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Cambridge Waste Water Treatment Plant Relocation Project

Preliminary Environmental Information
February 2022

Water resources

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Environmental information paper: Water resources

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Summary

1.1 The safeguarding of water resources is integral to the proposed development, both during construction and in operation. This document identifies preliminary information in relation to changes to water resources associated with the Proposed Development.

1.2 Changes to water resources during construction would be temporary and would be mitigated by rigorous standard protection measures, resulting in no significant effects.

1.3 In this section we summarise long-term operational impacts to water resources and discuss any mitigation measures to minimise adverse impacts.

Surface water

1.4 The proposed waste water treatment plant (WWTP) will operate in accordance with water quality requirements to be agreed with the Environment Agency. Consent conditions for the proposed WWTP, advised by the Environment Agency, require a reduced concentration in final treated effluent discharges of phosphorus, ammonia, total suspended solids and biological oxygen demand (BOD), when compared to the consented limits at the existing Cambridge WWTP. This means that when the proposed WWTP starts to operate, water quality in the River Cam will improve.

1.5 The proposed WWTP will incorporate improved storm water management, resulting in reduced frequency of storm flows to the River Cam.

1.6 The final treated effluent discharge from the existing Waterbeach Water Recycling Centre (WRC) to Bannold Drain will cease. Water quality in the drain should improve as a result, although flows will decrease.

Groundwater

1.7 We have undertaken an assessment of the risk to groundwater from leakage or accidental spills during operation of the proposed WWTP. Our preliminary mathematical modelling indicates that contaminants are unlikely to move through groundwater at sufficient concentrations or speed to impact any sensitive receptors such as Allicky Farm Pond, Stow-cum-Quy Fen SSSI and Black Ditch. The low permeability, clay-like or silty materials in the Grey Chalk underlying the proposed WWTP would be a major factor in limiting any contaminant movement. Land drainage may need to be modified within the proposed WWTP, however, to prevent the rapid transfer of contaminants to surface water features nearby, in the event of any leakage or accidental spills.

Flood risk

1.8 Our preliminary fluvial models indicate that increased final treated effluent discharges due to population growth will have a negligible impact on the flows and water levels of the River Cam. We will complete an assessment of flood risk to determine the risk to the Proposed Development from all sources of flooding, and also assess the impact of the Proposed Development to flood risk elsewhere. We will also produce a surface water drainage strategy to manage surface water runoff from hard surfaces associated with the Proposed Development.

Document purpose

This environmental information paper identifies potential changes to water resources associated with the construction and operation of the proposed waste water treatment plant. It sets out how we intend to manage the construction and operation of the proposed WWTP to avoid or reduce any adverse changes which have been identified. Beneficial changes to water resources resulting from the Proposed Development are also discussed. This information paper describes the water resources in the area of the Proposed Development with sections setting out information on:

- surface water features and hydrology, including the River Cam;
- geology, groundwater and aquifers, collectively referred to as hydrogeology;
- potential impacts to water resources during construction;
- potential impacts to water resources during operation;
- measures to avoid or minimise adverse impacts on water resources, also referred to as mitigation;
- any residual significant effects on water resources, taking into account the mitigation measures which are proposed; and
- flood risk.

The paper also includes discussion of:

- the use of water resources in the area for water supply and agriculture; and
- the potential impacts the Proposed Development may have on these groundwater and surface water abstractions.

Confirms that the elements detailed within the NPS for Waste Water are being considered, specifically existing status of, and impacts of the proposed project on water quality (including a consideration of abstractions), water resources and physical characteristics of the water environment including flood risk.

This information paper is also linked to other Preliminary Environment Information (PEI) topics including **Biodiversity, Climate resilience** and **Recreation**.

Work on some technical aspects discussed in this information paper are still in progress and will be updated during the environmental impact assessment (EIA).

This preliminary assessment is based on the current level of information provided in relation to the design, expected operational performance under extreme rainfall events, comparison of current and proposed permit limits for final effluent, together with available baseline data. A complete assessment of sensitivity of receptors, magnitude of impacts and significance of effects will be provided in the Environmental Statement.

Water environment overview

1.9 An overview of the water environment has been developed through the collection of available existing information, site visits and continued consultation with the organisations with responsibilities for water resources and water features in the area on issues including:

- River Cam water quality
- flood risk
- works affecting the River Cam
- land drainage
- nature conservation
- environmental permitting for discharge activities
- hydrogeological assessment and testing

1.10 The following sets out information on surface and groundwater features potentially affected by the Proposed Development and the existing status of these features.

River Cam and other surface waterbodies

1.11 The Proposed Development is located within the catchment of the River Cam1 and includes some sections which in construction will require work within the floodplain (Figure 1).The earth bank enclosing the proposed WWTP is approximately one kilometre to the east of the River Cam and is located outside the floodplain of the river.

1.12 Drainage channels, present on the eastern side of the proposed WWTP, discharge to Black Ditch, as shown on Figure 1. Black Ditch flows to the north, along the boundary of Stow-cum-Quy Fen, to Bottisham Lode which then discharges to the River Cam near Waterbeach. Quy Water, located to the east of the proposed WWTP and Black Ditch, is the main watercourse contributing to Bottisham Lode.

1.13 Reaches2 of the River Cam, together with some adjacent semi-natural habitat along the river, are designated as a County Wildlife Site (CWS), as shown in Figure 1.

1.14 Some open, still water bodies are located in the Black Ditch drainage area. These include:

- Allicky Farm Pond, a County Wildlife Site, adjacent to Black Ditch and about 1km north-east of the proposed WWTP; and
- ponds on the Stow-cum-Quy Fen Site of Special Scientific Interest (SSSI), about 1.5km north-east of the proposed WWTP, including a rectangular water body (The Cut) dug in the Grey Chalk.

Water quality

1.15

1.16

[1] For purpose of the WFD it is within the Cam and Ely Ouse catchment within the Anglian River Basin District.
[2] Reaches is a term used to describe sections of watercourses.

1.17 Overall, the River Cam3 water body is classified as heavily modified with 'Moderate' ecological status under the Water Framework Directive4 (WFD) (Environment Agency, 2022)5. The chemical quality elements are also classified as having 'Moderate' status and comprise key indicators of water body health such as ammonia, biochemical oxygen demand (BOD), dissolved oxygen (DO), phosphate, temperature and pH. Since 2012, river water quality has consistently achieved 'High' status for all parameters except phosphate. Phosphate concentrations are typically assigned 'Poor' status, owing to continuous sewage discharge, which can potentially signal a eutrophic water body (a water body rich in nutrients), leading to excessive growth of macrophytes (aquatic plants) and algal blooms. Phosphate is the main reason for the chemical status of the River Cam not achieving a higher classification under WFD.

1.18 The WFD considers Quy Water and Bottisham Lode as a single water body (Bottisham Lode - Quy Water). The Bottisham Lode - Quy Water6 WFD water body is also heavily modified and designated as having 'Moderate' ecological status overall under WFD (2019). It is also classified as 'Poor' specifically in relation to phosphate, caused by sewage discharge. However, for other water quality components, including ammonia and DO, Bottisham Lode - Quy Water achieves 'High' status.

1.19 There are additional WFD water bodies shown on Figure 1 to the west of the River Cam. These water bodies are located in the catchment of the River Great Ouse.

1.20 There are records (Environment Agency, 2022) for more than 100 active consented discharges in the catchment of the River Cam. Many of these consents are for discharges to the river, or tributaries of the River Cam, at locations within the catchment upstream of the outfall from the proposed WWTP. The active consents include discharges of treated sewage effluent, storm discharges (combined sewer outfall (CSO) and/or storm flows) and trade effluent.

1.21 There is an existing CSO to the River Cam at Riverside, approximately 3km upstream of the existing Cambridge WWTP, which operates as part of the existing Cambridge WWTP system. During storm events, when waste water infrastructure is operating at full capacity, the CSO may be used as an overflow to convey a mixture of rainwater and waste water to the River Cam (termed 'storm water'), preventing flooding of streets and homes. Analysis for the CSO at Riverside shows that it has discharged at most four times per year between 2018 and 2020. As discharge from the CSO contains untreated waste water, each CSO overflow to the River Cam adversely impacts water quality downstream.

1.22 The existing Cambridge WWTP includes storm water tanks which are used during storm events to store combined volumes of waste water and storm water. Once the storm tanks are full and preliminary treatment through settlement has occurred, the settled storm water is discharged to the River Cam. Preliminary modelling (@one, 2021) of the existing Cambridge WWTP indicates that settled storm water discharges to the River Cam occur approximately once every ten years. Settled storm water discharge will adversely impact water quality downstream of the existing outfall location.

Water levels

1.23 River flows recorded at Bottisham Lock gauging station (National River Flow Archive, 2020) ranged generally between about 0.9m^3/s (Q95, the flow which is exceeded for 95% of the time) in low flow conditions, and 10m^3/s (Q5, the flow which is exceeded for only 5% of the time) at high flows. The mean (average) flow was about 3.6 m^3/s in the period of record available for the gauging station (1936 to 1987). The River Cam is located in an area of eastern England which is substantially drier than most parts of the UK. Rainfall averages about 550mm a year in the catchment area around the Proposed Development.

1.24 River level is controlled by weir structures and sluice gates along much of its length, with a weir and lock structure located approximately 500m downstream of the proposed outfall. These existing modifications to the natural river channel contribute to the designation of the River Cam as a heavily modified water body.

Flood risk

1.25 The fluvial flood risk areas within the vicinity of the Proposed Development are shown on Figure 1. The figure includes Flood Zones 2 and 3, the areas defined by the Environment Agency as having a medium and high risk of fluvial flooding. All other areas are located in Flood Zone 1, defined by the Environment Agency as having a low risk of fluvial flooding7.

1.26 The Proposed Development is located within Flood Zone 1, but with below-ground pipeline and tunnel routes through Flood Zones 2 and 3 linking to existing and proposed infrastructure, including the final effluent outfall on the River Cam. Fluvial flood defences, in the form of higher land, along the River Cam are predominantly to a 1 in 10 year standard of protection in the area. However, close to Waterbeach, the embankment flood defences are to a 1 in 100 year standard of protection (Environment Agency, 2021). The location of these defences is shown on Figure 1.

1.27 There are no fluvial flood defences associated with Black Ditch. There are embankments/high ground along Quy Water, although the design standard of protection is not available and assumed to be low. The standard of protection of the flood defences along Bottisham Lode varies between 1 in 50 years and 1 in 100 years.

1.28 The Environment Agency has responsibility for main rivers including the River Cam and Bottisham Lode - Quy Water, as well as groundwater resources. Other watercourses and drains in the area are under the control of local Internal Drainage Boards. The Cam Conservators are the statutory navigation authority for the River Cam in the reaches from the centre of Cambridge to Bottisham Lock near Waterbeach. Their role is to maintain the river in a good navigable condition, strike a balance between the needs of all river users and riverside landowners and residents, and manage the river in a manner sensitive to environmental interests. Details in relation to navigation and recreational use of the River Cam are contained within the **Environmental Information Paper: Recreation**.

[7] Flood Zone 1 has less than 1 in 1000 probability of river flooding in any year.
Flood Zone 2 has a 1 in 100 to 1 in 1000 probability of river flooding in any year.
Flood Zone 3 has greater than 1 in 100 probability of river flooding in any year.

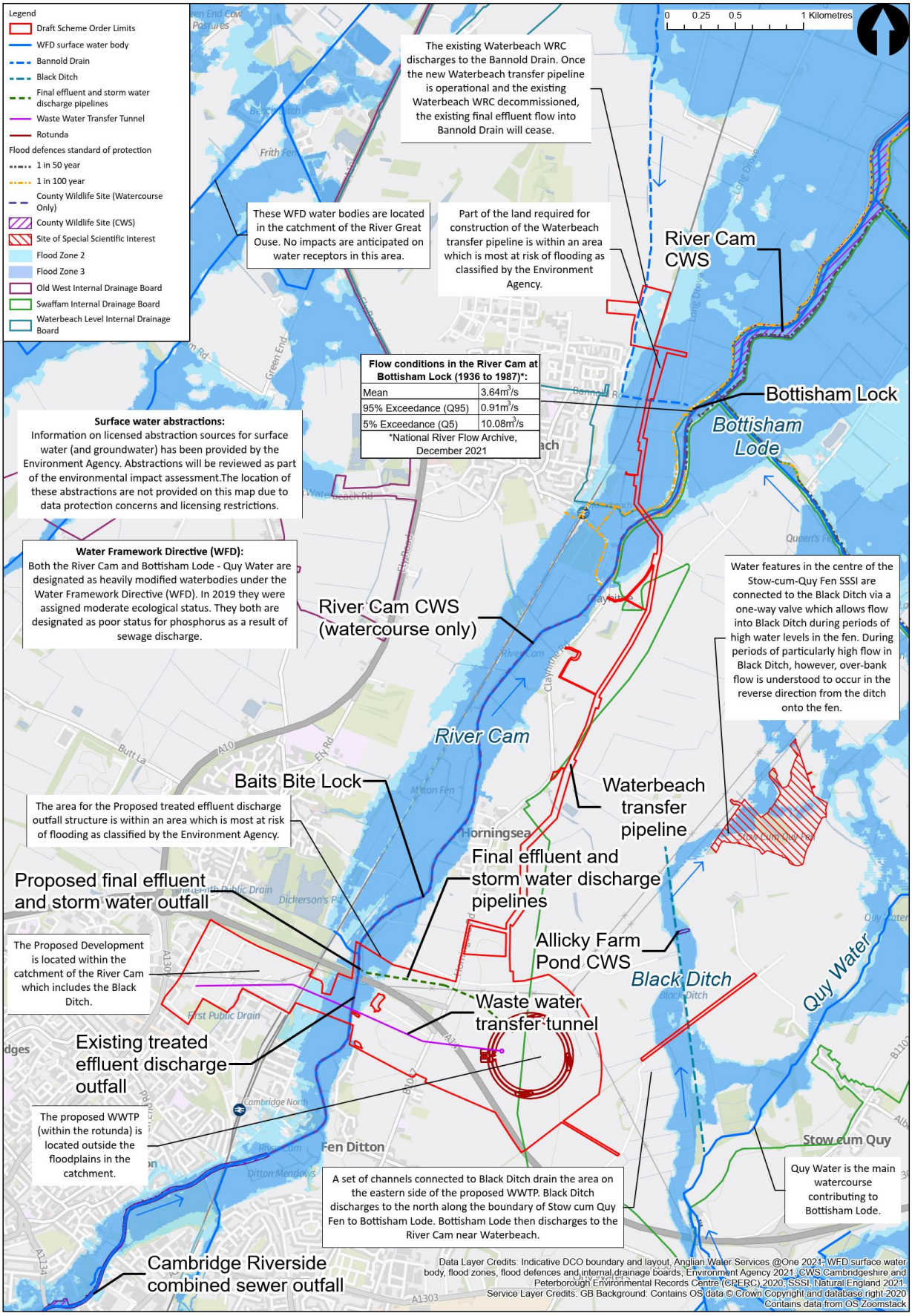

Figure 1: Surface water bodies and fluvial flood zones

Geology and groundwater

Detailed technical information on the geology and hydrogeology of the Proposed Development area can be found in the Hydrogeological Impact Assessment report (Mott MacDonald, 2021).

The bedrock geology underlying the proposed WWTP comprises the lowermost part of the Grey Chalk, as shown on Figure 2. The Grey Chalk is located close to the base of the Chalk bedrock which is present in much of the area to the east of the River Cam. The lowermost part of the Grey Chalk generally comprises a weak or marly chalk, a clay-like or silty material, and has a thickness of just over 10m at the proposed WWTP. In addition, a minor horizon of sandy or silty material, referred to as the Cambridge Greensand, is found in some areas in the base of the Grey Chalk.

The bedrock dips gently to the south-east in the region, with the Grey Chalk at the proposed WWTP underlain successively by the Gault Formation and the Lower Greensand (also referred to as the Woburn Sands Formation). The Gault Formation comprises grey marl, silty clay or mudstone. It forms the uppermost bedrock to the west of the proposed WWTP in the floodplain of the River Cam, as shown on Figure 2. The total thickness of the Gault Formation in the area is about 35m. Structures located in the Gault Formation would include the proposed waste water transfer tunnel, shafts associated with the tunnel, and some deep foundations at the proposed WWTP.

The Lower Greensand is present at the surface in a narrow outcrop about 5km to the north-west of the River Cam. It dips below the Gault Formation in the direction of the River Cam and the proposed WWTP. The Lower Greensand is about 8m to 10m thick where it underlies the Gault Formation near the River Cam and comprises generally sandy clay, clayey sand or sandstone. However, the deepest engineering works which form part of the Proposed Development, namely the waste water transfer tunnel, excavations for shafts associated with the tunnel, and deep foundations at the proposed WWTP, are not expected to extend down to the Lower Greensand.

Both the Chalk and the Lower Greensand are classified by the Environment Agency as Principal aquifers. The area of the proposed WWTP is located within the *Cam and Ely Ouse Chalk* WFD groundwater body[8]. This groundwater body is designated under the WFD (2019) as Poor overall status, as a result of both over-abstraction and poor agricultural nutrient management.

Groundwater is present within the Grey Chalk at the location of the proposed WWTP. However, based on the preliminary results from a series of borehole pumping tests completed in 2021, the permeability of the Grey Chalk is low at the location. As a result,

[8] Water Framework Directive Water Body ID GB40501G400500

little groundwater flow is likely to occur in this area. Seepages of groundwater from the Grey Chalk may, nonetheless, contribute to local drains and watercourses.

The materials are fine and variable in the Lower Greensand aquifer, and the formation is of limited thickness, up to about 10m. The aquifer is unlikely, therefore, to produce substantial yields[9] (greater than a few litres per second) at any borehole abstraction sites in the area. The Gault Formation is classified by the Environment Agency as an unproductive aquifer (effectively a non-aquifer).

River terrace sand and gravel deposits overlie the bedrock across a substantial part of the local catchment area, although the proposed WWTP would be constructed directly over Grey Chalk bedrock below the soil and sub-soil. Alluvium, comprising clay, silt, sand and gravel, is found in low-lying areas along the course of the River Cam. Peat deposits are present with the alluvium in parts of the valley floor near to the A14 crossing, and in some areas to the east of Waterbeach. River terrace deposits and alluvium are classified by the Environment Agency as Secondary A aquifers. Peat is classified as an unproductive aquifer.

The Environment Agency maps aquifer vulnerability nationally using information on recharge, soil leaching properties, superficial cover and the unsaturated zone above the groundwater table. Aquifer vulnerability mapping indicates that the proposed WWTP is located directly on the Grey Chalk in a high-risk area which the Environment Agency identifies as being 'able to easily transmit pollution to groundwater'. High risk areas are 'characterised by high leaching soils and the absence of low permeability superficial deposits'.

In the absence of low permeability deposits overlying the Grey Chalk, any contamination at the proposed WWTP could transfer quickly to groundwater. However, as indicated by the preliminary results of test pumping in boreholes constructed in 2021, the Grey Chalk underlying the proposed WWTP should have low permeability. Therefore, little groundwater flow is likely to occur within the Grey Chalk in this area.

The proposed WWTP is also identified as being in an area with 'soluble rock risk' in which 'solution features that enable rapid movement of a contaminant may be present'. However, there is no indication from geological logs of boreholes constructed in 2021, or from the preliminary borehole pumping test results, of the presence of solution features in the Grey Chalk at the location of the proposed WWTP.

The Proposed Development is also within a nitrate vulnerable zone (NVZ) for the Anglian Chalk groundwater. NVZs are areas designated as being at risk from agricultural nitrate pollution and include about 55% of land in England. Farmers and landowners are required

[9] 'Yield' is used in this context to describe pumping rates from individual boreholes.

to follow regulations in relation to the use of fertilisers and storage of organic manure in NVZs.

Groundwater abstractions

There are no groundwater abstractions for public water supply and no source protection zones for groundwater abstractions from either the Grey Chalk or the Lower Greensand aquifers in the area shown on Figure 2.

Information has been obtained on licensed groundwater sources provided by the Environment Agency, and unlicensed private sources (abstraction less than 20 m^3/d), provided by local councils. An initial review of the data indicates that there may be more than ten unlicensed private abstractions from boreholes and wells in the area between the proposed WWTP and the settlement of Waterbeach, although the source for most of the private groundwater abstractions is likely to be the Lower Greensand rather than the Grey Chalk. This is because the location of many abstractions is either to the west of, or close to, the contact of the Grey Chalk with the Gault Formation. As discussed in subsequent sections of this paper, the Lower Greensand should not be affected by the Proposed Development. However, one private abstraction source is understood to comprise a shallow well dug through superficial deposits.

An unlicensed groundwater source is also located approximately 0.5km to the east of the proposed WWTP. The source comprises a borehole, understood to have been drilled to a depth more than 50m, within a shallow well in the Grey Chalk. Based on the depth, the

borehole would have been completed in the Lower Greensand. However, Grey Chalk groundwater may also contribute to the water supply through the shallow well.

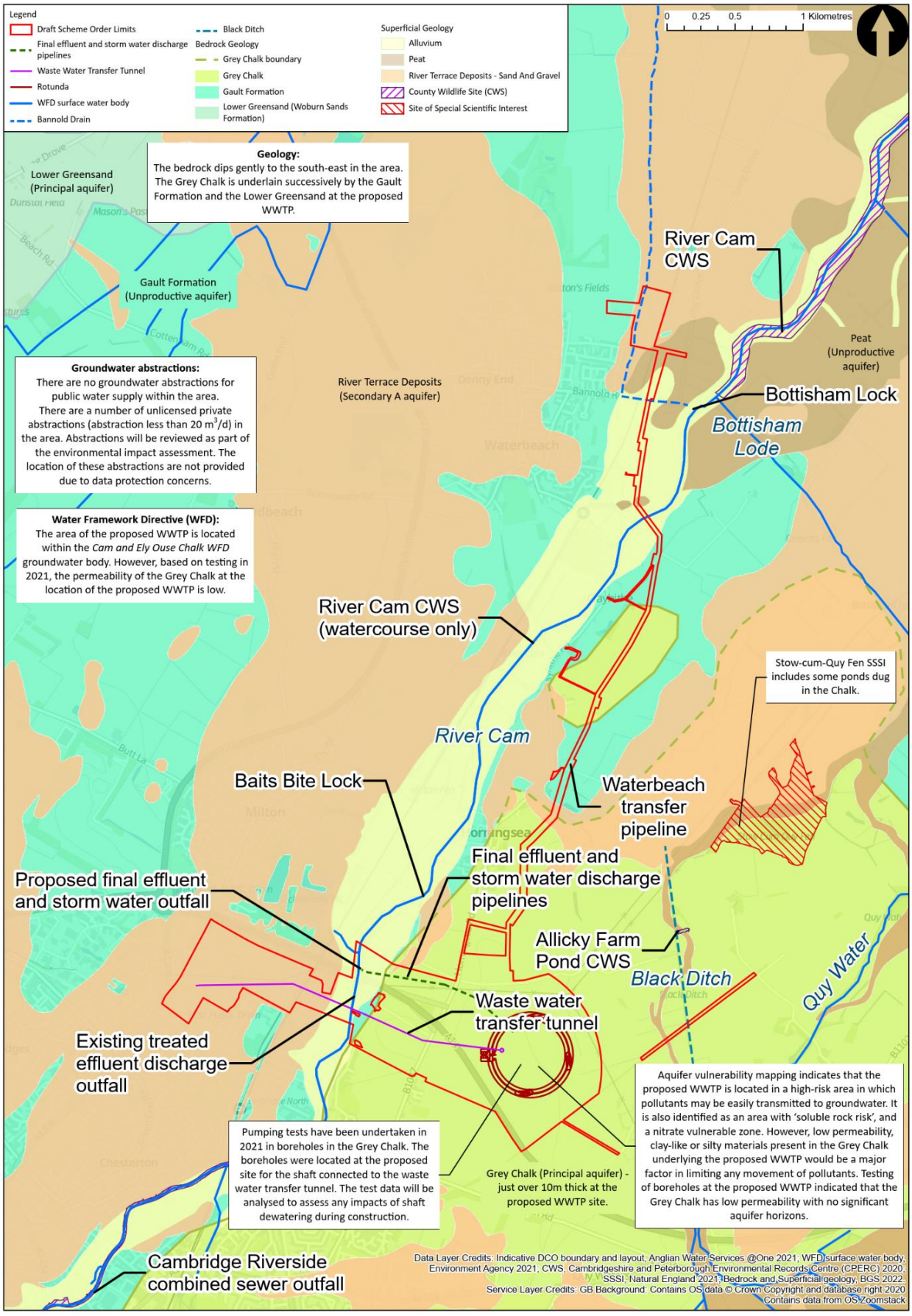

Figure 2: Geology and groundwater considerations

How will the proposed relocation of Cambridge Waste Water Treatment Plant change the water environment during construction?

The changes to the water environment during construction are discussed separately for surface watercourses, groundwater and flooding. All changes are expected to be temporary. They would occur during construction, although some effects may continue for short periods following the completion of construction. Where the effects are likely to continue after construction, this is indicated in the discussion. The impacts discussed below do not take account of mitigation measures that would be applied through the **Code of Construction Practice (CoCP)** an outline version is included within the PEI. Mitigation measures are discussed in section *How will we manage our development activities to avoid, reduce or offset adverse changes?*

The construction of the Proposed Development has the potential to impact upon the water environment in the following ways:

- the mobilisation and release of sediments or silt laden run-off in high rainfall events, during earthworks, as a result of dewatering, and during works in or close to the river;
- accidental spills or leaks to surface waters or groundwater;
- disruption of groundwater and or surface water flows in areas where excavations are required (such as pipeline routes, shafts and tunnels); and
- creating new pathways for contamination of water receptors.

Commissioning of tanks and pipes within the Proposed Development will require testing to ensure they can operate at the required pressure. Commissioning may impact the water environment in the following ways:

- exposure of Grey Chalk bedrock during the excavation of temporary lagoons[10] could create new pathways for contaminants; and
- discharge of treated final effluent used for pressure testing, to adjacent ditches or watercourses, could affect surface water levels and water quality.

River Cam and other surface waterbodies

Accidental spillages or leaks of some materials used in construction could give rise to contamination of surface water features including the River Cam and Black Ditch. Discharge of silt-laden water from dewatering of pits and excavations, or from run-off from construction areas, could also affect surface water quality. In particular, construction of the treated effluent discharge outfall in the bank and bed of the River Cam could be a source of potential contamination as a result of silt-laden water generated during construction. Any surface water abstractions dependent on these water features and located downstream of areas of construction might also be affected.

The waste water transfer tunnel will cross below the River Cam between the existing Cambridge WWTP and the proposed WWTP. Sections of the Waterbeach waste water

[10] Lined temporary lagoons will be used to store water for testing phases of tanks and pipelines

transfer pipelines[11] will also be installed below the River Cam at two crossing points. At all these river crossings, the tunnel and pipelines will be constructed in the Gault Formation below the alluvium or other deposits which underlie the river bed. As already indicated, the Gault Formation is not an aquifer and comprises materials with very low permeability. Therefore, there should be no leakage of fluids used in construction of the tunnel or pipeline to the deposits underlying the river, or to the river itself, and no leakage from the river to the tunnel or pipeline routes as boring takes place. Hence the crossings should have no impact on river water quality or river flows.

The final effluent and storm discharge pipelines will cross a prominent drainage ditch located about 25m to the east of the River Cam. The top of the pipelines will be below, although close to, the bed of the ditch.

Shallow ditches along the route of the Waterbeach waste water transfer pipelines will be blocked temporarily during construction. Any flowing water in ditches will be pumped across the pipeline route from the upstream to the downstream side whilst excavation and installation of the pipe section are carried out below the base of the ditch. Ditches will be reinstated promptly once the pipes have been laid, hence the effect on any section of a shallow ditch will be short-term and unlikely to be significant. For larger ditches, pipelines are expected to be installed below the ditches using micro-tunnelling techniques which minimise disturbance to materials in or around the bed of the ditch. As a result, any flow in these ditches will not be affected by the installation using these techniques.

Treated effluent from the existing Cambridge WWTP, or the existing treatment works at Waterbeach WRC, is likely to be used in pressure testing the Waterbeach waste water transfer pipelines. The pressure testing will be carried out when the pipelines are commissioned before being put into operation. The fluid used for testing would comprise the treated effluent which is currently discharged either to the River Cam or to the Bannold Drain near Waterbeach. A permit would be obtained for discharging the treated effluent to local drains or watercourses close to the pipeline following testing. This discharge of treated effluent is likely to have some temporary adverse impact on water quality, and possibly water levels, in the drains or watercourses.

Groundwater

Dewatering

There will be minor temporary reductions in groundwater flows and localised reductions in groundwater levels due to dewatering in the Grey Chalk during the construction of shafts and some foundations at the proposed WWTP and, possibly, during the excavation of some

[11] Waterbeach waste water transfer pipelines comprise 2 pipelines, each 500mm diameter.

sections of trenches for pipeline installations. The groundwater flows and levels are expected to recover quickly after dewatering.

With only a minor reduction in groundwater flows in the Grey Chalk during dewatering, no significant changes are expected to:

- water levels or flows in local watercourses; or
- water levels in any ponds or other still water bodies in local nature conservation sites (at Allicky Farm Pond CWS and Stow-cum-Quy Fen SSSI), which may be supported by groundwater from the Grey Chalk.

There may be a temporary reduction in groundwater flows and levels in superficial deposits in some areas due to the dewatering of trenches during installation of the Waterbeach waste water transfer and final effluent pipelines. If excavation is required below the water table in any section of a trench, dewatering would be necessary to maintain dry conditions. This dewatering would be expected to give rise to temporary, short term changes in groundwater flows and water levels in the area around the section of the trench and would have no permanent effect on the superficial deposits. Pipelines are expected to be installed in short sections, approximately 100m long, which could be open for a period of several weeks (MottMacDonald 2021). These sections of the trench would then be backfilled following pipeline installation.

Groundwater quality

Accidental spillages or leaks of potentially contaminating materials used in construction could give rise to contamination of the aquifer in the Grey Chalk or superficial deposits. Use of drilling fluids in borehole construction and piling related to shaft and foundation construction could also lead to groundwater contamination in the Grey Chalk.

Temporary lagoons

Excavation of temporary lagoons within the vicinity of the proposed WWTP will expose the Grey Chalk, potentially enabling any contaminants used during excavation to reach the Grey Chalk aquifer more rapidly. However, exposure of the Grey Chalk would be temporary only. The lagoons will then be lined with an impermeable membrane to prevent leakage through the base and sides. Once the lagoons are lined, there would be no further potential impact on groundwater levels or quality.

Groundwater abstractions

Based on records provided by the Environment Agency, there are no groundwater abstractions licensed for public water supply, or any other licensed groundwater abstractions, in areas in which groundwater levels could be affected by dewatering in the Grey Chalk.

As mentioned in the water environment overview, there is a private groundwater abstraction located approximately 0.5km from the proposed WWTP. The groundwater source comprises a borehole which, based on depth, should be dependent on groundwater from the Lower Greensand. However, the borehole was drilled in an existing shallow well in

the Grey Chalk. Depending on whether the borehole lining was sealed above the Lower Greensand, groundwater from the Grey Chalk may still contribute to the water supply.

Although the Grey Chalk could make some contribution to this groundwater source, no significant effect is expected from dewatering, owing to:

- the limited and temporary impact of dewatering on groundwater levels and flows in the Grey Chalk; and
- the contribution to the source from the Lower Greensand.

Site survey visits to private groundwater abstraction sources will be completed before March 2022. Any further concerns for groundwater abstraction sources, in relation to construction of the Proposed Development, will be assessed following these visits.

Flood risk

There is a potential for construction sites to affect surface water flood risk in surrounding areas by increasing surface water runoff temporarily during periods of high rainfall. The increased flood risk could affect land, infrastructure, access, properties and residents.

Some works, including the construction of the proposed outfall to the River Cam and installation of sections of the Waterbeach waste water transfer pipelines, will take place in areas defined by the Environment Agency as having a medium or high risk of fluvial flooding. Undertaking these works could affect fluvial flood risk temporarily in nearby locations during construction.

Once operational, how would the Proposed Development change the water environment?

The changes to the water environment during operation are also discussed separately for surface watercourses, groundwater and flooding. The impacts discussed below do not take account of mitigation measures that would be applied through the **CoCP** and existing

regulations. Mitigation measures are discussed in section *How will we manage our development activities to avoid, reduce or offset adverse changes?*

River Cam

As with the existing Cambridge WWTP, the operation of the Proposed Development has the potential to affect the River Cam in the following ways:

- changes to surface water quality as a result of the discharge of treated effluent to the River Cam;
- occasional impacts on water quality in the river through intermittent storm flow discharges and use of the CSO during more extreme rainfall events.
- localised increase in the temperature of the river water as a result of the discharge of treated effluent; and
- increases in water levels in the River Cam resulting from the discharge of treated effluent.

The following provides further detail on potential changes that occur in operation.

Water quality

The proposed WWTP will increase flow to full treatment (FFT)[12] compared to the existing Cambridge WWTP. Preliminary storm water modelling (@one, 2021) indicates that in a ten year simulation, increased treated flows would result in fewer storm water discharge incidents to the River Cam; no storm water discharge incidents were predicted from modelling exercises that consider a ten year period. Decreased frequency of storm water discharge to the River Cam will benefit water quality.

The impact of increased treated flows on CSO discharges has not been modelled. However, improved throughflow of storm water to storm tanks might be expected to reduce CSO discharge frequency. This could also have a beneficial impact on river water quality.

The discharge consent conditions for the Proposed Development are expected to limit concentrations of water quality parameters comprising phosphorus, ammonia, total suspended solids (TSS), and biochemical oxygen demand (BOD[13]) in the final effluent. Water quality consent limits for the existing and the indicative limits for the proposed WWTP are provided in Table1. Comparison of these two sets of limits indicates there would be substantial improvements in the quality of the final effluent for the Proposed Development

[12] Flow to full treatment is the maximum flow that a WWTP can treat.

[13] BOD is the amount of dissolved oxygen needed by aerobic biological organisms to break down organic material within water. This is tested for a water sample at certain temperature over a specific time period.

as compared to the existing situation. As a result, there should be an improvement in river water quality close to the location of the outfall at the time the Proposed Development comes into operation, when compared to current river water quality.

Table 1: Environment Agency water quality consent limits for the existing and proposed WWTP

Water Quality Element	Existing WWTP Consent limits (mg/l)	Proposed WWTP Indicative limits (mg/l)
Phosphorus	1	0.4
Total Suspended Solids	20	14
Biochemical Oxygen Demand	15	11
Ammonia	5	3

Over its operational lifetime, the Proposed Development's final effluent discharges will remain subject to the Environmental Permitting regime. The Environment Agency is required through the River Basin Management Planning (RBMP) process to ensure that river water quality is maintained, and will periodically review the relevant water quality components in the Environmental Permit. Permit conditions are, therefore, likely to vary over time in response to changes in flow, including those arising from population growth, changes in water usage, climatic or environmental factors. The plant has been designed to be flexible and accommodate changing regulatory requirements within the footprint of the landscaping bund.

Any changes to water quality might affect licensed surface water abstractions from the river downstream of the discharge. However, any licensed agricultural abstractions from the river, should not be sensitive to changes in water quality resulting from the Proposed Development.

The temperature of the final effluent will also be higher than the temperature of the water flowing in the River Cam, as is the case with the current effluent discharge from the existing Cambridge WWTP. Typically, the temperature of the final effluent could range from about 13^{o}C in winter to 22^{o}C in summer, compared to a river water temperature of about 9^{o}C in winter and 19^{o}C in summer (based on Environment Agency monitoring records for 2021). The mixing of the warmer effluent with colder river water could reduce dissolved oxygen (DO) levels slightly in the river reach downstream of the outfall, particularly during periods of low flows. However, when compared with the existing Cambridge WWTP, there should be no additional, discernible impact on DO in the river due to the temperature of the final effluent discharge.

The final treated effluent from the existing Waterbeach WRC is discharged into the Bannold Drain shown on Figure 1. The current permitted discharge (DWF) is 1350m^3/day. The drain is managed and maintained by Waterbeach Level Internal Drainage Board (IDB). When needed, the IDB is able to pump water from the Bannold Drain into the River Cam at Bottisham Lock. However, the IDB has also indicated there are surface water abstractions for agriculture in the Bannold Drain catchment; dams are placed in the drain to assist with

abstractions in summer months. These abstractions may, at least in part, be dependent on the treated effluent discharge.

It should be possible to estimate the flow in the Bannold Drain without the effluent contribution. If it is found that flows are much reduced, as may be the case particularly in dry summer periods, then this reduction in flow might have an impact on the existing agricultural abstractions from the drain.

Water quality in Bannold Drain could be expected to improve overall without the final effluent discharge. However, depending on abstractions from the drain, water levels are likely to be lower as a result of cessation of the discharge of final effluent. The drain might also dry up completely in drier conditions, although water levels may be sustained to some extent by groundwater seepages from sands and gravels in river terrace deposits present in the drainage catchment. The impact may be locally significant depending on contribution of the existing Waterbeach WRC discharge volumes to water levels within the drain.

Physical changes to the river

The outfall structure will be a permanent feature in the eastern bank of the River Cam. Outfall design will include bank protection works to protect the river bank either side of the outfall. Scour of the river bed and banks could occur close to the outfall as a result of final effluent and intermittent storm discharges. Localised scour could also result in the mobilisation of river sediments. We will complete scour modelling to predict the impacts of the discharge from the outfall on the river banks and bed, and this will inform final design. A WFD assessment will be carried out to identify any potential impacts on the water body status of the River Cam, including impacts due to the outfall structure, scour in the river channel, and changes in water quality.

There would also be a reduction in flow in the river reach between the outfall from the existing Cambridge WWTP and the outfall to the River Cam from the proposed WWTP, located about 100m downstream of the existing outfall. No significant effect is expected, however, as the water level in this section of the River Cam is controlled by the weir at Baits Bite Lock. Nonetheless, the potential impacts in this river reach would be considered in the WFD assessment.

The final effluent and storm discharge pipeline crossing of the drain, located about 25m to the east of the River Cam, will be installed just below the bed of the drain. As a result, flows in the drain would not be affected.

Groundwater and land drainage

Groundwater flows

There could be a minor risk of inflow of groundwater to shafts connected to the waste water transfer tunnel, or outflow of waste water from these shafts.

Pipeline trenches may intercept and cut across land drains. As a result, drainage water could be diverted to the trenches. In addition, in any locations where the pipeline trenches are excavated below the water table, materials used to backfill trenches around the pipelines

might act as groundwater drains. These groundwater drains could change the directions of groundwater flow locally and affect groundwater levels in the areas around the trenches.

Foundations for deeper structures in the proposed WWTP could intercept groundwater flows in the Grey Chalk. This could produce a rise in groundwater levels, possibly leading to localised groundwater flooding in some areas of the proposed WWTP at times of high groundwater levels.

Groundwater quality

Accidental spills or leakages to ground during operation of the proposed WWTP could give rise to contamination in the Grey Chalk underlying the proposed WWTP. This contamination could then emerge in seepages of groundwater to local water features including Black Ditch.

A preliminary assessment of this risk has been made using mathematical modelling of contaminant movement ('contaminant transport'), which can be found in the Hydrogeological Impact Assessment report (Mott MacDonald, 2021). The assessment indicated that, should any contamination occur in the Grey Chalk underlying the proposed WWTP, the contamination is unlikely to move through the groundwater and reach Black Ditch either:

- at significant concentrations; or
- within an extended time period modelled as more than 1,000 years for some potential contaminants.

The low permeability, clay-like or silty materials present in the Grey Chalk would be a major factor in limiting any contaminant movement. The contaminant transport modelling will, however, be updated for the environmental statement (ES) using hydrogeological data obtained from the ground investigation carried out in 2021.

Leakage from the Waterbeach pipeline and treated effluent and storm water discharge pipelines might also give rise to groundwater contamination in superficial deposits. As already indicated, the Proposed Development is located in a nitrate vulnerable zone (NVZ). Leakage of any untreated waste water from the proposed WWTP or from the Waterbeach waste water transfer pipelines, or leakage from the treated effluent and storm water discharge pipelines, might adversely impact nitrate levels in the groundwater at these locations within the NVZ.

No impacts to groundwater abstractions are expected during operation as no impacts are likely to groundwater flows or groundwater quality on which the abstractions are dependent. The contaminant transport modelling will, however, be used to assess the potential risk of contamination to the shallow well which is part of the unlicensed groundwater source located approximately 0.5km to the east of the proposed WWTP. As

already discussed, groundwater abstractions are being investigated in a water features survey and the results of the survey will be included in the ES.

Flood risk

There may be an increased flood risk to land, infrastructure, access, properties and residents downstream of the proposed outfall on the River Cam as a result of the increased treated effluent and storm water discharges.

We have completed preliminary fluvial flood modelling of the River Cam water levels to understand how the treated effluent returned to the river could affect flood levels. This involved mathematical modelling of river flows and levels to complete an initial assessment of this increased risk. It indicated that, in the 1 in 100 year flood event, including allowance for climate change, there would be:

- a very limited increase in water levels in the River Cam; and
- a negligible change in the potential area of inundation across the flood plain.

As a result, there would be a negligible impact to flood risk elsewhere as a result of the proposed increase of treated water returned to the River Cam catchment, and no fluvial flood mitigation is necessary.

Our ongoing work includes completion of a Flood Risk Assessment (FRA) in accordance with the National Policy Statement for Waste Water (Department of Environment, Food and Rural Affairs, 2012). This will include consideration of the fluvial 1 in 100 year event with an allowance for climate change.

Surface water runoff from the new access route, buildings, other structures, internal roads and areas of hardstanding in the proposed WWTP could present a risk of surface water flooding to the proposed WWTP, the access road, and to land surrounding the proposed WWTP, including land required as part of the landscaping proposals.

Surface water from uncontaminated hard surfaces will be managed through a surface water drainage system. Where possible, sustainable drainage systems will be used. The ongoing work includes completion of a surface water drainage strategy, which details how runoff from a design storm event[14], plus an allowance for climate change, will be managed.

Any surface water which has potential to be contaminated will be contained within an enclosed drainage system and passed back for treatment through the proposed WWTP.

How will we manage our development activities to avoid, reduce or offset adverse changes?

The safeguarding of water resources is integral to the way we have progressed our Proposed Development. This not only relates to the siting and design of the proposed

[14] A design storm event has a 1% chance of occurring annually.

WWTP but also to how we will manage our activities in construction, and ultimately how we intend to operate the proposed WWTP.

The **PEI Introductory Paper** sets out how the Development Consent Order (DCO) would secure mitigation in both construction and operation. In relation to construction this includes the use of a **CoCP** and subsequent plans that the appointed contractors (s) would be required to prepare and implement. These provide a consistent approach to the management of construction activities.

Furthermore, our activities would be subject to specific regulations for some activities in construction as well as the Environmental Permits required in operation.

The following sets out how we intend to mitigate our development proposals during construction (including commissioning and decommissioning activities) and once the proposed WWTP is operational.

This section sets out our proposed mitigation proposals for water resources.

In construction

The outline **CoCP** forms part of the PEI and sets out measures our appointed contractors would abide by as they complete construction of the Proposed Development. In construction the **CoCP** and associated management plans will document the range of measures that would be in place to avoid and minimise impacts that may occur in construction. In relation to the protection of water resources, this will require the appointed contractor to have in place appropriate consents for works that could affect surface water or ground water, and to implement specific measures to protect springs, boreholes and watercourses, including control of surface water runoff.

Secondary measures (management activities)

In construction the **CoCP** and associated management plans will document the range of measures that would be in place to avoid and minimise impacts that may occur in construction. In relation to the protection of water resources, this will require the appointed contractor to have in place appropriate consents for works that could affect surface water or ground water, and to implement specific measures to protect springs, boreholes and watercourses, including control of surface water runoff.

Works directly affecting watercourses

Rigorous protection measures to prevent contamination, which are standard practice in the construction industry in areas near water, will be implemented through the requirements within the outline **CoCP**. Construction of the outfall at the River Cam will take place behind a temporary barrier sunk into the river bed. Any water from the excavation would be pumped to a temporary settlement lagoon to remove sediment before discharging back into the river. However, some work will be required in the river for the installation of bed protection materials. This work will be undertaken following best construction practices for works, such

as dredging, which are carried out in rivers on a routine basis and subject to specific environment permits described below in the 'Regulation' section.

Land drainage in the vicinity of trenches associated with the Waterbeach waste water transfer and final effluent pipelines would be identified and modified prior to or during trench excavation and backfilling. The drainage would be reinstated to recreate, as far as practicable, the existing drainage network.

Potential contamination from leaks and spills

Accidental spills and leaks of potentially contaminating materials used in construction could give rise to contamination of the aquifer in the Grey Chalk or superficial deposits.

However, as with the protection of surface water, rigorous groundwater protection measures will be implemented during all works to prevent contamination of the Grey Chalk or superficial deposits. These measures are standard practice in the construction industry and are incorporated in the outline **CoCP**. They will include:

- prevention of leakage of fuels and oils using adequately sized secure storage;
- checking and maintaining plant in good condition at all times; and
- using drip trays and other measures to prevent contamination from plant which is stationary when in use.

Drilling and piling

Only proprietary drilling fluids, accepted for use in groundworks in the UK, would be used in tunnelling, borehole construction and piling during shaft and foundation construction. All boreholes constructed as permanent installations would be sealed around casing tubes in soil and sub-soil deposits close to the surface. The seal would prevent contamination from any surface water which might collect around the borehole and, potentially, seep down around the borehole to the water table.

Piling methods employed would also prevent the development of potential pathways for contamination from the surface to the Grey Chalk.

Flood risk in construction

As a requirement of the CoCP the contractor would be required to prepare a construction flood risk management plan. This would set out the requirements to prevent any significant

effects from construction sites on the existing flood risk in the surrounding area. The plan would also include:

- an assessment of any temporary changes to flood risk as a result of construction works undertaken in areas having a medium or high risk of fluvial flooding; and
- any measures which might be required during the works to deal with the additional flood risk in these areas.

Monitoring

As indicated within the section above, *Once operational, how would the Proposed Development change the water environment?* , no discernible changes to water levels or flows are expected in local watercourses, or to water levels in any ponds or other still water bodies in local nature conservation sites, during:

- the construction of shafts and some foundations at the proposed WWTP; and
- the excavation of trenches for pipeline installations.

Nonetheless, groundwater levels in the Grey Chalk and surface water levels in Black Ditch, Allicky Farm Pond CWS and in The Cut at the Stow-cum-Quy Fen SSSI, will be monitored during construction. The monitoring would be undertaken to provide reassurance that surface water levels are not affected by dewatering during construction at the proposed WWTP.

No mitigation should be necessary in relation to trench excavation for pipeline installation. However, we are carrying out surveys to identify any natural water features (ponds, springs etc) which might potentially be affected temporarily by dewatering and would require monitoring during pipeline construction.

Private groundwater abstractions located in the vicinity of the Waterbeach waste water transfer pipelines are included in the water features survey, together with other possible private groundwater sources in the area. While construction is in progress along the pipeline route in the area, regular contact would be maintained with owners of private groundwater abstractions in order to monitor the supplies. If considered necessary, groundwater level measurements will also be taken in any abstraction sources which might be affected

temporarily by dewatering during pipeline construction. In the unlikely event that a private groundwater source was significantly affected, immediate actions would be taken either to:

- maintain continuity of the private supply during the pipeline works, if this is practicable; or
- provide a temporary alternative supply in this period.

Tertiary measures (regulation)

The conditions under which final treated effluent, used in testing the Waterbeach waste water transfer pipelines, can be discharged to local drains or watercourses will be agreed with the Environment Agency. A permit will be obtained for this discharge.

All construction activities in, over, under or within 8m of main rivers will be subject to flood risk activities permits and will be agreed with the Environment Agency[15].

Works within the navigation to the bed and banks will also require a license from the Cam Conservators. This would apply to the proposed outfall.

Construction activities that impact on ordinary watercourses such as ditches or land drainage will require consent from Waterbeach Level IDB or Swaffam IDB.

Depending on the methods of construction adopted, abstraction licensing may be required for temporary dewatering during construction of shafts connected with the waste water transfer tunnel. This could include the shaft for the terminal pumping station to be constructed in the Grey Chalk at the proposed WWTP.

Consents may also be needed to dispose of the dewatering discharge.

In operation

As would be expected with a new waste water treatment plant, the consideration of water resources have been a core part of our decision-making process in relation to the Proposed Development, in accordance with the National Policy Statement for Waste Water (Department of Environment, Food and Rural Affairs, 2012). The advice of the Environment Agency, a regulatory stakeholder, has been fundamental in driving our design in relation to the quality standards that the proposed WWTP would have to comply with, how we should manage extreme rainfall events, as well as guiding the development of the new outfall.

Mitigation measures in operation are embedded through design allowing future flexibility and ability to adapt (the **Environmental Information Paper: Climate Resilience** contains further information on future resilience), through the development of management plans governing how our staff will operate our facility, and through obtaining and complying with

[15] https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

regulatory permits. This section presents the measures included as part of our Proposed Development.

Embedded measures

Storm water management

Preliminary storm water models indicate that improved storm water management resulting from increased treated flows, will reduce the number of settled storm water discharges (storm spill) to the River Cam. The preliminary storm water management approach will be finalised and agreed with the Environment Agency.

Proposed new outfall at the River Cam

The proposed outfall at the River Cam will be designed to prevent scour using well established engineering methods. Further mitigation measures may also be implemented on the River Cam based on the outcome of the WFD assessment.

Design of new subsurface infrastructure

Any significant risk of inflow of groundwater to shafts connected to the waste water transfer tunnel, or outflow of waste water from these shafts, would be eliminated by the robust design and construction of all shafts.

It is anticipated that the materials excavated from pipeline trenches would be suitable for pipe bedding and trench backfill. None of the materials, consisting mainly of superficial deposits, are expected to comprise a hard material which could damage the pipeline. Both pipe bedding and backfilling would therefore utilise materials from the sections of trench from which they are excavated. As a result, the trenches would not be expected to form new pathways for drainage of groundwater. Hence, as far as is practicable, there should be no significant change to groundwater drainage patterns in the vicinity of the pipelines.

If the excavated materials proved unsuitable for pipe bedding in any sections of the pipeline, a more uniform, sandy or granular material might be used. Additional measures would then be considered in the event that groundwater drainage was a concern. Such measures might include the use of clay plugs or partitions (also referred to as clay stanks) across the trench at suitable locations. However, such measures are not expected to be necessary.

As already indicated, foundations for deeper structures in the proposed WWTP could possibly give rise to groundwater flooding in some areas at times of high groundwater levels. An initial analysis of potential variations in groundwater levels will be undertaken during the environmental impact assessment and updated during the design of the proposed WWTP. If elevated groundwater levels are predicted, close to ground levels, drains may be installed near to these structures to ensure that groundwater flow is re-directed around the foundations.

Parts of the land drainage network within the proposed WWTP may need to be reconfigured during construction to prevent the potential for a rapid transfer of contaminants from any

accidental spills or leakages to surrounding surface water features. The reconfiguration of the land drainage might result in a change in contributions to flows in local drains connected to Black Ditch. However, this change should not have a discernible impact in terms of the overall flow regime in the Black Ditch.

The pipe to be used for the Waterbeach waste water transfer pipelines would be made from polyethylene, a plastic material. Pipe sections are heat welded together, and the welds should be stronger than the pipe itself. As the Waterbeach pipeline will be pressurised during operation in order to pump the waste water to the proposed WWTP, pipeline pressure testing will be undertaken on completion. The test pressure will exceed the normal working pressure of the pipeline. As a result, the risk of leakage or losses from failure of the pipeline materials or welds, leading to contamination of groundwater in the vicinity of the pipelines, would be extremely low. In addition, pressure in the pipeline will be monitored during operation to confirm that the pipeline is functioning correctly.

Unlike the Waterbeach waste water transfer pipelines, the treated effluent and storm water discharge pipelines would not be subject to pressure during operation, as the discharges would flow under gravity through the pipelines to the outfall. The pipes to be used for these discharge pipelines would also be made from polyethylene but reinforced with steel, taking into account the large diameter. Push fittings or sleeves would be used to join the pipe sections, with rubber gaskets included for sealing the joints. The pipe materials, and the method of production of the pipes, would be certified as suitable for the works. All joints between pipe sections would be inspected for satisfactory installation prior to backfilling of the section of pipeline trench.

The materials and methods of installation of the treated effluent and storm water discharge pipelines are standard for this type of use in the water industry. Although the joints are not as strongly sealed as for the waste water transfer pipeline, the gravity flow would not exert any notable pressure on the pipeline joints. Any leakage from the joints would, therefore, be minimal. The pipelines are also conveying treated final effluent and intermittent storm water discharges, rather than the untreated waste water conveyed continuously by the Waterbeach waste water transfer pipelines. Therefore, as a result of the gravity flow and

the nature of the discharges, there would be no significant effect on groundwater quality in the vicinity of the pipelines.

Leakage of waste water from the proposed WWTP will be minimised through sound design and good construction practices.

The proposed pipeline and WWTP design and construction measures, which eliminate or minimise the risk of contamination, will ensure there is no significant effect on nitrate levels in groundwater or surface water in the NVZ designated in the area.

Surface water drainage design

Surface water runoff from uncontaminated hard surfaces will be managed through a surface water drainage system. Standard measures for sustainable drainage schemes (SuDS) will be included in the design of proposed WWTP where appropriate and feasible.

Contaminated surface water runoff from process areas of the proposed WWTP, will be collected and then passed back to the proposed WWTP for treatment.

Secondary measures (management activities)

Operational management plans

The Environmental Permit for the proposed WWTP will require a written management system to be in place in the form of an Environmental Management System (EMS).

The written system would cover general management of the proposed WWTP, equipment maintenance, contingency plans, accident prevention and emergency response (including pollution response) as well as defining monitoring activities. The EMS would also set out an organisational structure with environmental management roles and responsibilities. Environment Agency advice in relation to the preparation of written systems also sets out the need to consider changing climatic conditions.

Ceasing use of the Waterbeach outfall

The assessment of the impact of removing the effluent contribution from the existing Waterbeach WRC on surface water abstractions from the Bannold Drain will be discussed with the IDB. The IDB may be aware of other means by which flows in the ditch could be maintained or augmented in the event that the current treated effluent discharge forms an important contribution to surface water abstractions. This might involve changes to water level controls in the Bannold Drain or the drainage pumping regime.

Tertiary measures (Regulation)

An assessment method has been agreed with the Environment Agency for determining consent conditions relating to final treated effluent quality for discharge from the proposed WWTP to the River Cam. The consent conditions place a duty to operate in accordance with permit limits and to monitor performance. As already indicated, the Environment Agency would be required, via the periodic RBMP process, to ensure that any observed

deterioration in river water quality is addressed by tightening the relevant water quality components in the Environmental Permit which covers the final effluent discharge.

Regulatory monitoring

All requirements for monitoring final effluent and storm water discharge quality, together with water quality in the River Cam in connection with these discharges, will be agreed with the Environment Agency as part of discharge consent conditions.

The frequency of effluent quality sampling for a continuous discharge is based on the population equivalent (PE)[16]. Continuous flow monitoring of the final effluent is also likely to be required.

Storm overflow discharges are irregular, intermittent and subject to discharge consent conditions agreed with the Environment Agency. Monitoring is likely to include storm event duration monitoring (EDM), magnitude and frequency of discharges i.e. through flow monitoring. It is expected that the proposed WWTP discharge permit may include conditions relating to the updated Environment Act 2021, which requires water companies to monitor storm events and monitoring of both upstream and downstream of discharge locations.

[16]For a PE of 50,000 or more, a minimum of 24 samples must be taken in every year of operation, 10% of which must be taken at the weekend (Waste water treatment works: treatment monitoring and compliance limits - GOV.UK (www.gov.uk))

Monitoring for groundwater quality changes

Monitoring of groundwater quality in the area around the proposed WWTP, if required during operation, would also be agreed with the Environment Agency. In the event of any accidental spills or leakages, or detection of significant contamination in groundwater from established regulatory monitoring within the catchment, an immediate investigation and clean-up programme would be implemented. As the proposed WWTP is located in a NVZ, measurements of nitrate levels in groundwater could also be included as part of any programme of monitoring agreed with the Environment Agency.

What might the likely significant effects to the water environment be in relation to the proposed relocation of Cambridge Waste Water Treatment Plant?

A preliminary assessment of impacts has been made for the water resources receptors which has been completed in accordance with the approach set out in the Scoping Report (Anglian Water Services Limited, 2021).

Based on our preliminary assessment, and taking into account the measures to avoid, reduce or offset adverse changes, no likely significant effects to water resources are identified in relation to the construction of the Proposed Development.

Our preliminary assessment has identified the following impacts, related to the operation of the proposed WWTP, which could potentially lead to significant effects:

- The final effluent outfall structure will be a permanent feature in the eastern bank of the River Cam. The magnitude of impact of the outfall structure and its operation to the water body status of River Cam will be confirmed through the WFD assessment. The final design and construction of the outfall, however, will remain subject to Environment Agency consent through an environmental permit. The permit would consider aspects such as controls on scour and final design of bank stabilisation works to mitigate local changes to the river bank where possible.
- Reduction in frequency of storm water discharges to the River Cam would have a beneficial (positive) impact on downstream water quality.
- There will be a beneficial (positive) impact on river water quality close to the location of the outfall at the time the Proposed Development comes into operation, when compared to current river water quality.
- Over time, as the population served by the proposed WWTP increases, the final effluent discharge to the river will also increase. Final treated effluent discharges will, however, remain subject to Environment Agency water quality consent conditions which may vary over the operational lifetime of the Proposed Development.
- Removing the effluent contribution to the Bannold Drain from the Waterbeach WRC may have a major impact, particularly in periods of dry weather, on surface water abstractions which are dependent on the drain as the source of water. The potential impact and measures to minimise impacts will be discussed with the IDB.

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