the Applicant will rely of the provisions of the draft DCO Article 21 – authority to survey and investigate land.

3.1.2 Table 3.1 summarises locations whereby Article 21 may be used for the purpose of environmental monitoring.

3.1.3 The expected duration relates to the indicative construction programme. This duration would be extended should there be construction delay and overall longer construction period.

Table 3.1 Land access for monitoring purposes

Feature	Monitoring activity summary	Access considerations	Expected duration
Stow-cum-Quy Fen (The Cut)	Monitoring prior to, during and 1 year post construction	Access to be discussed with the trustees to complete water level observations and install gauge board (if needed)	Up to 5 years
Allicky Farm Pond	Monitoring prior to, during and 1 year post construction	Access to be discussed with landowner/tenant to complete water level observations and install gauge board (if needed)	Up to 5 years
Black Ditch	Monitoring prior to, during and 1 year post construction	Access to be discussed with landowner/tenant to complete observations and collect water samples and install gauge board (if needed)	Up to 5 years
Private water supply – Horningsea	Monitoring prior to and during construction associated with the proposed Waterbeach pipelines	Access to be discussed with landowner/tenant to complete observations, also dependent on what measurement methods are practical. Any installation of a water level logger at the site would be subject to agreement.	Up to 2 years
Private water supply – near proposed WWTP	Monitoring prior to, and during construction of the proposed WWTP	Access to be discussed with landowner/tenant to complete observations, also dependent on what measurement methods are practical. Any installation of a water level logger at the site would be subject to agreement.	Up to 4 years

4 Plan Updates

4.1.1 The Water Quality Monitoring Plan would be updated to adapt to emerging data and refinement of the programme.

Table 4.1 Water quality monitoring plan updates

Plan version	Purpose	Trigger	Timing
Initial monitoring plan	Sets out the principles, locations, proposed parameters and defines ongoing adaptation to plan	To summarise monitoring proposed in ES and in relation to Statement of Common Ground (SOCG) matters	Pre examination
Pre-construction update	Update to refine monitoring programme	Once construction programme refined	Post examination, no later than 3 months before monitoring commences
Construction	Make any updates in relation to pre-construction data. Update reporting frequency. Agree parameters, methods, locations and reporting.	Once pre-construction monitoring is complete	Updates to be proposed no later than 2 months following completion of pre-construction monitoring
Post-construction (in Year 1 of operation)	Make any updates in relation to construction data Agree parameters, methods, locations and reporting	During completion of construction monitoring	Updates to be proposed no later than 2 months prior to completion of construction monitoring
Operation	Make any updates in relation to post-construction data Agree parameters, methods, locations and reporting	Once year 1 post construction monitoring is complete	Updates to be proposed no later than 2 months following completion of operation year 1 monitoring

5 Reporting

5.1.1 Data collected from environmental monitoring activities will be reported to relevant stakeholders. This section sets out proposed data dissemination approaches and frequency.

5.1.2 This does not negate any reporting requirements as specified within separate consents and permits.

5.1.3 The proposed approach to reporting is summarised in Table 5.1.

Table 5.1 Environmental quality data reporting

Stage	Report format	Responsible party	Frequency	Recipients
Pre-construction	Report at end of pre-construction monitoring stage: • monitoring locations list and grid references • groundwater and surface water levels raw data • groundwater levels charts • groundwater and surface water quality data and lab test certificates • chain of custody records • equipment details and calibration records	The Applicant	Annual	Environment Agency, Natural England. PWS owners provided with water levels for their own PWS.
Construction	Quarterly report prepared by contractor: • monitoring locations list and grid references • groundwater and surface water levels raw data • groundwater levels charts • groundwater and surface water quality data and lab test certificates • chain of custody records • equipment details and calibration records	Contractor(s)	As specified in approved CEMPs but assumed to be no less than quarterly	Environment Agency, Natural England. PWS owners provided with water levels for their own PWS.
Year 1 Operation	Report at end of year 1 of operation: • monitoring locations list and grid references • groundwater levels raw data • groundwater levels charts • groundwater and surface water quality data and lab test certificates • chain of custody records • equipment details and calibration records • cumulative presentation of data starting from pre-construction	Applicant, or Operator if different entity to Applicant	Annual	Environment Agency, Natural England
Long term monitoring	Report every 3 years following completion of the monitoring completed in that year: • monitoring locations list and grid references	Applicant, or Operator if different entity to Applicant	Every 3 years	Environment Agency, Natural England

Stage	Report format	Responsible party	Frequency	Recipients
	• groundwater levels raw data • groundwater levels charts • groundwater and surface water (SuDS pond) quality data and lab test certificates • chain of custody records • equipment details and calibration records • cumulative presentation of data showing change from previous monitoring stages • trend statement in reference to baseline			

References

BGS. (2023). *Onshore GeoIndex*. Retrieved from bgs.ac.uk: https://mapapps2.bgs.ac.uk/geoindex/home.html

Department for Environment Food & Rural Affairs. (2020, 11 25). *Wilbraham Fen*. Retrieved from Hydrology Data Explorer: https://environment.data.gov.uk/hydrology/station/bb6fc532-a7be-4a34-815d-a46de96fdb8a

Appendices

Appendix A - Comprehensive groundwater suite

Determinand	Detection limit (expressed as dry weight)	Determinand abbreviation	Media	Test result unit
Ammoniacal Nitrogen	0.01mg/l	AMMNS	WATER	mg/l
Antimony (Dissolved)	0.005mg/l	SB	WATER	mg/l
Arsenic (Dissolved)	0.001mg/l	AS	WATER	mg/l
Barium (Dissolved)	0.01mg/l	BA	WATER	mg/l
Beryllium (Dissolved)	0.01mg/l	BE	WATER	mg/l
Boron (Dissolved)	0.01mg/l	B	WATER	mg/l
Cadmium (Dissolved)	0.00008mg/l	CD	WATER	mg/l
Calcium	1mg/l	CA	WATER	mg/l
Chloride	1mg/l	CL	WATER	mg/l
Chromium (III) (Dissolved)	0.004mg/l	CRIII	WATER	mg/l
Chromium (VI) (Dissolved)	0.0006mg/l	CRVI	WATER	mg/l
Copper (Dissolved)	0.001mg/l	CU	WATER	mg/l
Cyanide (Free)	0.001mg/l	GHYDC	WATER	mg/l
Cyanide (Total)	0.02mg/l	CNCOMP	WATER	mg/l
Fluoride	1mg/l	FLS	WATER	mg/l
Hardness (CaCO3)	10mg/l	HARDW	WATER	mg/l
Iron (Dissolved)	0.01mg/l	FE	WATER	mg/l
Lead (Dissolved)	0.001mg/l	PB	WATER	mg/l
Magnesium (Dissolved)	1mg/l	MG	WATER	mg/l
Manganese (Dissolved)	0.002mg/l	MN	WATER	mg/l
Mercury (Dissolved)	0.00005mg/l	HG	WATER	mg/l
Molybdenum (Dissolved)	0.07mg/l	MO	WATER	mg/l
Nickel (Dissolved)	0.001mg/l	NI	WATER	mg/l
Nitrate as NO3	1mg/l	NIRS	WATER	mg/l
pH	-	PHS	WATER	
Phenols (speciated: phenol, cresols, dimethylphenols, trimethylphenols)	0.0005mg/l	PHE	WATER	mg/l
Polycyclic aromatic Hydrocarbons (USEPA 16 speciated)	0.002µg/l	PAHs	WATER	µg/l

Determinand	Detection limit (expressed as dry weight)	Determinand abbreviation	Media	Test result unit
Selenium	0.001mg/l	SE	WATER	mg/l
Sodium	1mg/l	NA	WATER	mg/l
Sulphate	3mg/l	SO4	WATER	mg/l
Sulphur	3mg/l	S	WATER	mg/l
Total Petroleum Hydrocarbon – Criteria Working Group: Ali-Aro Split TPHCWG Bands inc BTEX[10]	10 µg/l (each and every TPH Band) 5 µg/l BTEX	TPH	WATER	µg/l
Vanadium	0.001mg/l	V	WATER	mg/l
Volatile Organic Compounds, (Speciated USEPA Method 8260 Target List)	0.001mg/l	VOCs	WATER	mg/l
Zinc	0.001mg/l	ZN	WATER	mg/l
Total Dissolved Solids	0.1mg/l	DISS	WATER	mg/l
Alkalinity - Bicarbonate	1mg/l	BICAW	WATER	mg/l

* = UKAS (BS EN ISO/IEC 17025:2005 unless otherwise stated)

[10] The addition of BTEX to the groundwater monitoring suite was requested by the Environment Agency in an email response October 2023 to a draft version of this document, and further discussed between the Environment Agency and the Applicant in October 2023. It was agreed that BTEX could be added to the suite if there is no additional significant cost to the Applicant. If there is significant additional cost, then the Total Petroleum Hydrocarbon (TPH) suite, without BTEX, is considered suitable.

Appendix B - Comprehensive surface water suite

Determinand	Detection limit (expressed as dry weight)	Determinand abbreviation	Media	Test result unit
Ammoniacal Nitrogen	0.01mg/l	AMMNS	WATER	mg/l
Antimony (Dissolved)	0.005mg/l	SB	WATER	mg/l
Arsenic (Dissolved)	0.001mg/l	AS	WATER	mg/l
Barium (Dissolved)	0.01mg/l	BA	WATER	mg/l
Beryllium (Dissolved)	0.01mg/l	BE	WATER	mg/l
Boron (Dissolved)	0.01mg/l	B	WATER	mg/l
Cadmium (Dissolved)	0.00008mg/l	CD	WATER	mg/l
Calcium	1mg/l	CA	WATER	mg/l
Chloride	1mg/l	CL	WATER	mg/l
Chromium (III) (Dissolved)	0.004mg/l	CRIII	WATER	mg/l
Chromium (VI) (Dissolved)	0.0006mg/l	CRVI	WATER	mg/l
Copper (Dissolved)	0.001mg/l	CU	WATER	mg/l
Cyanide (Free)	0.001mg/l	GHYDC	WATER	mg/l
Cyanide (Total)	0.02mg/l	CNCOMP	WATER	mg/l
Fluoride	1mg/l	FLS	WATER	mg/l
Hardness (CaCO3)	10mg/l	HARDW	WATER	mg/l
Iron (Dissolved)	0.01mg/l	FE	WATER	mg/l
Lead (Dissolved)	0.001mg/l	PB	WATER	mg/l
Magnesium (Dissolved)	1mg/l	MG	WATER	mg/l
Manganese (Dissolved)	0.002mg/l	MN	WATER	mg/l
Mercury (Dissolved)	0.00005mg/l	HG	WATER	mg/l
Molybdenum (Dissolved)	0.07mg/l	MO	WATER	mg/l
Nickel (Dissolved)	0.001mg/l	NI	WATER	mg/l
Nitrate as NO3	1mg/l	NIRS	WATER	mg/l
pH	-	PHS	WATER	
Total Phenols	0.0005mg/l	PHE	WATER	mg/l
Selenium	0.001mg/l	SE	WATER	mg/l
Sodium	1mg/l	NA	WATER	mg/l
Sulphate	3mg/l	SO4	WATER	mg/l
Sulphur	3mg/l	S	WATER	mg/l
Total TPH	10 µg/l (each and every TPH Band)	TPH	WATER	µg/l
Vanadium	0.001mg/l	V	WATER	mg/l
Zinc	0.001mg/l	ZN	WATER	mg/l
Total Dissolved Solids	0.1mg/l	DISS	WATER	mg/l

Determinand	Detection limit (expressed as dry weight)	Determinand abbreviation	Media	Test result unit
Alkalinity - Bicarbonate	1mg/l	BICAW	WATER	mg/l
Biological Oxygen Demand	4mg/l	BOD	WATER	mg/l
Chemical Oxygen Demand	10mg/l	COD	WATER	mg/l
Dissolved organic carbon	2mg/l	DC	WATER	mg/l
Phosphates	2mg/l	P	WATER	mg/l
Total suspended solids	5mg/l	TSS	WATER	mg/l

* = UKAS (BS EN ISO/IEC 17025:2005 unless otherwise stated)

Get in touch

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You can view all our DCO application documents and updates on the application on The Planning Inspectorate website:

https://infrastructure.planninginspectorate.gov.uk/projects/eastern/cambridge-waste-water-treatment-plant-relocation/