Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Environmental Statement Appendix 3.5: Final Site Selection Appendices I to N

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I. Flood risk screening assessment

I.1 Site area 1

Topographic levels

I.1.1 The site has an area of approximately 68Ha. Topographic levels on site vary between approximately 7.53mAOD and 11.49mAOD, with an average of 10.11mAOD (according to Environment Agency 2m LiDAR data). Lowest topographic levels are present to the south-east of site. Highest topographic levels are associated with a public footpath, Mere Way, which transects the site.

Vulnerability Classification

I.1.2 The existing site is greenfield, which is unclassified for flood risk vulnerability with respect to the National Planning Policy Framework (NPPF). Post development, the proposed Waste Water Treatment Plant would be considered “Water Compatible” and therefore the NPPF vulnerability of the site would be increased compared to the existing situation.

Fluvial/Tidal

I.1.3 Site 1 is located entirely within Environment Agency (EA) Flood Zone 1, with a less than 1 in 1000 (0.1%) annual chance of flooding from rivers or sea. The site is a minimum of 1.7km north-west of the River Cam, which is an EA main river, and is a minimum of 3.7km south-east of the Great Ouse, which is also an EA main river (Figure I.2).

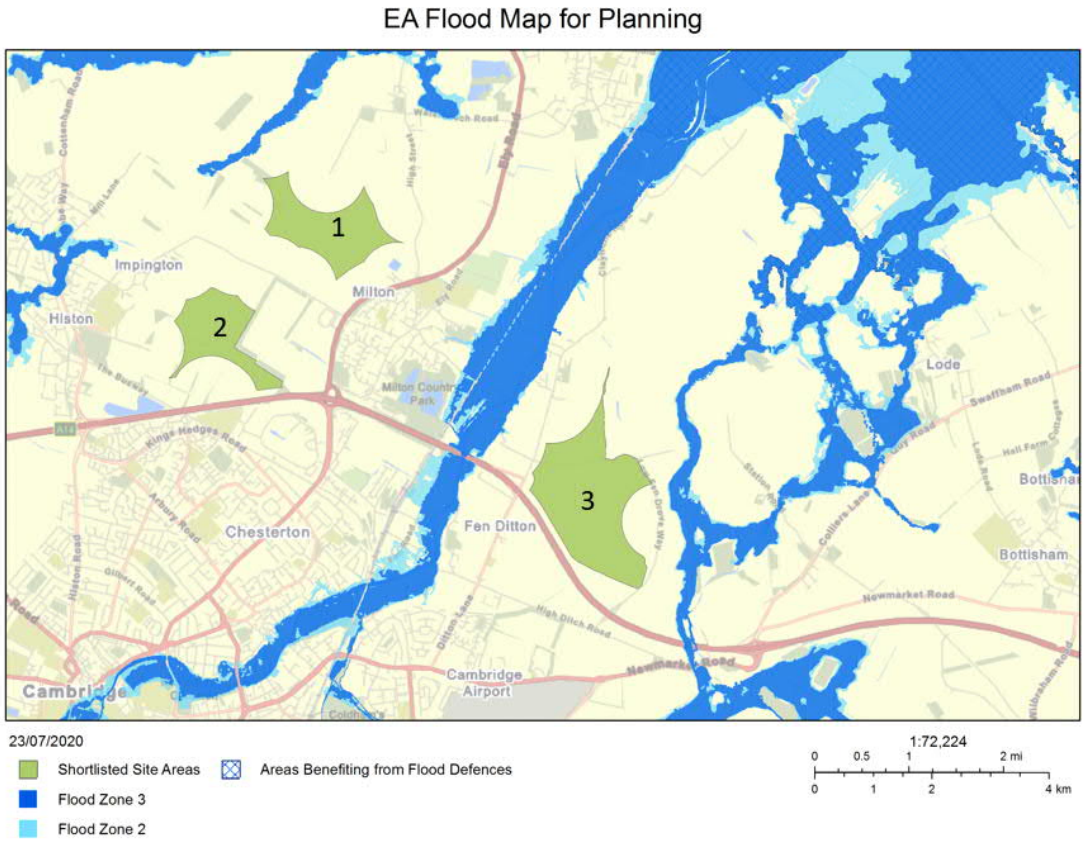
I.1.4 The site is not located in an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection.

I.1.5 There are numerous ordinary watercourses/drains both onsite and within its near vicinity. A review of the Internal Drainage Boards (IDB) map for Cambridgeshire indicates that approximatively 1km north of site, drainage is managed by the Old West IDB. However, the site itself falls outside all designated IDB boundaries and is be assumed to be under riparian ownership. Confirmation of drain management would be sought with Old West IDB if this site area is selected.

I.1.6 The closest EA Flood Zone 2 and 3 areas are located approximately 360m north west of site, associated with the ordinary watercourses/drain network which drains to the River Great Ouse.

I.1.7 The present-day fluvial/tidal risk to site is considered to be low.

Figure I.2: EA Flood Map for Planning



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Peak river flow climate change considerations

I.1.8 The site is currently located entirely within EA Flood Zone 1. EA guidance states that "Water Compatible" developments which are currently located within Flood Zone 1 but may be in Flood Zones 2 or 3 in the future, should apply the Central Allowance for peak river flow. In the Anglian catchment, the Central peak river flow allowance is 25%.

I.1.9 The EA has further confirmed that the site is outside the modelled flood extent of the Cam Urban model. The FEH webservice indicates that the site is located on the watershed of the River Cam catchment and the Great Ouse catchment. Taking this in to consideration, and given that the site is located entirely within Flood Zone 1, the future fluvial/tidal flood risk to site is considered to be low.

Surface Water

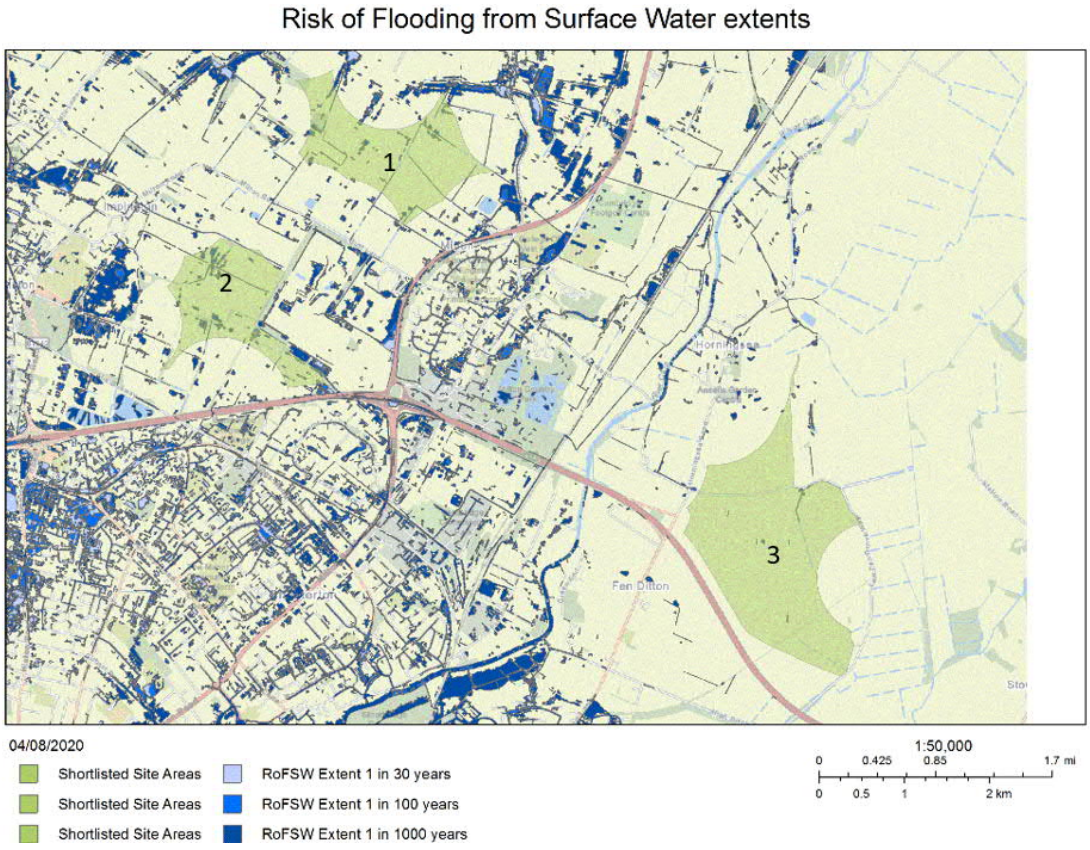
I.1.10 According to the EA Risk of Flooding from Surface Water (RoFSW) extents maps, the risk of surface water flooding on site is considered to be "Very Low" to "Low". Areas identified to be at "Very Low" risk have a less than 1 in 1,000-year (0.1%) annual risk of flooding from surface water sources. Those identified at "Low" risk have between a 1 in 1,000-year to 1 in 100-year (0.1% to 1%) annual risk of flooding.

I.1.11 In a “Low” risk surface water flooding event, additional water would predominantly accumulate within and discharge from existing onsite drainage channels. Some minor ponding may occur at areas of marginally lower topographic elevation. The average surface water flood depth in affected drainage channels in this event would be 0.15m to 0.3m.

I.1.12 As there is no evidence of overland flow routes across the site, it is considered likely that additional future rainfall, in the event of climate change, could be adequately managed by onsite drainage (subject to verification of greenfield runoff rates according to the CIRIA 753 guidance).

I.1.13 The risk of flooding from surface water sources is considered to be low.

Figure I.3: Risk of flooding from surface water (RoFSW) extents



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Geology

I.1.14 According to the British Geological Survey, superficial deposits are largely absent from site, with two small pockets of River Terrace Deposits (sand and gravel) occupying approximately 6% of the site area. Site investigation is recommended to confirm the BGS 1:50,000 scale designation of superficial deposits

I.1.15 The BGS maps demonstrate that the bedrock underlying the site is the Gault Formation (mudstone).

Figure I.4: BGS superficial geology (1:50,000)

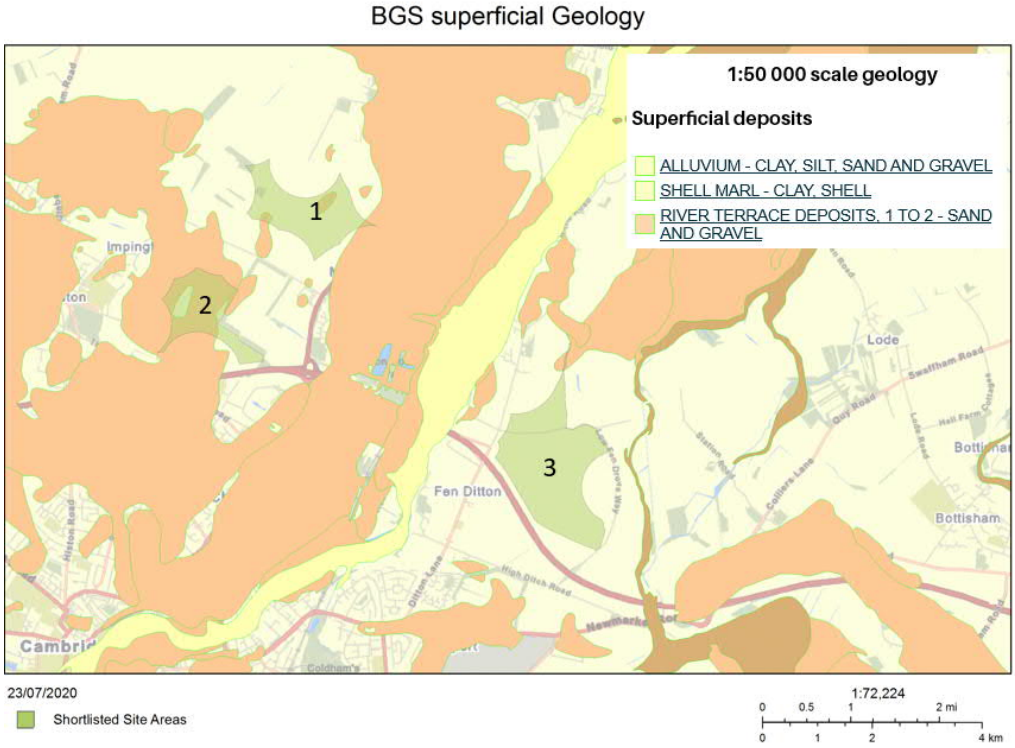

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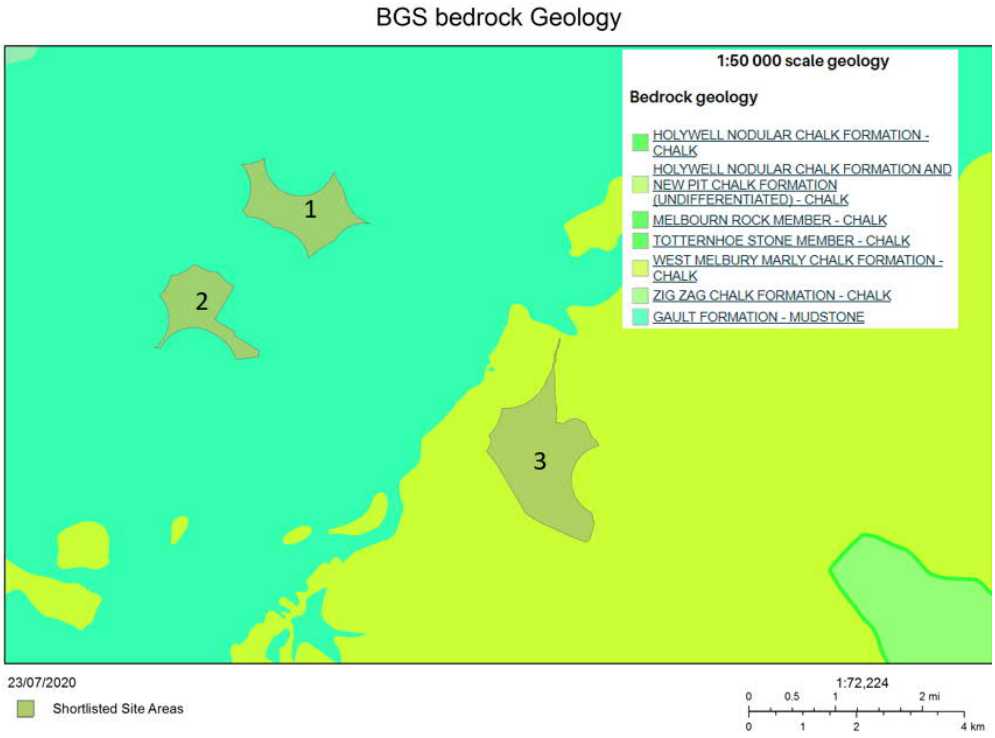
Figure I.5: BGS bedrock geology (1:50,000)



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Groundwater

I.1.16 The BGS Hydrogeology 1:625,000 maps consider the bedrock in this area to have essentially no groundwater. The site is not located within an EA groundwater Source Protection Zone.

I.1.17 The superficial River Terrace deposits, where present on site, are considered a Secondary “A” aquifer, whereas the bedrock mudstone is not considered an aquifer, according to BGS/MagicMap designations.

I.1.18 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) states that groundwater flooding has occurred within the district, at Barrington, Bassingbourn, south east Cambridge, Fulbourn, Great Eversden, Little Eversden, Madingley, Stow Cum Quy, Thriplow and Waterbeach. There is no indication however that the west of Milton has previously been affected by groundwater flooding.

I.1.19 The risk of flooding from groundwater is considered to be low.

Infiltration Potential

I.1.20 Superficial gravel deposits occupy approximately 6% of the site area and may be suitable for infiltration (pending infiltration tests). Appendix C of the Cambridge City Council SFRA (2010), indicates that there is a likelihood of impeded drainage associated with the mudstone bedrock.

Sewer

I.1.21 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of sewer flooding on site, based on information provided by the Highways Agency, parish councils and Anglian Water Services DG5 register.

I.1.22 The risk of flooding from sewer sources is considered to be low.

Historic

I.1.23 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of historical flooding from fluvial, groundwater, surface water or sewer sources on site in the years preceding 2010.

I.1.24 The EA hold historic records of fluvial flooding in the district, which indicate fluvial flooding in 1947 and 2001, approximately 1.5km south-east of site, due to exceedance of channel capacity on the River Cam.

Residual Risk

I.1.25 The site is located entirely within EA Flood Zone 1 and is not located with an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to site in the event of a breach of defences is considered to be low.

I.1.26 The EA has further confirmed that the site is outside the flooding extent from the Cam Urban model and that defence-breach hazard mapping is not available for site (as of August 2020). It would appear therefore that the EA does not consider the site to be at significant risk in the event of a breach of defences.

I.1.27 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered to be at risk in the event of reservoir failure.

I.2 Site area 2

Topographic levels

I.2.1 The site has an area of approximately 53Ha. Topographic levels on site vary between 10.82mAOD and 13.28mAOD, with an average of 11.97mAOD (according to Environment Agency 2m LiDAR data). The site is relatively flat, with lowest elevations towards the north-west of site.

Vulnerability Classification

I.2.2 The existing site is greenfield, which is unclassified for flood risk vulnerability with respect to the National Planning Policy Framework (NPPF). Post development, the proposed Waste Water Treatment Plant would be considered “Water Compatible” and therefore the NPPF vulnerability of the site would be increased compared to the existing situation.

Fluvial/Tidal

I.2.3 Site 2 is located entirely within Environment Agency (EA) Flood Zone 1, with a less than 1 in 1000 (0.1%) annual chance of flooding from rivers or sea. The site is a minimum of 2.1km north-west of the River Cam, which is an EA main river, and is a minimum of 2.8km south-east of the Great Ouse, which is also an EA main river.

I.2.4 The site is not located in an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection.

I.2.5 There is an ordinary watercourse/drain along the north-eastern boundary of site. A review of the Internal Drainage Boards (IDB) map for Cambridgeshire indicates that approximatively 1km north of site, drainage is managed by the Old West IDB. However, the site itself falls outside all designated IDB boundaries and might be assumed to be under riparian ownership. Confirmation of drain management would be sought with Old West IDB if this site area is selected.

I.2.6 The closest EA Flood Zone 2 and 3 areas are approximately 1km north-west of site, associated with a public drain, which in turn drains to the Great Ouse.

I.2.7 The present-day fluvial/tidal risk to site may is considered to be low.

Peak River Flow Climate Change Considerations

I.2.8 The site is currently located entirely within EA Flood Zone 1 (Figure L.1). EA guidance states that “Water Compatible” developments which are currently located within Flood Zone 1 but may be in Flood Zones 2 or 3 in the future, should apply the Central Allowance for peak river flow. In the Anglian catchment, the Central peak river flow allowance is 25%.

I.2.9 The EA has further confirmed that the site is outside the modelled flood extent of the Cam Urban model. The FEH webservice indicates that the site is located on the watershed of the River Cam catchment and the Great Ouse catchment. Taking this into consideration, and given that the site is located entirely within Flood Zone 1, the future fluvial/tidal flood risk to site is considered to be low.

Surface Water

I.2.10 According to the EA Risk of Flooding from Surface Water (RoFSW) maps, the risk of surface water flooding on site is on average considered to be “Very Low” (Figure L.2). Areas identified to be at “Very Low” risk have a less than 1 in 1,000-year (0.1%) annual risk of flooding from surface water sources.

I.2.11 Areas at marginally lower topographic elevation on site have a variable risk (“Low”, ”Medium” and “High”) of surface water flooding. Those identified at “Low” risk have between a 1 in 1,000-year and 1 in 100-year (0.1% to 1%) annual risk of flooding, those at “Medium” risk have a 1 in 100-year to 1 in 33-year (1% to 3.3%) annual risk of flooding, and those at “High” risk have a greater than 1 in 33-year (3.3%) annual risk of flooding.

I.2.12 In “Low” and “Medium” and “High” risk surface water flooding events, average surface water flood depths from ponding at low topographic elevation areas, would be 0.15m to 0.3m. Surface water would largely accumulate and discharge via the existing onsite drainage channels.

I.2.13 As there is no evidence of overland flow routes across the site, it is considered likely that additional future rainfall, in the event of climate change, could be adequately managed by onsite drainage (subject to verification of greenfield runoff rates according to the CIRIA 753 guidance).

I.2.14 The risk of flooding from surface water sources is considered to be low.

Geology

I.2.15 According to the British Geological Survey Superficial Geology mapping, River Terrace Deposits (sand and gravel) are present to the west of site. Site investigation is recommended to confirm the BGS 1:50,000 scale designation of superficial deposits. There are no recorded superficial deposits to the east of site.

I.2.16 The BGS maps demonstrate that the bedrock underlying the site is the Gault Formation (mudstone).

Groundwater

I.2.17 The BGS Hydrogeology 1:625,000 maps consider the bedrock in this area to have essentially no groundwater. The site is not located within an EA groundwater Source Protection Zone.

I.2.18 The superficial River Terrace deposits, where present on site, are considered a Secondary “A” aquifer, whereas the bedrock mudstone is not considered an aquifer, according to BGS/MagicMap designations.

I.2.19 Cambridge City Council Strategic Flood Risk Assessment (SFRA) (2010) states that groundwater flooding has occurred within the district, at Barrington, Bassingbourn, south east Cambridge, Fulbourn, Great Eversden, Little Eversden, Madingley, Stow Cum Quy, Thriplow and Waterbeach. There is no indication however that the vicinity of Milton has previously been affected by groundwater flooding.

I.2.20 The risk of flooding from groundwater is considered to be low.

Infiltration Potential

I.2.21 Superficial gravel deposits are present to the west of site and this area may be suitable for infiltration (pending infiltration tests). Appendix C of the South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010), indicates that there is a likelihood of impeded drainage associated with the mudstone bedrock.

Sewer

I.2.22 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of sewer flooding on site, based on information provided by the Highways Agency, parish councils and Anglian Water Services DG5 register.

I.2.23 The risk of flooding from sewer sources is considered to be low.

Historic

I.2.24 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of historical flooding from fluvial, groundwater, surface water or sewer sources on site in the years preceding 2010.

I.2.25 The EA hold historic records of fluvial flooding in the district, which indicate fluvial flooding in 1947 and 2001, approximately 1.7km south-east of site, due to exceedance of channel capacity on the River Cam.

Residual Risk

I.2.26 The site is located entirely within EA Flood Zone 1 and is not located with an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to the site in the event of a breach of defences is considered to be low.

I.2.27 The EA has further confirmed that the site is outside the flooding extent from the Cam Urban model and that defence-breach hazard mapping is not available for the site (as of August 2020).

It would appear therefore that the EA does not consider the site to be at significant risk in the event of a breach of defences.

I.2.28 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered at risk in the event of reservoir failure.

I.3 Site area 3

Topographic levels

I.3.1 The site is approximately 127Ha. Topographic levels on site vary between 4.41mAOD and 14.09mAOD, with an average of 9.07mAOD (according to Environment Agency 2m LiDAR data). Highest topographic levels are to the south west of site, and lowest topographic levels are to the east. The site generally slopes to the east.

Vulnerability Classification

I.3.2 The existing site is greenfield, which is unclassified for flood risk vulnerability with respect to the National Planning Policy Framework (NPPF). Post development, the proposed Waste Water Treatment Plant would be considered “Water Compatible” and therefore the NPPF vulnerability of the site would be increased compared to the existing situation.

Fluvial/Tidal

I.3.3 Site 3 is located entirely within Environment Agency (EA) Flood Zone 1 (Figure L.1), with a less than 1 in 1000 (0.1%) annual chance of flooding from rivers or sea. The site is a minimum of 430m west of Quy Water, a tributary of the River Cam. Both Quy Water and the River Cam are main EA rivers. The site is a minimum of 600m south-east of the River Cam.

I.3.4 The site is not located in an area that is considered to benefit from EA defences to a 1 in 100 year standard of protection.

I.3.5 There are several drains present on site. The site is largely located within an area managed by Swaffam IDB. Confirmation of drain management would be sought with Swaffam IDB if this site area is selected.

I.3.6 The closest EA Flood Zone 2 and 3 areas are approximately 450km north-west of the site, associated with the River Cam and 200m east of site, associated with Quy Water.

I.3.7 The EA has further confirmed that the site is outside the modelled flood extent of the Cam Urban model. The present-day fluvial/tidal risk to site is considered to be low.

Peak River Flow Climate Change Considerations

I.3.8 The site is currently located entirely within EA Flood Zone 1. EA guidance states that “Water Compatible” developments which are currently located within Flood Zone 1 but may be in Flood Zones 2 or 3 in the future, should apply the Central Allowance for peak river flow. In the Anglian catchment, the Central peak river flow allowance is 25%.

I.3.9 The EA has supplied the modelled flood extents for the 1% Annual Exceedance Probability (AEP) including a 20% Climate Change (CC) peak river flow allowance. The supplied data is from the Cam Urban model, which includes a blanket 20% climate change peak river flow allowance. Modelled flood extents and depths for the Central Allowance (25%) are not currently available from the EA (August 2020). The 1%AEP+20%CC flood extent is considered indicative only of potential flooding in the 1%AEP+25%CC event.

I.3.10 In a 1%AEP+20%CC event, the modelled flood level at the closest modelled upstream node to site (BL7420D) would be 6.42mAOD (Figure L.6). The average elevation on site is 9.07mAOD (according to Environment Agency 2m LiDAR data). EA modelled flood extents for the 1%AEP+20%CC event demonstrates that the site would not be inundated in this event.

I.3.11 Confirmation of 1%AEP+25%CC flood levels, flows and extents should be sought where possible, availing of EA JFlow models, prior to development on this site.

I.3.12 As the Cam Urban model demonstrates the site not to be inundated in the 1%AEP+20%CC event, the fluvial /tidal risk to site in the future is considered to be low.

Figure I.6: EA Modelled Node Locations in relation to the eastern portion of site 3.

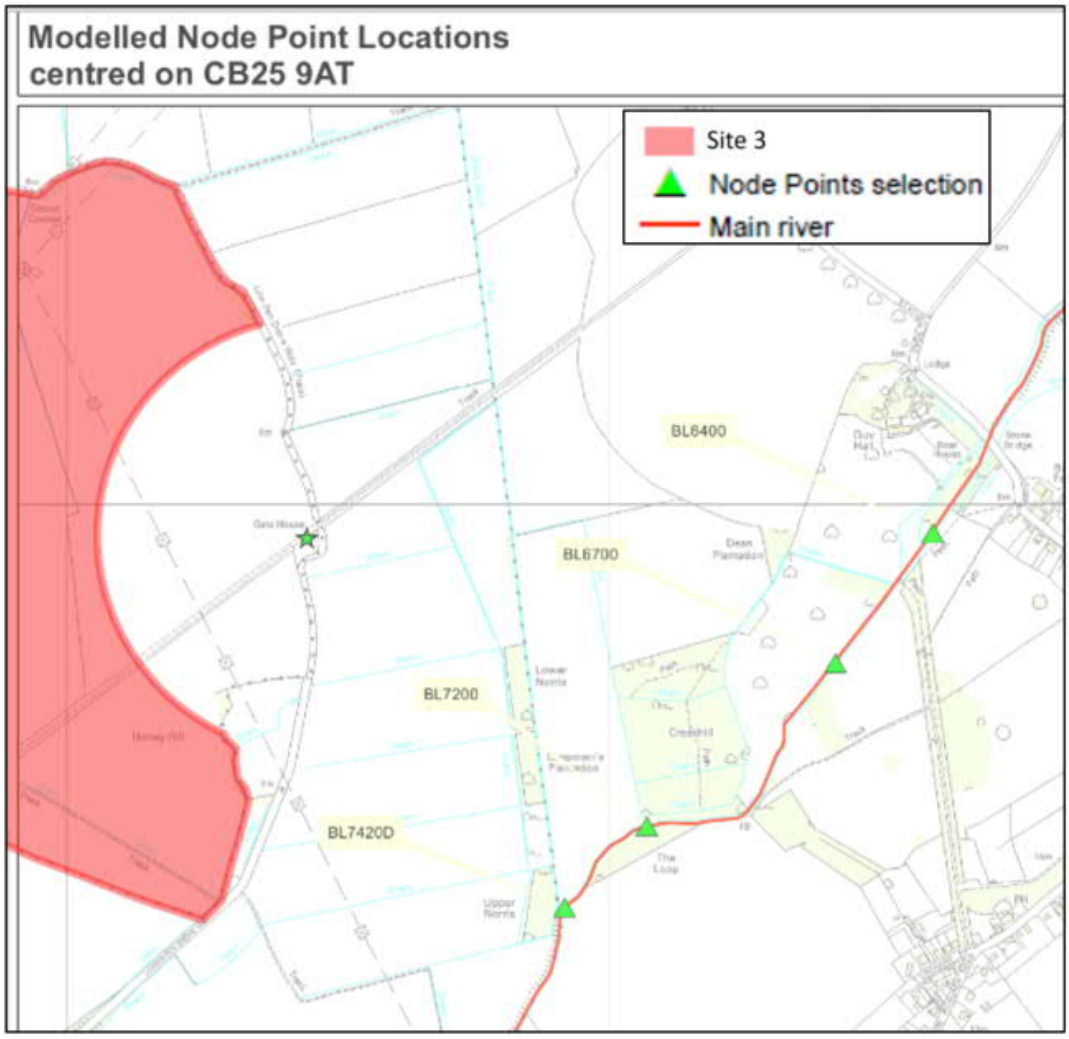

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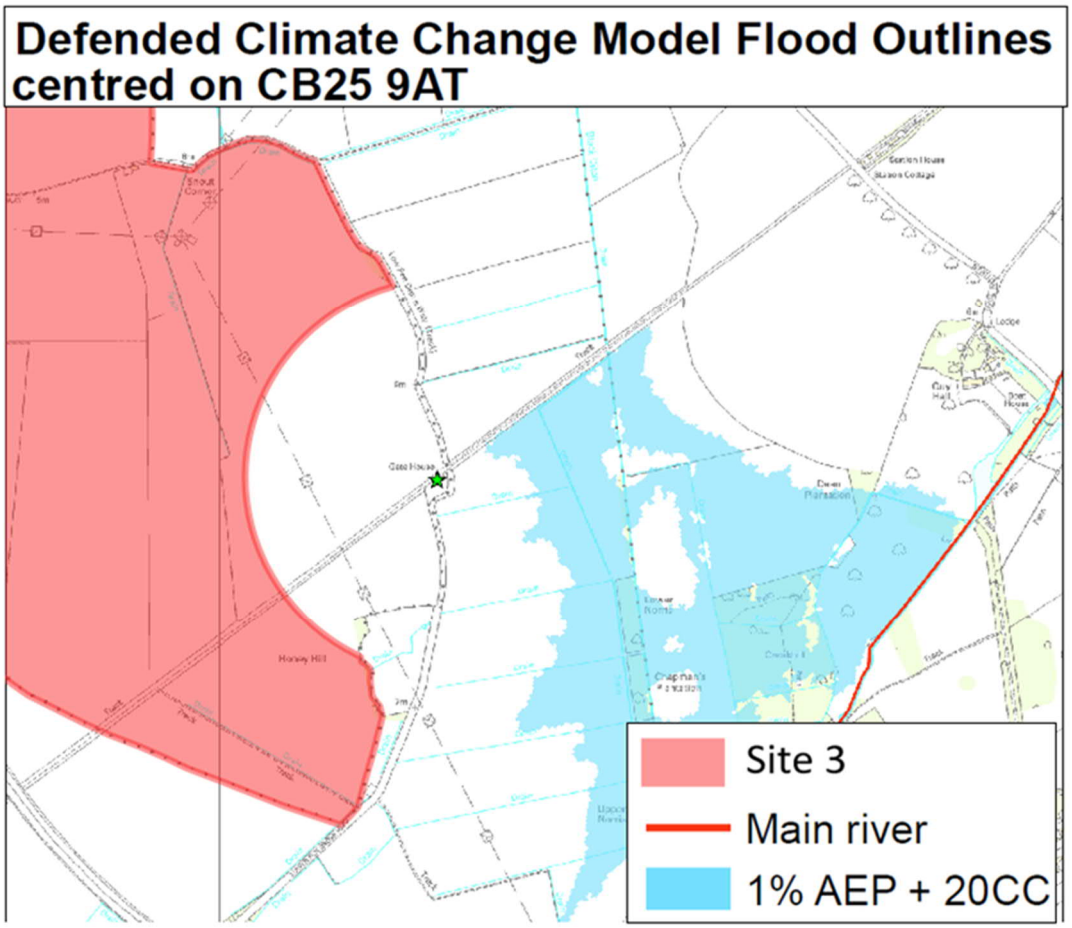
Figure I.7: EA 1%AEP+20%CC flood extents in relation to the eastern portion of site 3.



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Surface water

I.3.13 According to the EA Risk of Flooding from Surface Water (RoFSW) maps, the risk of surface water flooding on site is considered to be “Very Low”. Areas identified to be at “Very Low” risk have a less than 1 in 1,000-year (0.1%) annual risk of flooding from surface water sources.

I.3.14 In a “Low” risk (1 in 1,1000-year to 1 in 100-year) surface water flooding event, the site would largely be unaffected. Maximum flood depths of 0.6m to 0.9m may occur in a “Low Risk” event along the track at Snouts Corner, north-east of site.

I.3.15 As there is no evidence of overland flow routes across the site, it is considered likely that additional future rainfall, in the event of climate change, could be adequately managed by onsite drainage (subject to verification of greenfield runoff rates according to the CIRIA 753 guidance).

I.3.16 The risk of flooding from surface water sources is considered to be low.

Geology

I.3.17 According to the British Geological Survey Superficial Geology mapping, there are no records of superficial deposits across most of the site. The northern spoke of site does however appear to

intersect superficial River Terrace Deposits (sand and gravel). Site investigation is recommended to confirm the BGS 1:50,000 scale designation of superficial deposits.

I.3.18 The BGS maps demonstrate that the bedrock underlying the site is the West Melbury Marly Chalk Formation.

Groundwater

I.3.19 The BGS Hydrogeology 1:625,000 maps consider the chalk bedrock in this area to be a highly productive aquifer. The chalk bedrock is considered a Principal aquifer according to BGS/MagicMap designations. However, in this area, important aquifer horizons are absent in chalk.

I.3.20 The superficial River Terrace deposits, where present on the northern spoke of site, are considered a Secondary “A” aquifer, according to BGS/MagicMap designations.

I.3.21 The site is not located within an EA groundwater Source Protection Zone.

I.3.22 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) states that groundwater flooding has occurred within the district, at Barrington, Bassingbourn, south east Cambridge, Fulbourn, Great Eversden, Little Eversden, Madingley, Stow Cum Quy, Thriplow and Waterbeach. The closest recorded incident of groundwater flooding occurred approximately 1km east of site (Appendix B, South Cambridgeshire and Cambridge City SFRA).

I.3.23 The risk of flooding from groundwater is considered to be low.

Infiltration Potential

I.3.24 Superficial gravel deposits may be present on the northern spoke of site and this area may be suitable for infiltration (pending infiltration tests).

I.3.25 Chalk bedrock might be assumed to have high infiltration potential. However, Appendix C of the South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there is a likelihood of impeded drainage at site. Infiltration testing will be carried out on site.

Sewer

I.3.26 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of sewer flooding on site, based on information provided by the Highways Agency, parish councils and Anglian Water Services DG5 register.

I.3.27 The risk of flooding from sewer sources is considered to be low.

Historic

I.3.28 The South Cambridgeshire and Cambridge City SFRA (South Cambridgeshire District Council & Cambridge City Council, 2010) indicates that there have been no recorded incidents of historical flooding from fluvial, groundwater, surface water or sewer sources on site in the years preceding 2010.

I.3.29 The EA hold historic records of fluvial flooding in the district, which indicate fluvial flooding in 1947 and 2001, approximately 300m west of site, due to exceedance of channel capacity on the River Cam.

Residual Risk

I.3.30 The site is located entirely within EA Flood Zone 1 and is not located with an area that is considered to benefit from EA defences to a 1 in 100-year standard of protection. Therefore, the risk to site in the event of a breach of defences is considered to be low.

I.3.31 The EA Risk of Flooding from Reservoirs map demonstrates that the site is not located within an area considered at risk in the event of reservoir failure.

J. Green Belt study

MOTT MACDONALD

CWWTP Stage 4 Site Selection

Green Belt Study

August 2020

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CWWTP Stage 4 Site Selection

Green Belt Study

August 2020

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Contents

1 Introduction

The site selection process for the relocation of the Cambridge Waste Water Treatment Plant (CWWTP) from its existing location on the northern boundary of Cambridge to a new location north or north-east of the city, has followed a series of detailed appraisal steps to identify sites for the new location. The process is now progressing to Stage 4: Final Site Selection in which three site areas are being considered, all in the Cambridge Green Belt.

This study has been prepared to support the Stage 4 site selection process through an examination of the final three site areas and an assessment of each site area in terms of its impact on the openness of the Cambridge Green Belt. The National Planning Policy Framework (NPPF), February 2019, sets out that "*the Government attaches great importance to Green Belts. The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the essential characteristics of Green Belts are their openness and their permanence".*

The study assesses and defines the character and particular qualities of the site areas and the wider landscape in which they are located and the contribution each makes to the performance of Green Belt purposes. The study evaluates the impact of development on the site areas specifically in terms of their performance of Green Belt purposes. It does not consider the wider planning context of the site areas in this evaluation.

1.1 Methodology

The methodology for the study was structured broadly as follows:

- An initial study area for the Green Belt assessment was established by modelling the zone of theoretical visibility (ZTV) for each of the three sites. This was refined through site survey, to take into account the screening effects of vegetation and built development.
- An overview of published Cambridge Green Belt studies since 2002 was carried out.
- A baseline study, informed by published Green Belt studies, existing landscape character assessments, site survey, Ordnance Survey mapping and aerial photography, identified and evaluated the landscape character of the study area[1]. The baseline study was undertaken to gain an understanding of the landscape setting of Cambridge and the Green Belt, focussing on aspects which are relevant to the performance of Green Belt purposes. The baseline study also identified visual receptors potentially affected by development on each of the three sites.
- Each site and its landscape setting was appraised in terms of its performance against the five Green Belt purposes set out in the National Planning Policy Framework (NPPF) and the three Cambridge Green Belt purposes set out in the Cambridge Local Plan and the South Cambridgeshire Local Plan.
- The overall scale of impact resulting from development on each site on Green Belt purposes was evaluated.

[1] The methodology for the baseline study followed the Guidelines for Landscape and Visual Impact Assessment 3rd Edition, Landscape Institute and Institute of Environmental Management and Assessment, 2013

1.2 Green Belt purposes

The NPPF outlines the five purposes of Green Belts in Paragraph 134. These are:

a. To check the unrestricted sprawl of large built-up areas;
b. To prevent neighbouring towns merging into one another;
c. To assist in safeguarding countryside from encroachment;
d. To preserve the setting and special character of historic towns; and
e. To assist in urban regeneration, by encouraging the recycling of derelict and other urban land.

Paragraph 144 states that: *When considering any planning application, local planning authorities should ensure that substantial weight is given to any harm to the Green Belt. 'Very special circumstances' will not exist unless the potential harm to the Green Belt by reason of inappropriateness, and any other harm resulting from the proposal, is clearly outweighed by other considerations.*

The Cambridge Local Plan (2018)[2] highlights three purposes of the Cambridge Green Belt.

These are to:

a. Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre;
b. Maintain and enhance the quality of its setting; and
c. Prevent communities in the environs of Cambridge from merging into one another and with the city.

1.3 Published Green Belt assessments

The recognition of the need for a Green Belt around Cambridge stems from the report *Cambridge Planning Proposals*[3] published in 1950 which described concerns that rapid growth around the city was a threat to the character of the *only true university town* left in England. Paragraph 426 of this report states that *an attempt should be made to keep the population of urban Cambridge to a level that will retain the general advantages of a medium sized town and the special advantages of Cambridge, and that future development should be compact rather than sprawling*.

The boundaries of the Cambridge Green Belt were approved in the Cambridge Green Belt Local Plan, 1992[4]. The plan did not describe the landscape of the Green Belt but included extracts from the Deposit Plan (May 1984) which assesses the importance of the landscape on the northern fringes of the city and its negative and positive features. The plan mentions the importance of Cambridge airport as providing a green wedge of open land which stretches into the city.

[2] Cambridge Local Plan, Cambridge City Council, 2018 ((https://www.cambridge.gov.uk/local-plan-2018)
[3] Cambridge Planning Proposals, Holford and Miles Wright, 1950
[4] Cambridge Green Belt Local Plan, Cambridgeshire County Council, 1992

A series of Green Belt studies have been carried out since the boundaries were approved. Apart from the 2002 study, which considers a wider study area, they do not include the three site areas considered for the CWWTP. The review of the studies below concentrates on the findings relevant to the northern and eastern sectors of the Cambridge Green Belt where the three sites are situated.

Cambridge Green Belt Study 2002

The Cambridge Green Belt Study[5], carried out by Landscape Design Associates in 2002 looked at the contribution the northern and eastern sectors of the Green Belt make to the overall purposes of the Cambridge Green Belt and assessed whether there was scope for urban expansion, through Green Belt releases, without harming Green Belt purposes.

The 2002 study included a landscape assessment, defining distinct landscape character areas. A visual assessment described the approaches and gateways to Cambridge and key views of the city, with particular emphasis on the interrelationship between the city edge and the surrounding landscape. Views along the River Cam corridor towards Cambridge tend to be from ground level, with a countryside foreground and a generally soft urban edge. From the northern rail approach, they are industrial and commercial in character.

The study discussed the pedestrian links between the city and the surrounding countryside, the importance of the Cam corridor as a 'greenfinger', bringing the countryside into the city, and the relationship between the 'inner necklace' villages in the Green Belt and the city. A distinctive feature of Cambridge is its appearance as a densely treed city with a soft, green edge merging into an agricultural landscape.

The report noted that the overriding character of the setting of Cambridge is rural, though with a greater density of settlements in some areas than others, and that it is important that the landscape surrounding Cambridge retains this rural character. The Green Belt plays an important role in the protection of countryside between settlements and maintaining the separation between the 'necklace' villages, including between Histon and Milton, and Horningsea, Fen Ditton and Stow-cum-Quy. Green spaces along the River Cam and east of the city around Teversham are supportive landscapes contributing to the setting and special character of Cambridge.

The study noted how the landscape and views in the eastern part sector had changed in recent years due to development on the Addenbrookes Hospital and airport sites and detracting elements such as the A14, pylons running across the landscape east of Teversham and the hangar buildings at Cambridge Airport. This is most relevant to site area 3, north of the airport. The assessment concluded that there was potential to develop land west of Airport Way and north of Newmarket Road and this could enhance the setting and special character of Cambridge as part of the vision for East Cambridge, but that it could not be developed without causing significant detriment to Green Belt purposes.

Inner Green Belt Boundary Study 2012

The Inner Green Belt Boundary Study[6], by Cambridge City Council and South Cambridgeshire District Council was published in 2012. It was informed by an appraisal by Cambridge City Council in the 2012 of the inner Green Belt boundary areas in the context of the recent land releases. This concluded that areas of the City with level views and where the edge has a mixed foreground can accommodate change more easily than areas with views from higher ground, with an open aspect and/or which are close to the city centre. The study concluded that Sector

[5] Cambridge Green Belt Study, Landscape Design Associates, 2002

[6] Cambridge Inner Green Belt Boundary Study, Cambridge City Council and South Cambridgeshire District Council, 2012

18, between the A14, Cambridge Airport and the River Cam was of either very high importance (the River Cam corridor) or high importance to the Green Belt, of high importance to the separation of Green Belt villages and of high or medium importance to the setting of the city.

Inner Green Belt Boundary Study 2015

The most recent study, the Cambridge Inner Green Belt Study[7] was carried out by LDA Design in 2015 on behalf of South Cambridgeshire District Council to establish where there might be any Green Belt releases. This was required as a consequence of the proposed development required by Regional Planning Guidance 6: East Anglia which included 22,000 homes in the Cambridge Sub-Region.

The study assessed the importance of the landscape south and west of site area 3 in relation to Green Belt purposes but did not assess the landscape near site areas 1 or 2. It found that Sector 18, between Fen Ditton and site area 3, plays an essential role in the separation between Fen Ditton and Cambridge, between Fen Ditton and the A14 and between the A14 and the future allocated edge of Cambridge. It provides a rural setting to the city when viewed from the strategic route. The study concluded that is unlikely that any development within this sector could be accommodated without substantial harm to Green Belt purposes. Sector 19, the area west of site area 3, provides a setting for the north-east of Cambridge and Fen Ditton and the approach to the village and city along the B1047 from the north. It also plays an essential role in the separation between Fen Ditton and Cambridge. The river corridor forms a key green corridor into the heart of the city and is an important route into Cambridge for pedestrians, cyclists and river users. It is unlikely that any development within this sector could be accommodated without substantial harm to Green Belt purposes.

[7] Cambridge Inner Green Belt Study, LDA Design, 2015

2 Site options

The options to be assessed are site areas 1, 2 and 3 (see Figure 2.1 below).

Site area 1

Site area 1 is 2km north-west of the existing WWTP. A new vehicle access off Butt Lane would be required for a development on this site.

The site area is approximately 68ha and is open farmland with mainly arable fields of varying size, defined by ditches and hedges with trees. The western end of the site area includes a small area of woodland. Mere Way, a former Roman road that crosses the area, is a public right of way (PRoW). The landform is mostly level and at 9-10m AOD. The land rises slightly in the south towards Butt Lane. Woodland belts screen the nearby villages of Milton and Impington from the site.

Site area 2

Site area 2 is 2km to the north-west of the existing WWTP. A new vehicle access off Butt Lane would be required for a development on this site.

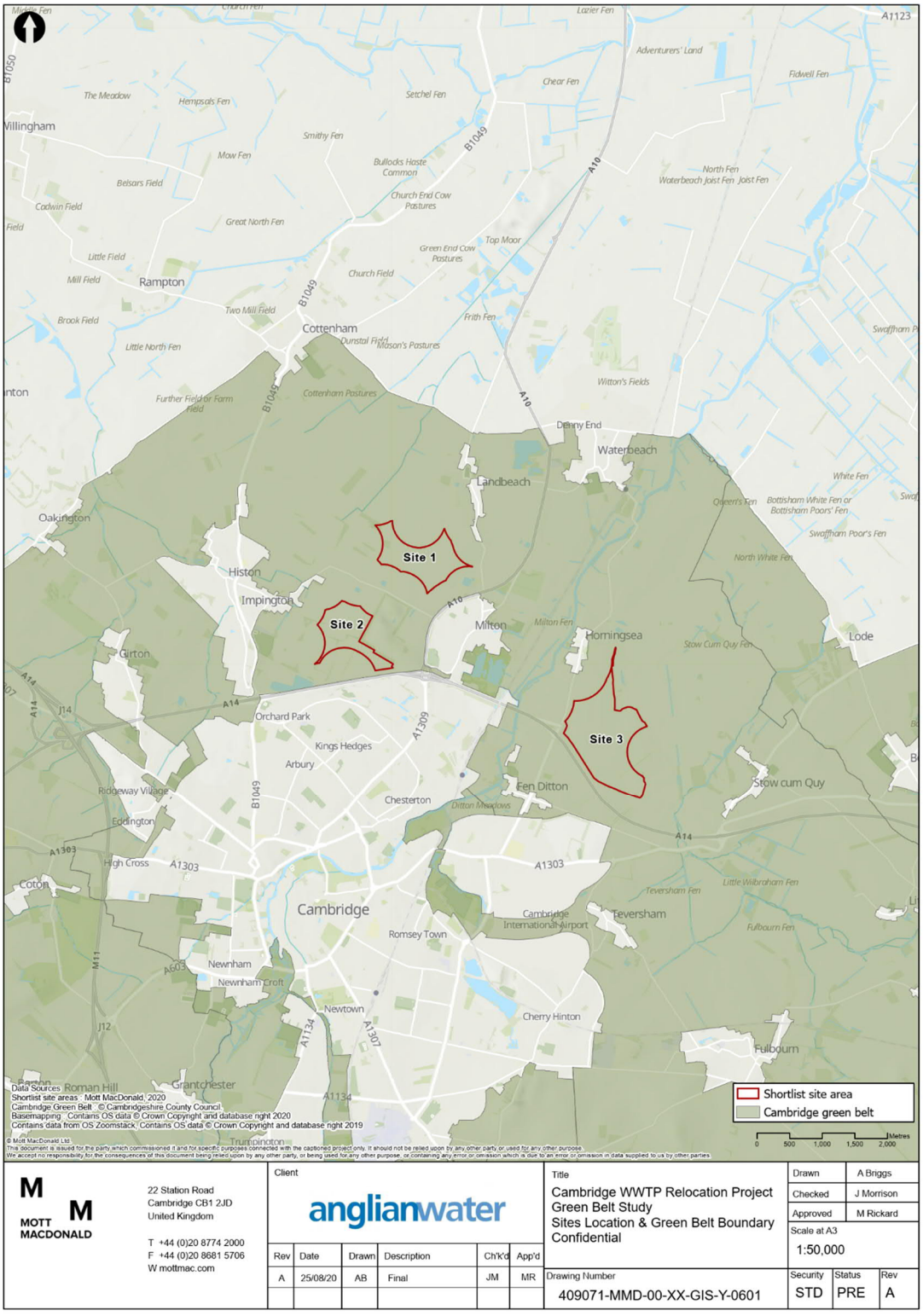
The site area is approximately 53ha in area and is farmland with arable fields of varying sizes defined by ditches, tree belts and hedges with trees. The landscape around the southern half of site area 2 includes woodland belts and consequently has a more wooded, less open character than the northern half. The landform, at 11-12m AOD, rises slightly towards the south. Two small roads cross the site east-west. Mere Way, a former Roman road and PRoW runs parallel to the eastern boundary with the Milton Recycling Centre. The site is 450m from the A14 but is mainly screened from the road, Milton and Impington and the recycling centre by woodland and tree belts.

Site area 3

Site area 3 is located 1km to the east of the existing WWTP. It can be accessed by road from the A14 and Horningsea Road.

The site area is 127ha in area and is open farmland with large arable fields defined by boundary hedges and ditches. The landform, at 5-12m AOD, rises gently towards the west. Low Fen Drove Way, a PRoW, follows the eastern boundary of the site, a dismantled railway crosses the southern end of the site and overhead powerlines cross the northern end. There are otherwise no substantial areas of screening vegetation on the site.

Figure 2.1: CWWTP - site areas



Source: Mott MacDonald

3 Baseline appraisal

3.1 Study Area

The study area for this assessment concentrates on an area where the potential effects of the CWWTP are most likely, within approximately 5km of the sites. This has been established through site survey, desk study and modelling the zone of theoretical visibility of each site.

3.2 Landscape character

The concept of 'openness' in the Green Belt is a broad policy concept and the visual quality of the landscape is not in itself an essential part of the openness for which Green Belt is protected, though in some cases that might be an aspect of the planning judgement involved particularly where setting or merging of urban areas in views are highlighted (see Samuel Smith Old Brewery (Tadcaster) v North Yorkshire County Council [2020] UKSC3).

3.2.1 National Character Assessments

The study area is located on the junction of three National Character Areas[8] (NCA): NCA 88: Bedford and Cambridgeshire Claylands, NCA 46 The Fens and NCA 87: East Anglian Chalk. The study area therefore includes characteristics of all three areas, but site areas 1 and 2 lie in NCA 88 Bedford and Cambridgeshire Claylands and site area 3 lies in NCA 46 The Fens.

NCA 88: Bedford and Cambridgeshire Claylands

The Bedford and Cambridgeshire Claylands NCA is a broad, gently undulating, lowland plateau dissected by shallow river valleys. Soils are lime-rich, loamy and clayey soils on higher land, with better-drained soils in the river valleys. Scattered woodland cover comprises small plantations and secondary woodland, with pollarded willows and poplar along river valleys. A predominantly open, arable landscape of planned and regular fields bounded by open ditches and trimmed, often species-poor hedgerows which contrast with occasional irregular or piecemeal fields. There is a diversity of building materials including brick, render, thatch and stone in small villages, usually nucleated around a church or village green though fen-edge villages are often in a linear form along roads. Major transport routes cross the area, including the A14 road and the East Coast mainline.

NCA 46 The Fens

The Fens NCA is a low-lying, flat landscape with drainage ditches, dykes and rivers that slowly drain towards the Wash, England's largest tidal estuary. Woodland cover is sparse, notably a few small woodland blocks, occasional avenues alongside roads, isolated field trees and shelterbelts of poplar, willow and *leylandii* hedges around farmsteads. The predominant land use is arable – wheat, root crops, bulbs, vegetables and market gardening made possible by actively draining reclaimed land areas. Associated horticultural glasshouses are a significant feature. Open fields, bounded by a network of drains and the distinctive hierarchy of rivers (some embanked), have a strong influence on the geometric/rectilinear landscape pattern. Nucleated settlements and isolated farmsteads are mostly located on slightly elevated 'geological islands'. Otherwise, village are linear form along the main arterial routes. Domestic

[8] https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles#ncas-in-the-east-of-england

architecture mostly dates from after 1750 and comprises a mix of late Georgian-style brick houses and 20th-century bungalows.

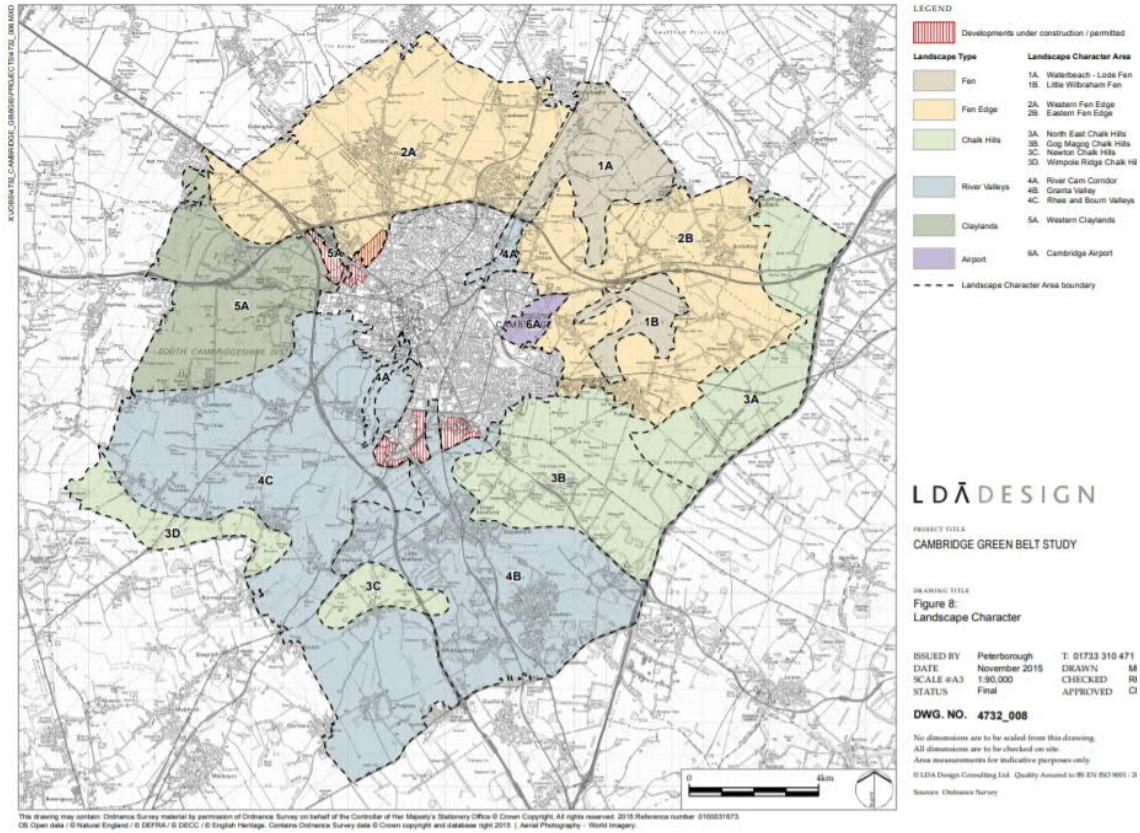
NCA 87: East Anglian Chalk

The area is, a narrow continuation of the chalk ridge that runs across southern England, continuing in the Chilterns and along the eastern edge of The Wash. Soils are nutrient-poor and shallow. The rolling downland is mostly in arable production has sparse tree cover but distinctive beech belts along long, straight roads. The River Rhee and River Granta, flow in gentle river valleys across the NCA. The chalk aquifer is abstracted for water to supply Cambridge and its surroundings and also supports flows of springs and chalk streams. In the east there are pine belts. Remnant chalk grassland, including road verges, supports chalkland flora and vestigial populations of invertebrates, such as great pignut and the chalkhill blue butterfly. Archaeological features include Neolithic long barrows and bronze-age tumuli, which line the route of the prehistoric Icknield Way, and the Anglo-Saxon linear earthworks of Devil's Dyke and Fleam Dyke. Traditional building materials in the villages include brick and clunch. Isolated farmhouses are typically built of yellow, gault clay bricks. Roads and railways are prominent transport features.

3.2.2 Local character assessments

A number of landscape character assessments have been produced for Cambridge and its surroundings. The most recent is included in the Cambridge Inner Green Belt Study, carried out by LDA Design in 2015. This study identified local landscape character areas (LCA) as shown on the figure below.

Figure 3.1: Cambridge Inner Green Belt Study – Landscape Character Areas



Source: Cambridge Inner Green Belt Study, LDA Design, 2015

The CWWTP study area includes parts of two landscape character areas (LCA), described in the Cambridge Inner Green Belt Study. Site areas 1 and 2 lie in the Western Fen Edge LCA. Site area 3 lies in the Eastern Fen Edge LCA. The Waterbeach Lode Fen LCA separates the Fen Edge LCAs. Brief descriptions of the LCA, based on the descriptions in the Cambridge Inner Green Belt Study, are given below. The areas have been extended to include a wider study area to the north than was considered in the Green Belt study. The amended LCA are shown on Drawing 409071-MMD-00-XX-GIS-Y-0602 in Appendix A.

Western Fen Edge LCA

The Western Fen Edge LCA is relatively low lying, with a variety of land uses, including arable and pastoral agriculture, roads, industrial and commercial development and settlement. The A14 has similarly severed Cambridge and the fen edge landscape to the north. The LCA includes more large-scale infrastructure including the Milton Park and Ride and Milton Recycling Centre just off the A10 Milton Road, the former land fill site, the guided busway and small industrial estates and units in Impington and Milton.

The LCA includes the villages of Impington, Histon, Milton and Landbeach. These, apart from Landbeach, expanded substantially in the 20th and 21st centuries with mainly housing. There is a hospital and large secondary school at Impington and development is ongoing, with the expansion of Waterbeach on the former barracks site. The historic centres of Impington, Histon, Milton and Landbeach are designated as conservation areas but they lack the historic character of the villages in the Eastern Fen Edge LCA which has undergone less change. Otherwise, the villages largely retain a rural setting, with the urban edge meeting farmland in most directions. Land between the villages comprises flat open fields separated by drainage ditches and hedgerows. It becomes more wooded, with tree belts and tree lined field boundaries near to Impington.

Milton Country Park is a valued local outdoor recreational facility and there are a small number of public rights of way in the area. Traffic generated by the larger villages, science parks in Cambridge (south of the LCA), the A14, the Milton Park and Ride and Milton Recycling Centre result in relatively low levels of tranquillity in Histon, Impington and Milton. Away from the main roads, especially around Horningsea and Stow cum Quy, the landscape is more tranquil. According to the CPRE light pollution and dark skies map[9], the area is not generally dark at night. This is due to extensive street lighting in settlements and along roads.

The landscape of the LCA is not designated and there are many detracting features along the A14 corridor. It lacks distinctive features that would contribute to a distinctive sense of place. The villages contain historic cores with conservation area status but overall, they lack a strong historic character and the LCA has a low value. The LCA has a low susceptibility to change due to the type of development proposed owing to the presence of large-scale infrastructure in the area. **The overall sensitivity of the area is low.**

Waterbeach-Lode Fen LCA

The key characteristics of the Waterbeach-Lode Fen LCA stem from the flatness of the low-lying landform and the modifications to the pattern and features of the landscape made over the centuries to convert former wetland into farmland. It is a regular landscape, with straight roads, ditches, shelter belts and field boundaries. The dark brown peat soils support intensive arable agriculture. Lines of willows and poplars mark the course of the River Cam and subsidiary watercourses. Settlement is dispersed and on the higher land, along roads. There are many 'islands' which rise above the fen, ranging between the Isle of Ely, at 20m above the adjacent

[9] Campaign to Protect Rural England: England's Light Pollution and Dark Skies https://www.nightblight.cpre.org.uk/maps/

peat fens, and much smaller features only a metre or two above the surrounding farmland. These islands are often occupied by settlements or farmsteads which, with their associated tree cover, increases their prominence. Most buildings are of brick construction and date from the draining of the land in the 18th and 19th centuries.

There are few views of Cambridge, but the hangars of the airport are visible from the southern end of the LCA. Green links to the city are along the River Cam and through Ditton Meadows. There is an extensive public rights of way network between Horningsea, Stow cum Quy and Lode. This includes the Fen Rivers Way, along the River Cam, and the Harcamlow Way. The LCA is tranquil away from the A14 and, according to the CPRE light pollution and dark skies map, is relatively dark at night. Skyglow above Cambridge is apparent.

The LCA includes three conservation areas: Baits Bite Lock, Waterbeach and Horningsea Conservation Areas. Stow cum Quy Fen is a SSSI. The LCA includes the majority of the National Trust's Wicken Fen Vision area. The 100 year vision aims to restore habitats and create a landscape-scale space for people and wildlife between Cambridge and the Wicken Fen Nature Reserve. The vision is a strategic element of green infrastructure in the adopted development plans for both South Cambridgeshire District Council (adopted 2018) and East Cambridgeshire District Council (adopted 2015).

The landscape is important for recreation and wildlife, providing a continuous green link between Cambridge and the countryside. It has distinctive elements and features that contribute to its moderately strong sense of place. These factors combine to give the LCA a medium value. The LCA has a medium susceptibility to change due to the type of development proposed owing to the absence of large-scale infrastructure in the area. **The overall sensitivity of the area is medium.**

Eastern Fen Edge LCA

The Eastern Fen Edge is a transitional landscape between the Fenlands LCA to the west and the Chalklands LCA to the south and east. The area is relatively low lying, appearing generally flat, and containing a variety of land uses, including arable and pastoral farmland, roads and settlement. The fen edge has traditionally been an important location for settlement, being above the fen floodplain but close to the lower lying farmland along rivers and watercourses. The A14 has severed the link between Cambridge and the landscape to the north. Fen edge villages such as Swaffham Prior and Bottisham were in the past wealthy and contain fine medieval churches. Building materials traditionally used in the fen edge villages include gault brick, render, and thatch. There are distant views of the centre of Cambridge from higher ground to the east and south and views of the larger structures at Cambridge Airport from around Teversham.

The villages in the study area, including Horningsea, Lode, Stow cum Quy, Landbeach and Bottisham, largely retain a rural setting, with the urban edge meeting farmland in most directions. Land between the villages comprises flat open fields separated by drainage ditches and hedgerows Fen Ditton is on the southern side of the A14 and there is continuous urban development along Ditton Lane between Cambridge and Fen Ditton, but overall there is a clear landscape separation between the village and the city provided by the grazing land south of the village and Ditton Meadows, on the River Cam. Around the villages, the landscape is more wooded.

There is a good public rights of way network in the LCA, including the Harcamlow Way Trail and a registered park and garden at the National Trust's Anglesey Abbey. The centres of Horningsea, Waterbeach and Fen Ditton are conservation areas. The area is relatively tranquil, especially away from the A14, which generates traffic and noise along its corridor. Traffic

generated by these elements and by the science parks south of the A14 and the A14 junctions result in relatively low levels of tranquillity in Histon, Impington, Milton and Waterbeach and the landscape along the A14 and A10. Away from the main roads, especially around Horningsea and Stow cum Quy, the landscape is more tranquil. The villages are lit at night, but the minor roads in rural areas are not lit and consequently the landscape is relatively dark at night. Skyglow above Cambridge is apparent. There are few detractors from the rural character of the landscape.

The landscape of the LCA is not designated, but the presence of the registered park and garden, conservation areas and many buildings of historic interest in the villages and the opportunities for recreation in the countryside give the LCA a medium value. The LCA has a medium susceptibility to change due to the type of development proposed owing to the lack of large-scale infrastructure in the area. **The overall sensitivity of the area is medium.**

3.3 Statutory designations

3.3.1 Conservation areas

Conservation areas closest to the three sites are:

- Fen Ditton;
- Baits Bite Lock;
- Milton;
- Waterbeach;
- Landbeach;
- Histon;
- Impington;
- Tevershsam; and
- Horningsea.

3.3.2 Registered Parks and Gardens

The gardens of Anglesey Abbey and Swaffham Prior House are on the Historic England's register of Historic Parks and Gardens of special historic interest.

3.3.3 Sites of Special Scientific Interest (SSSI)

Sites of Special Scientific Interest (SSSI) in the study area include:

- Stow cum Quy SSSI;
- Wilbraham Fen SSSI; and
- Cam Washes SSSI.

3.4 Visual assessment

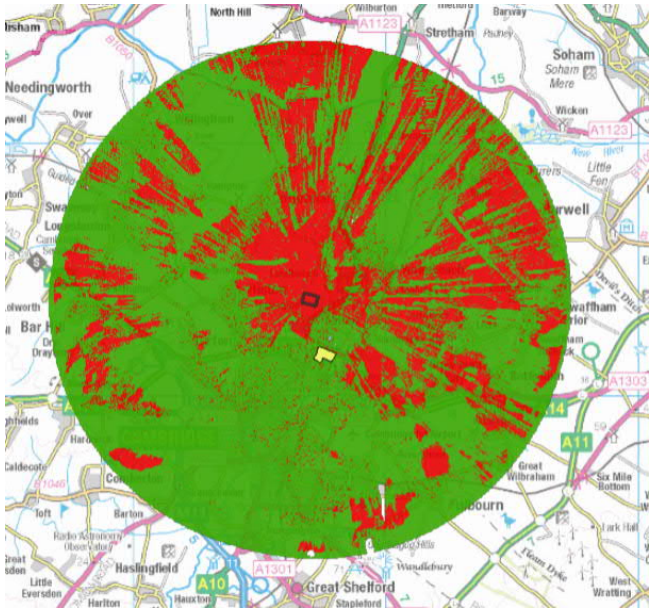
To inform the Green Belt assessment, the ZTV for each of the sites was modelled to help determine the visibility of the scheme from ground level and identify visual receptors potentially affected by the proposals. The extracts from the plans below are inserted for easy comparison.

The ZTVs were modelled assuming the highest structures on the new WWTP would be the digestors, at 26m high. The viewer height was assumed to be 1.6m high. An indicative WWTP site footprint was developed for each site area, however, the layout of the WWTP within the footprint will not be developed until later design stages.

The ZTVs were created using a digital surface model from LiDar data that included the heights of surface features such as buildings and vegetation. They illustrate the relatively minor role of the local topography in screening the proposed works.

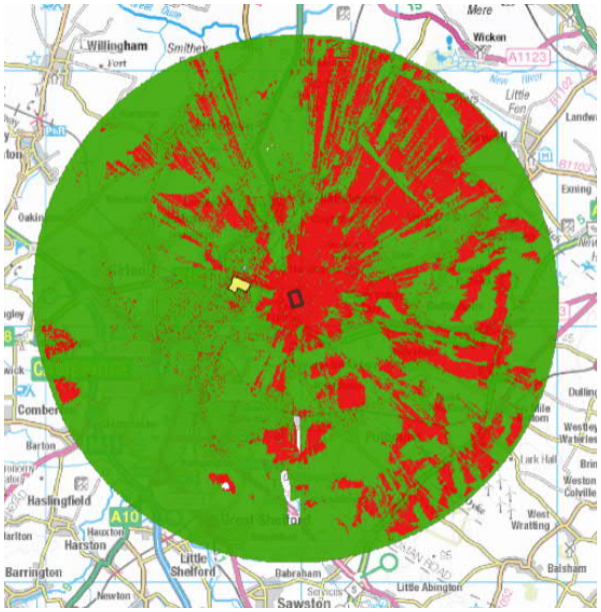
It should be noted that ZTV mapping is a tool for indicating the theoretical extent of the visual influence of a development and that it tends to overestimate the visibility of a development because the data used does not fully register the screening effects of existing vegetation or built development. In addition, it does not reflect how visual impacts diminish with distance from a development, so that the further a receptor is from the new structure, the less prominent it is in the view. The mapping shows that the scheme would be most visible to the north, west and east of the three site area options, but largely screened from the city of Cambridge and the south by the A14 and built development.

Figure 3.2: ZTV for Site areas 1, 2 and 3 (modelled on a 10km radius, measured from the centre of the site areas)



Site area 1

Site area 2



Site area 3

Source: Mott MacDonald

The areas shaded red on the plans above show the locations where the scheme would be theoretically visible. The areas in green show where the scheme would probably not be visible. Where the red shaded area is continuous, views would be more clear but where it starts to fragment, views would be filtered or wholly/partially screened by intervening vegetation and buildings. From interpretation of the ZTVs, site survey and use of mapping and aerial photography, it was determined that visual receptors within 1km of the site options would potentially have clear, filtered or partially screened views of a development on the site areas. Views from more distant locations would be mainly screened, although the taller elements could be visible above trees or buildings. Comparison of the ZTVs shows that development on site area 2 would be the least visible from the Green Belt. Site areas 1 and 3 would be more clearly visible and over a wider area of the Green Belt, especially to the north and east.

The below tables list potential sensitive visual receptors, their location and distance from the three option sites. Drawing 409071-MMD-00-XX-GIS-Y-0603 in Appendix A shows the location of the potential visual receptors within 1km of the study area.

Site area 1 would be visible in filtered views from Landbeach, isolated properties in the landscape near the site and a PRoW. Stakeholders highlighted the importance of preserving rural views from Milton Cemetery Public during consultation on the CWWTP site selection.

Site area 2 would be visible in filtered views from properties on the eastern boundary of Impington, isolated properties near the site and a PRoW. The Histon & Impington Village Design Guide[10] identifies an important key view into the countryside from St Andrew's Church, Impington.

Site area 3 would be visible in clear views from stretches of Low Fen Drove Way and clear and filtered views from Biggin Abbey Cottages, the villages of Horningsea, Fen Ditton and Stow cum Quy and several PRoW.

Table 3.1: Sensitive visual receptors within 1km of site 1

Receptor	Sensitivity	Minimum distance
Residents of and recreational visitors to Rectory Farm (A10) looking west	High	0.4km
Residents in properties on Butt Lane looking north	High	0.4km
Residents in properties on Milton Road looking north	High	0.7km
Residents on High Street and Midway, Landbeach looking south-west	High	0.5km
Residents on Akeman Street, Landbeach looking south-east	High	0.9km
Residents at Oldfield Farm Barn looking south-east	High	0.9km
Residents at Bedlam Farm looking east	High	0.8km
Visitors to Milton Cemetery looking west	Medium	0.5km
Users of Byway 162/3 (Mere Way) and permissive paths 31/PF 01 and 02 looking east	Medium	0.1km
Users of A10 Ely Road looking west	Medium	0.3km

Table 3.2: Sensitive visual receptors within 1km of site area 2

Receptor	Sensitivity	Minimum distance
Residents in properties on Milton Road looking south	High	0.4km
Residents adjacent to Fieldstead Farm looking east	High	0.5km
Residents of the Blackwell Caravan Site looking north	High	0.4km
Residents of St Andrew's Way, Impington looking east	High	0.7km
Residents of St George's Way, Impington looking east	High	0.7km
Residents of Woodcock Close, Impington looking east	High	0.7km
Residents of Percheron Close, Impington looking east	High	0.7km
Users of Byway 162/3 (Mere Way) looking west	Medium	0km
Users of Bridleway 135/6 looking north	Medium	0.7km

[10] The Histon & Impington Village Design Guide Supplementary Planning Document Consultation Draft, South Cambridgeshire District Council, June 2019

Table 3.2: Sensitive visual receptors within 1km of site area 3

Receptor	Sensitivity	Minimum distance
Residents of High St, Horningsea looking south	High	0.8km
Residents at Biggin Abbey Cottages looking south-east	High	0.8km
Residents of Horningsea Road, Fen Ditton looking south-east	High	0.5km
Residents of High Ditch Road, Fen Ditton looking north	High	0.8km
Residents of the Marleigh Development (under construction) looking north	High	0.9km
Residents in property on Low Fen Drove Way	High	0.4km
Residents of Stow Road in Stow cum Quy looking west	High	0.7km
Users of Footpath 85/5 and Byway 130/3 (Field Lane) looking north-east	Medium	0.8km
Users Byway 85/14 looking west	Medium	0.5km
Users of Footpath 85/8 looking east	Medium	0.7km
Users of Byway 130/1 (Harcamlow Way and Fen Rivers Way) looking south-east	Medium	0.8km
Users of Footpath 130/2 looking east	Medium	0.7km
Users of Footpath 218/2 (Harcamlow Way) and guests at the Quy Mill Hotel looking west	Medium	0.7km

4 Appraisal of options against Green Belt purposes

Table 4.1: Site area 1: appraisal of baseline character and performance against Green Belt purposes

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
Site 1		
To check the unrestricted sprawl of large built-up areas	Site area 1 is located on of a belt of farmland which runs along the northern boundary of Cambridge. This provides a rural setting for the villages north of Cambridge and the northern outskirts of the city. The A14 generally provides a strong boundary to the city, but there is development up to the A14 on both sides between the city and Impington and Milton. Histon and Impington form one continuous settlement. The Milton Park and Ride, Milton Recycling Site and former landfill site adjacent to the A10 and Butt Lane are urban elements between site area 1 and the A14 and, while planting and landscape restoration have reduced their urbanising influence, they effectively extend built development associated with the northern boundary of Cambridge north of the A14. The A10 and associated screen planting provide a clearly defined visual and physical boundary to the western edge of Milton. Landbeach is a small settlement east and north-east of site area 1. Housing lines both sides of the High Street between the A10 and the junction with Waterbeach Road. Development on site area 1 would extend the existing developed area south of Butt Lane into the farmland north of the lane. It would not change the clearly defined boundaries of Milton or Landbeach.	Fair
To prevent neighbouring towns merging into one another	The belt of farmland around the northern edge of Cambridge provides a clear separation between Milton, Landbeach, Histon and Impington, the villages nearest site area 1. Development on site area 1 would not result in the coalescence of these settlements, but it would reduce the landscape gap between Milton and Landbeach.	Good
To assist in safeguarding countryside from encroachment	The immediate surroundings of site area 1 comprise flat, open farmland separated by drainage ditches and sparse hedgerows. However, tree-lined roads and gardens and woodland along the western boundary of Milton and the eastern edge of Impington screen views of these settlements from much of the landscape and consequently existing views are mainly rural in character. The farmland between site area 1 and the A14 is intensively farmed with arable fields, barns, a reservoir and fields covered by greenhouses and other structures required for fruit farming. Rectory Farm has a farm shop, visitor attractions and car parking. This combined with the presence of the Milton Park and Ride, Milton Recycling Site and former landfill site off Butt Lane, contributes to a less rural character in the Green Belt south of site area 1. Development on site area 1 would result in further encroachment on the countryside.	Fair

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
To preserve the setting and special character of historic towns	The landscape north of the A14 provides a landscape setting for the northern boundary of Cambridge and for the villages of Landbeach, Milton and Impington which are partly in conservation area. The existing approaches into Cambridge from the north through Milton and Impington over the A14 are urban in character and do not contribute to the special setting of Cambridge. Development on site area 1 would not detract from the setting and special character of Cambridge but would detract from the setting of Landbeach, which is almost entirely within conservation area. The conservation areas of Milton and Impington are screened from the site by intervening development and vegetation.	Fair
To assist in urban regeneration, by encouraging the recycling of derelict and other urban land	The land around site area 1 is farmland. Development on site area 1 would not assist in urban regeneration by encouraging the recycling of derelict and other urban land.	Poor
Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre	The landscape north of the A14 provides a landscape setting for the northern boundary of Cambridge, but the A14 effectively severs the area from Cambridge. The landscape is attractive but contains few distinctive features or views that contribute to Cambridge as a compact, dynamic city with a thriving historic centre. Development north and south of the A14 has weakened the character of Cambridge as a compact city in this location. Development on site area 1 would be directly related to the regeneration of North East Cambridge – the need for relocation of the WWTP arises from the allocation of the existing Cambridge WWTP site under Policy 15 of the Cambridge Local Plan 2018 for high quality mixed-use development, primarily for employment uses such as B1, B2 and B8, as well as a range of supporting commercial, retail, leisure and residential uses.	Fair
Maintain and enhance the quality of the landscape setting of Cambridge	A feature of Cambridge is the distribution, setting, scale and character of the villages around its outskirts. There is still a strong degree of physical separation between most villages and Cambridge and maintaining this protects and enhances the quality of the landscape setting of Cambridge. The approach to Cambridge, along the A10, is largely rural in character up to the junction with Butt Lane. The site area 1 scheme design would incorporate landscape mitigation including tree belts, hedgerows and areas of planting to partly screen the site and to integrate it into the wider landscape. However, it would not be possible to mitigate all elements, due to their height and scale. Development on site area 1 would add to the existing urbanising elements along the A10 and would not maintain or enhance the quality of the landscape setting of Cambridge.	Good
Prevent communities in the environs of Cambridge from merging into one another and with the city	The farmland around the northern edge of Cambridge provides a clear separation between the communities of Milton, Landbeach, Histon and Impington. The A14 almost wholly severs Cambridge from this landscape and the settlements to the north, although there is a continuous urban development over the A14 between Milton and Impington and Cambridge. Development on site area 1 would not result in the coalescence of these settlements, but it would reduce the landscape gap between Milton and Landbeach.	Good

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
Overall site performance against Green Belt Purpose	The presence of the transport and other large infrastructure north of the A14 has extended built development associated with the northern boundary of Cambridge into the farmed landscape around Site area 1. This development has encroached on the countryside. The landscape around site area 1 however still provides a clear separation between Milton, Landbeach, Histon and Impington and a setting for the villages, which are partly in conservation area. It does not contribute to the historic setting of Cambridge owing to severance caused by the A14 and the urban character of the approaches to the city from the north. Site area 1 is not currently derelict or urban land.	**Fair**
Overall scale of impact	Development on site area 1, in a landscape of low sensitivity, would extend the existing developed area south of Butt Lane into open farmland and consequently reduce the openness of the Green Belt in this location. It would detract from the setting of Landbeach and would narrow the landscape gap between Milton and Landbeach. The development would have little effect on the landscape setting of Cambridge. It would be a prominent feature in the open landscape, visible from properties along High Street, Landbeach, from isolated properties near the site, and from the PRoW along Mere Way.	

Table 4.2: Site area 2: appraisal of baseline character and performance against Green Belt Purposes

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
To check the unrestricted sprawl of large built-up areas	Site area 2 is located close to the A14 in a belt of farmland around the northern boundary of Cambridge. This provides a rural setting for the villages north of Cambridge and the northern outskirts of the city. The Milton Park and Ride site, Milton Recycling Site and former landfill site adjacent to the A10 and Butt Lane are immediately adjacent to the eastern boundary of site area 2. The Evolution Business Park is on its northern boundary. The park and ride site, recycling centre, landfill site and business park are partly screened by perimeter planting but have an urbanising influence on the area. They are clearly separated from the village of Impington by intervening farmland, woodland belts, hedgerows. Development on site area 2 would effectively extend the existing developed area south of Butt Lane west towards Impington.	Poor
To prevent neighbouring towns merging into one another	The belt of farmland around the northern edge of Cambridge provides a clear separation between Milton, Histon and Impington, the villages nearest site area 2. The A14 generally provides a strong boundary to the city, but there is development up to the A14 on both sides between the city and Impington and Milton. Development on site area 2 would not result in the further coalescence of Cambridge and Impington because the existing landscape gap between the two areas would not be affected, however, it would slightly reduce the landscape gap between Milton and Impington.	Good
To assist in safeguarding countryside from encroachment	The immediate surroundings of site area 2 comprise flat, open farmland, separated by drainage ditches and sparse hedgerows near Butt Lane/ Milton Road in the north, and a smaller scale landscape, with woodland belts and copses nearer to the A14 and Impington in the south and west. The tree-lined roads and gardens of Milton and Impington screen views of urban development from much of the landscape, and existing views are mainly rural in character. The farmland north of site area 2 is intensively farmed with fields in arable production and covered by	Fair

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
	greenhouses and structures required for fruit farming. This combined with the presence of the Milton Park and Ride, Milton Recycling Site, former landfill site and Business Park off Butts Lane, contributes to an erosion of the rural character of the area along Butt Lane/Milton Road. Development on site area 2 would result in an expansion of the existing encroachment on the countryside due to the recycling centre, park and ride site and business park.	
To preserve the setting and special character of historic towns	The landscape north of the A14 provides a landscape setting for the northern boundary of Cambridge and for the villages of Landbeach, Milton and Impington which are partly in conservation area. The existing approaches into Cambridge from the north through Milton and Impington over the A14 are mainly urban in character and do not contribute to the special setting of Cambridge. Development on site area 2 would not detract from the setting and special character of the city, but the taller elements on the site could detract from the setting of the Impington Conservation Area around St Andrew's Church. However, trees and woodland between the site and the eastern boundary of Impington would largely screen the development from the conservation area.	Fair
To assist in urban regeneration, by encouraging the recycling of derelict and other urban land	The land around site area 2 is farmland. Development on site area 2 would not assist in urban regeneration by encouraging the recycling of derelict and other urban land.	Poor
Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre	The landscape north of the A14 provides a landscape setting for the northern boundary of Cambridge, but the A14 effectively severs the area from Cambridge. The landscape is attractive but contains few distinctive features or views that contribute to the Cambridge as a dynamic city with a thriving historic centre. Development north and south of the A14 has weakened the character of Cambridge as a compact city in this location. Development on site area 2 would be directly related to the regeneration of NEC – the need for relocation of the WWTP arises from the allocation of the existing Cambridge WWTP site under Policy 15 of the Cambridge Local Plan 2018 for high quality mixed-use development, primarily for employment uses such as B1, B2 and B8, as well as a range of supporting commercial, retail, leisure and residential uses.	Fair
Maintain and enhance the quality of its setting	A feature of Cambridge is the distribution, setting, scale and character of the villages around its outskirts. There is still a strong degree of physical separation between most villages and Cambridge and maintaining this protects and enhances the quality of the landscape setting of Cambridge. The site area 2 scheme design would incorporate landscape mitigation including tree belts, hedgerows and areas of planting to partly screen the site and to integrate it into the wider landscape. However, it would not be possible to mitigate all elements, due to their height and scale. Development on site area 2 would not contribute to the quality of the landscape setting of Cambridge.	Good

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
Prevent communities in the environs of Cambridge from merging into one another and with the city	The farmland around the northern edge of Cambridge provides a clear separation between the communities of Milton, Histon and Impington. The A14 almost wholly severs Cambridge from this landscape and the settlements to the north, although there is a narrow corridor of continuous urban development over the A14 between Milton and Impington and Cambridge. Development on site area 2 would not result in the coalescence of these settlements, but it would reduce the landscape gap between Milton and Impington.	Good
Overall site performance against Green Belt Purpose	The presence of the transport and other large-infrastructure and business units north of the A14 has extended built development into the farmed landscape adjacent to site area 2. This development has encroached on the countryside. The landscape around Site area 2 still provides a clear separation between Milton, Histon and Impington and a setting for the historic parts of the villages. It does not contribute to the historic setting of Cambridge owing to severance caused by the A14 and the urban character of the approaches to the city from the north. Site area 2 is not currently derelict or urban land.	**Fair**
Overall scale of impact	Development on site area 2, in a landscape of existing low sensitivity, would extend the existing developed area south of Butt Lane towards the A14. It would reduce the landscape gap between Milton and Impington. It would further reduce the openness of the Green Belt, though there is existing built development nearby. The development would have little effect on the landscape setting of Cambridge. The taller elements of the development would be visible from Impington and residential properties close to the site, above intervening vegetation. The development would be visible from the PRoW along Mere Way.	

Table 4.3: Site area 3: appraisal of baseline character and performance against Green Belt Purposes

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
To check the unrestricted sprawl of large built-up areas	Site area 3 is located on of a belt of farmland which borders the north-eastern boundary of Cambridge. This provides a rural setting for the villages of Horningsea, Stow cum Quy, Fen Ditton and Lode to the north-east of the city. Development in Cambridge extends up to the city boundary, apart from on Coldham's Common, along the River Cam corridor and on part of the airport. Fen Ditton, south of the A14, is largely separated from Cambridge by farmland and meadows. Horningsea, Stow cum Quy, Fen Ditton and Lode are clearly separated from Cambridge and one another by farmland. The River Cam corridor separates Horningsea and Milton. The A14 passes through farmland in this area. Development on site area 3 would introduce large-scale development into a rural area. It would contribute to the unrestricted sprawl of large built-up areas, due to the absence of built development in this location.	Good

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
To prevent neighbouring towns merging into one another	The belt of farmland and meadows around the north-eastern edge of Cambridge and along the River Cam corridor provides a clear separation between Horningsea, Stow cum Quy, Fen Ditton, Lode and Milton. Fen Ditton is largely separated from Cambridge by farmland and meadow, but a ribbon of housing along Ditton Lane joins the Barwell area of Cambridge with the village. Development on site area 3 would not result in the further coalescence of Cambridge and Fen Ditton but would reduce the extent of farmland separating Cambridge from the villages to the north-east. It would also reduce the landscape gap between Horningsea and Stow cum Quy.	Good
To assist in safeguarding countryside from encroachment	Site area 3 is located on land that is currently open farmland, separated by ditches and low hedgerows. The landscape a surrounding the site area has a rural character with few detractors apart from the A14, which passes the southern site of the site, and an overhead power line which crosses the site. The A14 is visually relatively unobtrusive in the existing low-lying landscape but can be heard over a wide area. Development on site area 3 would result in the encroachment on the countryside due to the introduction of large infrastructure feature into the countryside.	Good
To preserve the setting and special character of historic towns	The farmland on both sides of the A14 provides a landscape setting for the villages of Stow cum Quy, Lode, Horningsea and Fen Ditton (the last two largely in conservation area). The nearby gardens of Anglesey Abbey and Swaffham Prior House are on Historic England's register of Historic Parks and Gardens of Special Historic Interest in England. The villages have not, despite their proximity to Cambridge, experienced the substantial 20th and 21st century expansion that has taken place in nearby Milton. The rural, tree-lined character of Horningsea Road, Stow Road/Church Road and Newmarket Road (east of Stow cum Quy) creates an attractive approach into Cambridge from the north-east. This is diminished however, once travellers reach the A14 roundabout and continue south of the A14. Stourbridge Common, Ditton Meadows and the River Cam corridor are a green link between the centre of the city and the countryside to the north and east. The Cambridge commons are a key feature of the city and its historic setting. Development on site area 3 would be apparent from Stow cum Quy, Lode, Horningsea and Fen Ditton, detracting from the rural setting of the historic villages. It would not detract from the setting of Cambridge.	Good
To assist in urban regeneration, by encouraging the recycling of derelict and other urban land	The land around site area 3 is farmland. Development on site area 3 would not assist in urban regeneration by encouraging the recycling of derelict and other urban land.	Poor

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
Preserve the unique character of Cambridge as a compact, dynamic city with a thriving historic centre	The landscape on both sides of the A14 provides a landscape setting for the north-eastern boundary of Cambridge. A key feature of the historic character of city is the way the countryside is drawn into the centre city along the River Cam corridor. Ditton Meadows and Stourbridge Common and farmland along river provide a continuous green link between the historic centre and the rural landscape to the north-east. The gardens of Anglesey Abbey and the extensive public right of way network along the river and between Stow cum Quy, Lode, Horningsea and Fen Ditton are important recreational resources which contribute to the attractiveness of Cambridge as a place to live and work. The development edge of Cambridge in this area follows the city boundary, maintaining the compactness of the city. Development on site area 3 would effectively introduce large-scale development associated with Cambridge into the rural area on the north-eastern side of the A14, reducing the compactness of the city in this location. It would also diminish the attractiveness of the landscape, which is an important recreational resource for the city of Cambridge.	Good
Maintain and enhance the quality of its setting	A feature of Cambridge is the distribution, setting, scale and character of the villages around its outskirts. There is still a strong degree of physical separation between the majority of villages and Cambridge. Maintaining this protects and enhances the quality of the setting of Cambridge. The landscape immediately around site area 3 is open, arable farmland separated by low hedgerows and ditches. The wider landscape contains several features of historic and ecological importance with the SSSIs at Stow cum Quy Fen and Wilbraham Fen, the tree-lined waterways of Quy Water and the River Cam, the designed landscape at Anglesey Abbey and the many woodland belts and undesignated areas of fenland in the area. The A14 and an overhead power line compromise the few detracting elements in the area. The site area 3 scheme design would incorporate landscape mitigation including tree belts, hedgerows and areas of planting to partly screen the site and to integrate it into the wider landscape. However, it would not be possible to mitigate all elements, due to their height and scale. Development on site area 3 would detract from the quality of the setting of the villages nearby.	Good
Prevent communities in the environs of Cambridge from merging into one another and with the city	The farmland around the north-eastern edge of Cambridge provides a distinct separation between Cambridge and the villages of Stow cum Quy, Lode, Horningsea and Fen Ditton. The villages are clearly separated from each other by intervening farmland. Development on site area 3 would reduce the landscape gap between Horningsea and Stow cum Quy.	Good
Overall site performance against Green Belt Purpose	The area around site area 3 is open farmland with no large-scale development. Cambridge has a clearly defined edge in this area, with development up to, but not beyond, its boundary. The landscape provides a rural setting for the for north-eastern Cambridge and the villages of Horningsea, Stow cum Quy, Fen Ditton and Lode and a clear landscape separation between them. Stourbridge Common, Ditton Meadows and the River Cam corridor are a green link between the centre of the city and the countryside, a key feature of the city's historic character. The landscape around site area 3 provides an important recreational resource for Cambridge. The A14 and an overhead power line, which crosses the site, detract from the rural character of the landscape.	**Good**

Green Belt Purpose	Assessment	Site performance against Green Belt Purpose (Good/Fair/Poor)
Overall scale of impact	Development on site area 3, in a landscape of existing medium sensitivity, would introduce large-scale development into a rural area, contributing to the extension of sprawl of large built-up areas, encroaching on the countryside and reducing the openness of the Green Belt, due to the absence of existing built development nearby. The compactness of the city in this location would be reduced and the landscape gap between Horningsea and Stow cum Quy would be narrowed. The scheme would be clearly visible in the open landscape from the A14 and nearby PRoW and its taller elements would be apparent from Stow cum Quy, Lode, Horningsea and Fen Ditton, detracting from the rural setting of the villages.	

4.1 Summary

Site areas 1 and 2 are situated in landscapes of low sensitivity, with existing transport and other infrastructure. The sites are in an area of Green Belt that makes a fair contribution to the purposes of the Green Belt. They lie close to large villages of some historical interest, but which have been much expanded in recent years. The sites are both currently open, mainly arable farmland, but site area 2 is adjacent to the Milton Recycling Centre and former landfill site and its immediate surroundings are more wooded. Development on both would extend the urban edge of Cambridge northwards and would reduce the landscape gaps between adjacent settlements. The openness of the Green Belt would be reduced by development on both sites, but development on site area 2 would be less harmful to the purposes of the Green Belt due to the proximity of existing built development and existing screening vegetation.

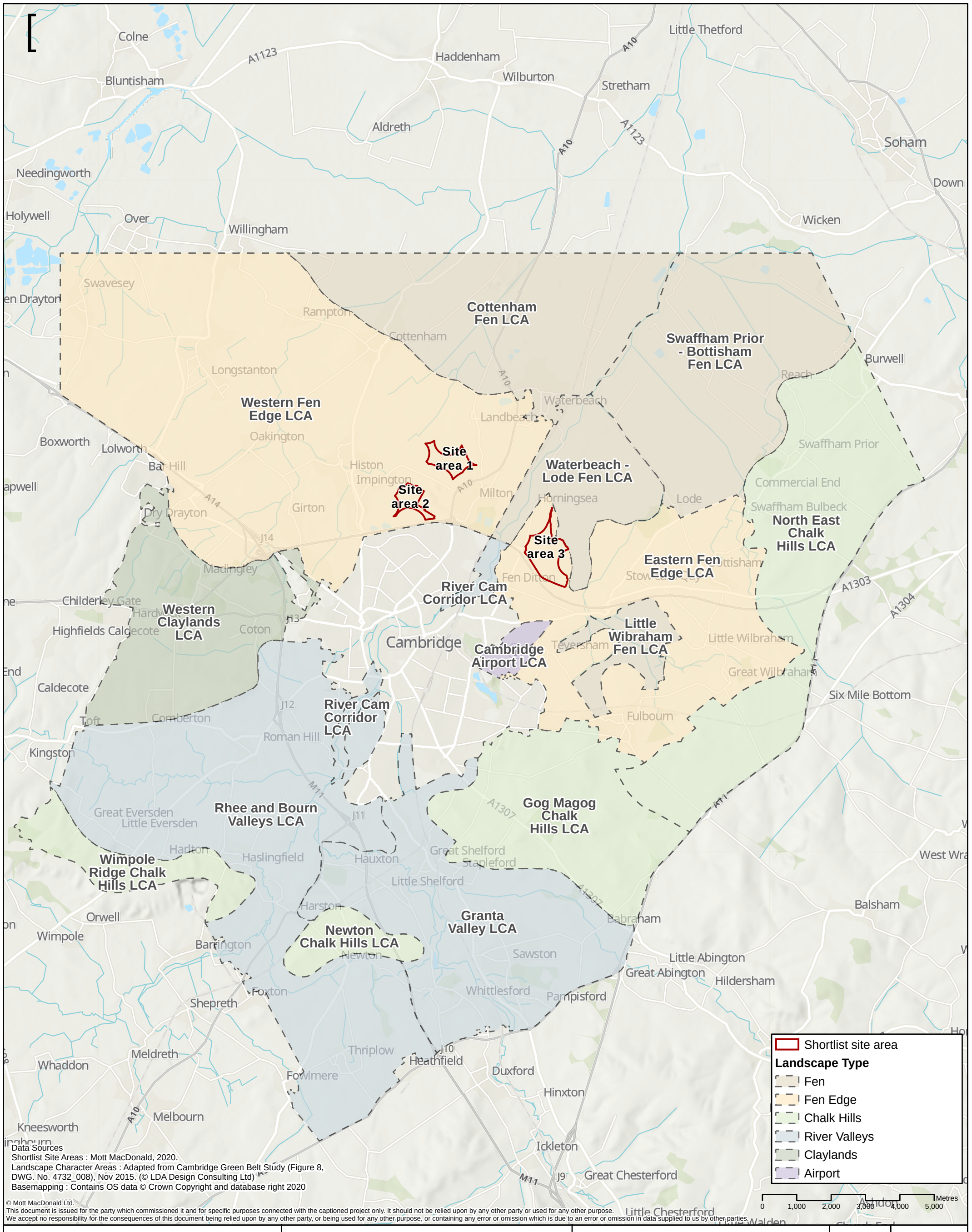
Site area 3 is situated in a landscape of medium sensitivity, close to the A14. The site is in an area of Green Belt that makes a good contribution to the purposes of the Green Belt. The landscape is more open and rural here, with small villages with a high proportion of historic buildings. Site area 3 is close to protected landscapes and habitats and in an area with a higher recreational value than around Site areas 1 and 2. Development on site area 3 would introduce large-scale development into a rural area, contributing to the extension of the urban edge of Cambridge into the countryside. It would reduce the openness of the Green Belt in this location due to the absence of existing built development nearby.

Overall, development on site area 2 would have the least adverse effects on landscape character, visual amenity and on the openness and purposes of the of the Green Belt. Development on site area 1 would have similar, but greater adverse effects on landscape character, visual amenity and on the openness and purposes of the of the Green Belt. Development on site area 3 would have the most adverse effects on landscape character, visual amenity and on the openness and purposes of the Green Belt.

Appendices

A. Figures

Figure A.1: Landscape character areas



Data Sources
Shortlist Site Areas : Mott MacDonald, 2020.
Landscape Character Areas : Adapted from Cambridge Green Belt Study (Figure 8, DWG. No. 4732_008), Nov 2015. (© LDA Design Consulting Ltd)
Basemapping : Contains OS data © Crown Copyright and database right 2020

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Client: anglianwater

Rev	Date	Drawn	Description	Ch'k'd	App'd
A	01/08/20	AB	Final	JM	MR

Title
Cambridge WWTP Relocation Project
Green Belt Study
Landscape Character Areas
Confidential

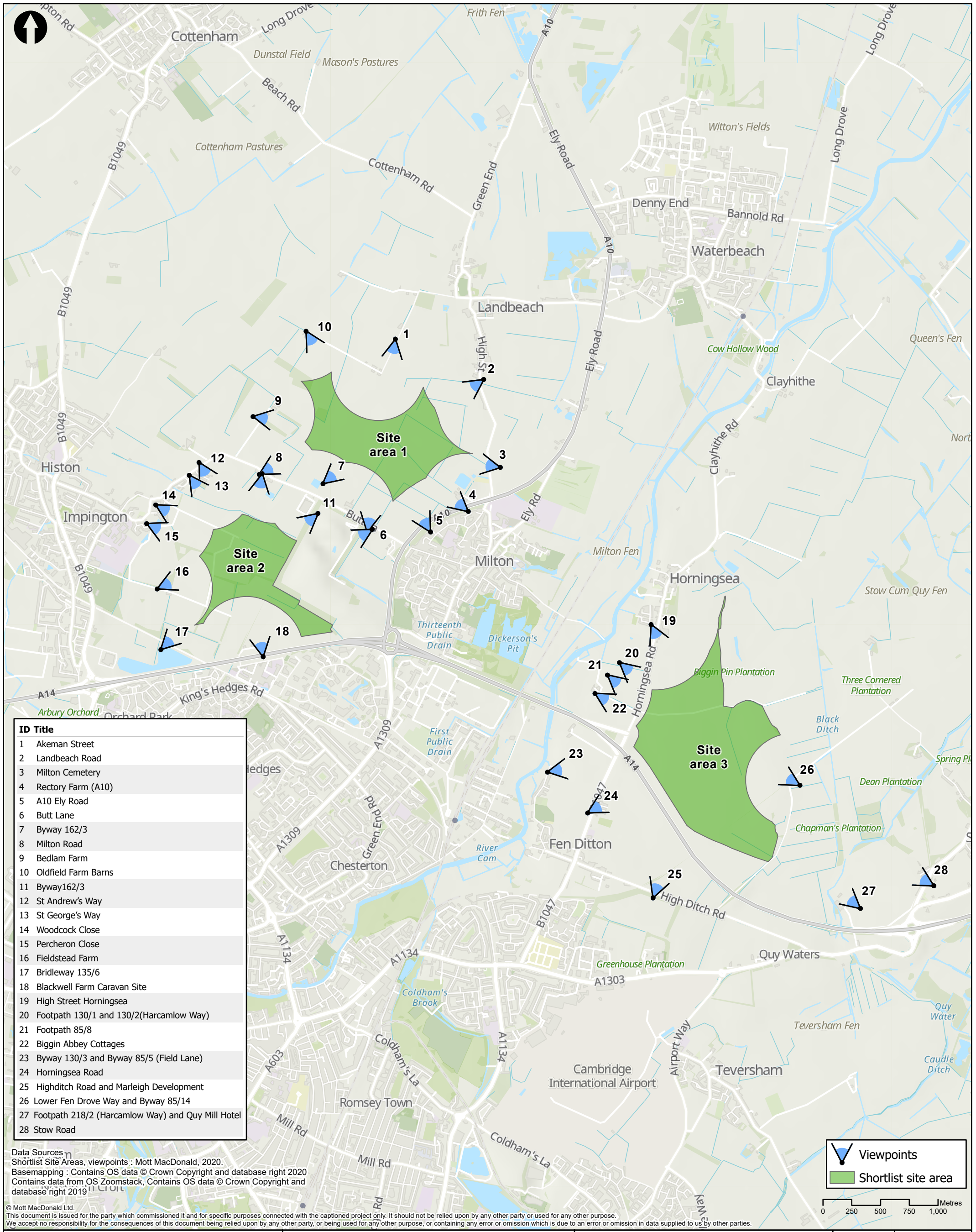
Drawn	A Briggs
Checked	J Morrison
Approved	M Rickard

Scale at A3: 1:100,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0602

Security	Status	Rev
STD	PRE	A

Figure A.2: Visual receptors



ID	Title
1	Akeman Street
2	Landbeach Road
3	Milton Cemetery
4	Rectory Farm (A10)
5	A10 Ely Road
6	Butt Lane
7	Byway 162/3
8	Milton Road
9	Bedlam Farm
10	Oldfield Farm Barns
11	Byway162/3
12	St Andrew's Way
13	St George's Way
14	Woodcock Close
15	Percheron Close
16	Fieldstead Farm
17	Bridleway 135/6
18	Blackwell Farm Caravan Site
19	High Street Horningsea
20	Footpath 130/1 and 130/2(Harcamlow Way)
21	Footpath 85/8
22	Biggin Abbey Cottages
23	Byway 130/3 and Byway 85/5 (Field Lane)
24	Horningsea Road
25	Highditch Road and Marleigh Development
26	Lower Fen Drove Way and Byway 85/14
27	Footpath 218/2 (Harcamlow Way) and Quy Mill Hotel
28	Stow Road

Data Sources
Shortlist Site Areas, viewpoints : Mott MacDonald, 2020.
Basemapping : Contains OS data © Crown Copyright and database right 2020
Contains data from OS Zoomstack, Contains OS data © Crown Copyright and database right 2019

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Rev	Date	Drawn	Description	Ch'k'd	App'd
A	19/08/20	AB	Final	JM	MR

Title
Cambridge WWTP Relocation Project
Green Belt Study
Potential Visual Receptors Within 1km
Confidential

Drawn	A Briggs
Checked	J Morrison
Approved	M Rickard
Scale at A3	1:30,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0603

Security	Status	Rev
STD	PRE	A

B. Landscape and visual impact assessment criteria

This study includes an assessment of the sensitivity of the landscape and visual receptors to aid understanding of the landscape and visual context of the site areas and their settings.

The sensitivity of the landscape character areas (LCA) was evaluated by considering the existing value of the landscape and its susceptibility to the type of change arising from the proposed development.

The value, susceptibility to change and sensitivity of each LCA was evaluated in accordance with the criteria set out in the tables below.

Table B.1: Landscape value

Value	Criteria for assessing landscape value
High	Designated landscape (such as National Park, AONB). Landscape of high scenic quality with a distinctive combination of features, elements and characteristics, outstanding views and a strong sense of place. A scarce or fragile landscape with cultural, historic or ecological elements which make a major contribution to landscape character. No or very few landscape detractors. Has components which are difficult to replace (such as mature trees). A tranquil landscape in good condition, largely intact, with an unspoilt character.
Medium	Landscape locally designated (such as conservation area, regional park) or locally valued (for its recreational facilities and footpath networks for instance). Some scenic quality and a moderate sense of place. A landscape with some distinctive features, elements and characteristics. Some cultural, historic or ecological elements which contribute to landscape character. Some high use areas, but overall medium tranquillity. Few landscape detractors.
Low	Undesignated landscape, not valued for its scenic quality, with a disparate combination of features, elements and characteristics and a weak sense of place. Mainly common features and few or no cultural, historic or ecological elements that contribute to landscape character. Many landscape detractors. A landscape of low tranquillity.

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

Table B.2: Landscape susceptibility

Susceptibility	Criteria for assessing landscape susceptibility
High	The overall character and the valued landscape characteristics, elements and features have a low ability to tolerate the nature and scale of the change resulting from the proposed development without permanent serious adverse change to the baseline situation.
Medium	The overall character and the valued landscape characteristics, elements and features have a moderate ability to tolerate the nature and scale of the change resulting from the proposed development, with some adverse changes to the baseline situation.
Low	The overall character and the valued landscape characteristics, elements and features have a high ability to tolerate the nature and scale of the change resulting from the proposed development, with limited adverse changes to the baseline situation.

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

Table B.3: Landscape sensitivity

Sensitivity	Criteria for assessing landscape sensitivity
High	Landscape of high national importance, rarity and value with distinctive features/elements with limited ability to accommodate change without incurring substantial loss/gain (i.e. designated areas, registered parks and gardens, country parks and strong sense of place). A high susceptibility to change due to the type of development proposed.
Medium	Landscape of medium value and local or regional recognition of importance, able to accommodate some change (i.e. with features worthy of conservation, some sense of place or value through use of perception). A medium susceptibility to change due to the type of development proposed.
Low	Undesignated landscape of low value, low to medium ability to accommodate change (i.e. non-designated or designated areas of local recognition or areas with little sense of place). A low susceptibility to change due to the type of development proposed.

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

The view value and the susceptibility to change and sensitivity of visual receptors was evaluated in accordance with the criteria set out in the tables below.

Table B.4: View value

View value	Criteria for assessing view value
High	A view in which attractive features are dominant or include attractive focal points and/or skyline features. Visual detractors may be present but are not strongly apparent in the composition of the view. A view in a high quality landscape such as an Area of Outstanding Natural Beauty, designated or identified as of value in a guide book or tourist literature. A view where the composition is a fundamental aspect of the design or function of a heritage asset and is integral to its setting.
Medium	An unremarkable view where neither attractive or discordant elements are dominant or form a clearly apparent part of its composition. A view that is undesignated and undocumented.
Low	A view where discordant or unattractive features are dominant or prevalent and/or where such features are focal points and/or skyline features. These views may contain some attractive features but these are not strongly apparent in the composition of the view. A view that is undesignated and undocumented.

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

Table B.5: Susceptibility to change

Susceptibility	Criteria for assessing visual receptor susceptibility
High	Occupiers of residential properties, users of public rights of way, visitors to places whose attention is focussed on the landscape.
Medium	People working in or travelling through rural areas whose attention is partially on the landscape. People walking or cycling through urban areas whose views are partially focussed on their surroundings. Users of publicly accessible outdoor open space including cemeteries.
Low	People at work, at school and engaging in formal sport. People walking or cycling through urban areas whose attention is focussed on their destination rather than enjoying the scenery they are passing through. People travelling at high speed on roads or railways.

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

Table B.6: Sensitivity of receptors

Receptor	Sensitivity
Occupiers of residential properties, PRoW users, visitors to heritage assets. Views with few detractors, is designated, is within a scenic area or is important to the setting of a heritage asset.	High
People working in or travelling through rural areas, and walking or cycling through urban areas and visiting outdoor publicly accessible open space. Views where neither attractive or discordant elements are dominant and are undesignated and undocumented.	Medium
People at work, at school, engaging in formal sport, commuting in urban areas and travelling at high speed on roads or railways. Views with predominantly discordant or unattractive and are undesignated and undocumented.	Low

Source: Criteria based on guidance in the Guidelines for Landscape and Visual Impact Assessment. 3rd edition (LI and IEMA, 2013)

K. Preliminary transport assessment

MOTT MACDONALD

Preliminary Transport Assessment

Cambridge Waste Water Treatment Plant Relocation

20 October 2020

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Executive summary

Mott MacDonald has been commissioned by Anglian Water to conduct a preliminary transport assessment for three potential sites for the relocation of the existing Cambridge Waste Water Treatment Plant (WWTP).

The existing WWTP, which provides waste water and sludge treatment for the residents and businesses of Cambridge, lies within the area now known as North East Cambridge (NEC) and occupies a significant part of the area designated for regeneration by the recently adopted Cambridge Local Plan and the South Cambridgeshire Local Plan.

To facilitate the regeneration of NEC, the Cambridgeshire and Peterborough Combined Authority (CPCA) with the support of local partners, applied for funding from the Housing Infrastructure Fund (HIF), which is administered by Homes England, to relocate the WWTP.

In March 2019, the Government announced that HIF funding would be granted and, as a result, Anglian Water is currently in the early stages of planning its relocation.

Following initial optioneering and site screening to identify three preferred sites (1, 2 and 3) for relocation of the WWTP, a preliminary assessment has been undertaken of the transport considerations for each of the site options.

This preliminary transport assessment set out the following considerations in relation to Sites 1, 2 and 3:

- The potential access requirements in terms of location and likely dimensions
- Details of any goods vehicle restrictions which might impact on site operations
- Details of off-site junctions where an impact might be expected and where the authorities might seek mitigation in the event of any of the sites being granted planning approval
- Details of the transport proposals being promoted for the area including those associated with development and those by the public bodies and how these might impact on / interact with the different relocation proposals.

Based upon these initial findings, and a preliminary review of existing highway infrastructure and constraints, the below site recommendations were made.

For Site 3, access options are constrained as both of the two potential routes would have significant issues to overcome to provide access for the predicted traffic levels associated with the proposed site. The access route via High Ditch Road (designated as HDR-01 and shown in Appendix A.6) would need significant highway improvement to accommodate the safe movement of predicted HGVs and would also require the removal of existing 18T weight restrictions so that HGVs can access/egress the site via Low Fen Drove Way. Furthermore, the alternative access route, designated as HSR-01 (Appendix A.7), which routes along Horningsea Road via Junction 34 of the A14 (Fen Ditton) was found to also have 18T weight restrictions and currently only caters for movements to and from the west.

For both sites 1 and 2, the recommended point of access is from Butt Lane (see drawings BTL-01 for Site 1 and BTL-06 for Site 2, in Appendix A.2 & A.3).

Analysis of the Butt Lane/ Park and Ride/ A10 junction indicates that, during the PM peak, the junction is likely to operate at capacity without the WWTP included and so some improvements may be sought as part of any approvals process should access be provided from Butt Lane.

The initial analytical work set out in the Preliminary Transport Assessment used existing available survey data (for Site 1 and 2 this was available via the Waterbeach New Town Transport Assessment and was collected between 2014 and 2016, and for Site 3 via the Wing (Newmarket Road) development Transport Assessment collected in 2013). For any future assessment work, including any formal planning submissions, new surveys will be required as the County Council typically requires surveys to be no older than three years old[1].

As well as surveying the existing WWTP site to understand the route that vehicles take to get to the site and the existing levels of trip generation (probably using Automatic Number Plate Recognition (ANPR) techniques), the following traffic surveys are likely to be needed on the local and strategic network:

a. For sites 1 and 2
    i. Landbeach Road/A10,
    ii. Butt Lane/ A10,
    iii. Butt Lane/ Park and Ride Link Road,
    iv. Park and Ride/ A10 junction,
    v. A14 Junction 33,
    vi. Mere Way/ Butt Lane,
b. For Site 3[2]
    i. A14 Junction 33
    ii. A14 Junction 34,
    iii. Horningsea Road/Low Fen Drove Way,
    iv. A14 Junction 35,
    v. A1303/High Ditch Road.

The survey data required for the above locations would include:

- Manual Classified Count surveys for each of the junctions on two weekdays covering the 3-hour peak periods.
- Automatic Traffic Counts for a two-week period at the location of the site access and potentially on the A10 to show day-to-day variations in traffic flow across a representative period.

The scope of analysis needed for the Transport Assessment for the new WWTP site would be dependent on the scale of traffic movements expected to be generated by the proposed development. However, regardless of this, the Transport Assessment would be expected to have the following structure:

- **Policy Review** – this section would provide a summary of the relevant and emerging planning policy at a national and local level that relate to the proposed site and surrounding transport network;
- **Baseline Transport Conditions** – this section would provide an audit of the existing transport conditions in the area surrounding the development including highway conditions, public transport availability and personal injury collision analysis;
- **Development Proposals** - outlines the details of the proposed development;

[1] Cambridgeshire County Council Transport Assessment Guidance: https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Transport%20Assessment%20Guidelines%20Sept%202019%20Publication%20Version.pdf

[2] Depending on the access location chosen

Development Trip Generation, Distribution and Assignment - this section would detail the trip generation for the proposed site through interpretation of the existing site surveys and re-distribute these trips on the network based on the results of the ANPR survey. Should the proposed site trips be expected to expand or result in additional trips on the network beyond those at the existing site, the trip generation would be appropriately factored up to reflect the trip increase;

- **Junction Capacity Modelling and Impact Assessment** – would present the results of the junction modelling assessment with and without the proposed development for the future year. This would assess the impact of the development on the highway network and determine whether this is 'severe' in accordance with the requirements of the National Planning Policy Framework and therefore additional mitigation measures are needed;
- **Mitigation Measures -** identifies suitable measures to help mitigate the transport impacts of the development should the impact assessment demonstrate that such measures are needed; and
- **Summary and Conclusions** - this would draw together the findings of the TA.

It is anticipated that, given the complexities of the construction works needed for the site, that a Construction Management Plan would need to be submitted as an outline at the development consent application stage, with a final version secured through planning obligation or condition.

It is also anticipated that a Travel Plan would be needed to demonstrate how workers would be encouraged to travel to the site by sustainable modes.

We would recommend early engagement with Cambridgeshire County Council and Highways England to make them aware of the preferred site/s and site access; and suggest frequent pre-application scoping discussions as the development progresses, including the preparation of a Transport Assessment Scoping Note to agree the assessment methodology in advance of developing the Transport Assessment.

1 Introduction/Overview

Mott MacDonald has been commissioned by Anglian Water to conduct a preliminary transport assessment for three potential sites for the relocation of the existing Cambridge Waste Water Treatment Plant (WWTP)

1.1 Background

1.1.1 The two local planning authorities, Cambridge City Council and South Cambridgeshire District Council, are promoting the regeneration of the area previously known as the Cambridge Northern Fringe East (CNFE). Development of the area, now known as North East Cambridge (NEC), is supported by planning policy in the recently adopted Cambridge Local Plan and the South Cambridgeshire Local Plan and subject to an emerging Area Action Plan.

1.1.2 The existing Cambridge Waste Water Treatment Plant (WWTP), which provides waste water and sludge treatment for the residents and businesses of Cambridge, as well as a number of surrounding villages, lies within the NEC site and occupies a significant part of the area designated for regeneration.

1.1.3 To facilitate the regeneration of NEC, the Cambridgeshire and Peterborough Combined Authority (CPCA) with the support of local partners, applied for the funding from the Housing Infrastructure Fund (HIF), which is administered by Homes England, to relocate Cambridge WWTP which is owned and operated by Anglian Water Services Limited (Anglian Water).

1.1.4 The government announced in March 2019 that funding would be granted for the relocation of Cambridge WWTP and, as a result, Anglian Water is currently in the early stages of planning its relocation.

1.1.5 Following initial optioneering and site screening to identify the three preferred sites (1, 2 and 3) for relocation of the WWTP, a preliminary assessment is needed to provide a high-level overview of the transport considerations for each of the site options.

1.1.6 This preliminary transport assessment includes consideration of the following in relation to Sites 1, 2 and 3:

- Estimated vehicle movements during construction and operation
- The potential access requirements in terms of location and likely dimensions
- Details of any goods vehicle restrictions which might impact on site operations
- Details of off-site junctions where an impact might be expected and where the authorities might seek mitigation in the event of any of the sites being granted approval for development consent
- Details of the transport proposals being promoted for the area including those associated with development and those by the public bodies and how these might impact on / interact with proposals.

1.2 Existing site

1.2.1 The existing Cambridge Waste Water Treatment Plant (WWTP) is located just south of the A14 within the administrative boundary of Cambridge City (see Figure 1.1).

1.2.2 To the immediate north lies the A14, a strategic stretch of dual carriageway with an east to west function running from the east coast of England at Felixstowe, through Ipswich and Bury St Edmunds, and past Cambridge before joining the M6 towards Birmingham. The A14 also provides key interchanges with other routes on the strategic network such as the M1, A1(M) the A11 and the M11.

1.2.3 North west of the existing WWTP, the A14 connects to the A10 via Junction 33 of the A14, a grade separated junction known as the Milton Interchange. Through this interchange, the A10 acts as a key radial route into Cambridge, serving a large number of settlements between Cambridge and King's Lynn, including Ely, Milton, Waterbeach and Landbeach.

1.2.4 To the immediate east, the WWTP site is bordered by the Fen Line, on which Greater Northern and Greater Anglia run train services from Cambridge and Cambridge North to numerous stations across the wider East of England region including King's Lynn to the north. Further to the east, the WWTP site is also bordered by the River Cam.

1.2.5 To the south of the WWTP lies an area of largely industrial land use as well as Cambridge North train station.

1.2.6 To the immediate west lies the A1309 (Milton Road), a key radial route into Cambridge City Centre.

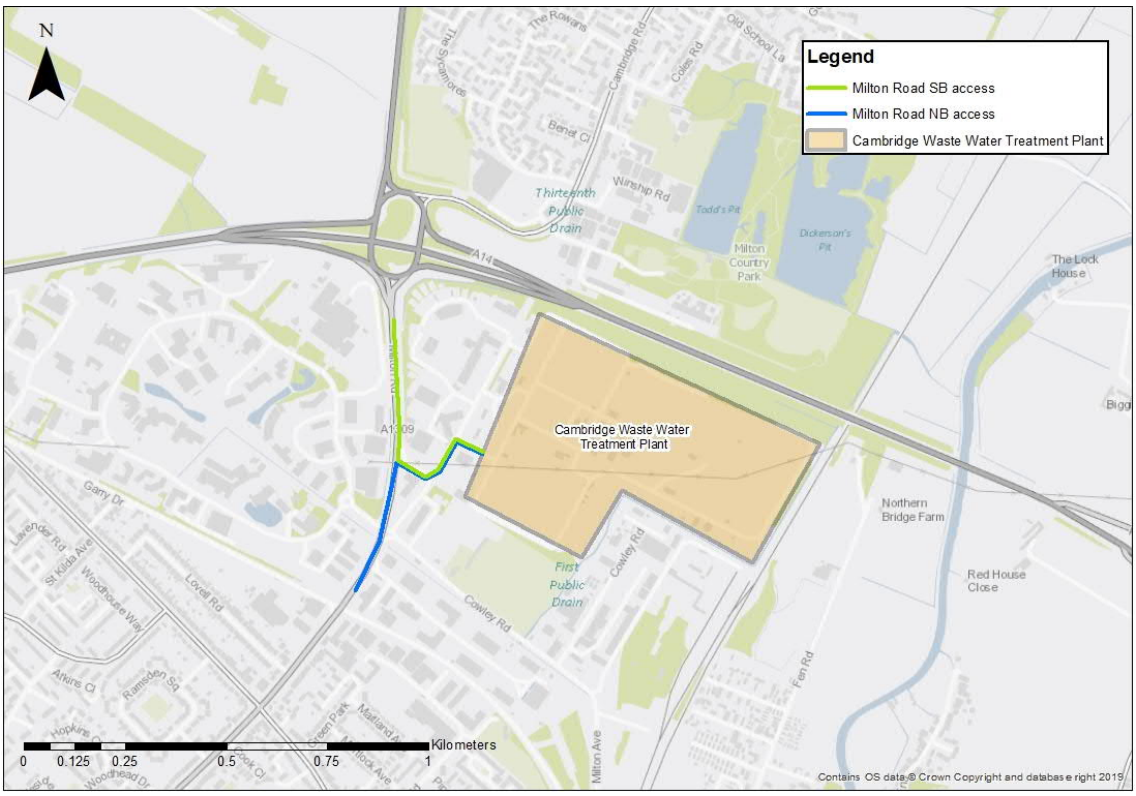
Figure 1.1: Existing WWTP site

Source: Mott MacDonald

1.3 Existing site access

1.3.1 The existing WWTP site can be accessed from Cowley Road, which connects to Milton Road via a signalised junction approximately 400m to the south of Junction 33 of the A14. Currently at this junction, there is dedicated slip lane access for southbound traffic, allowing largely unopposed movement into the site. For northbound traffic there is a dedicated right-hand turn facility, allowing vehicles to queue at the junction minimising blocking back along Milton Road.

Figure 1.2: Existing site access into the WWTP



Source: Mott MacDonald

1.4 Existing operational site movements

Heavy Good's Vehicles

1.4.1 To better understand Heavy Goods Vehicle (HGV) movements associated with the existing site, monthly import and export data was obtained from Anglian Water to estimate average daily HGV movements. HGV movements include liquid sludge imports, biosolids exports, non-routine tanker movements and septic waste movements.

1.4.2 Flow is presented as an average daily total, and a flat profile has been applied, based on the operational hours of the site (08:00-20:00), to estimate average movements per hour (See Table 1.1).

Table 1.1: Operational HGV movements

Service vehicle	Average daily vehicle movements	Hours of operation	Average hourly vehicle movements
Liquid sludge imports	58	12	4.83
Biosolids exports	10	12	0.83
Non-routine tanker movements	12	12	1
Septic waste movements	50	12	4.17
Total	**130**	12	**10.73**

Source: Anglian Water

1.4.3 Table 1.1 shows that the average daily HGV movements at the existing site equals 130. When these movements are applied using a flat profile across a 12-hour operational period (08:00-20:00), average hourly vehicle movements equate to just over 10 vehicles per hour.

Staff

1.4.4 In addition to HGV movements, further data has also been provided regarding the number of operational staff present at the site throughout the week (See Table 1.2).

Table 1.2: Operational/ Staff movements

Vehicle Type	Number	Frequency
Vans made up of:		
Sludge Technicians	2	Daily
Operations Team	2	Daily
Maintenance Technician	1	Mon-Friday
CHP Technician	1	Mon-Friday
Cars	6	Daily
Chemical Deliveries	3	Per Week
Other Service Vehicles	2	Per Week
Maximum Daily Total	**17**	

Source: Anglian Water

1.4.5 Given the rotational shift patterns of employees working at the existing site, there is potential for a maximum of 17 staff-based trips on any given day. This equates to an additional 34 one-way movements, which again, are likely to be spread out across the 12-hour operational profile of the site.

1.5 Future operational site movements

Heavy Good's Vehicles

1.5.1 Due to a marked increase in the capacity of works, total HGV movements at the proposed site are predicted to differ slightly from the existing site. Although the predicted increase is considered to be minimal in the context of a future Transport Assessment; future operational HGV movements have been provided below in Table 1.2 for reference.

Table 1.3: Future operational HGV movements

Service vehicle	Average daily vehicle movements	Hours of operation	Average hourly vehicle movements
Liquid sludge imports	62	12	5.17
Biosolids exports	10	12	0.84
Non-routine tanker movements	14	12	1.16
Septic waste movements	60	12	5
Total	**146**	12	**12.16**

Source: Anglian Water

At the new site, average daily vehicle movements are estimated to increase to 146, which equates to an average hourly flow of 12 vehicle movements per hour.

Staff

1.5.2 The total number of operations staffs required at the new site is not predicted to change. However, given the limited number of staff movements at the existing site, any associated change to staff movements is likely to be considered negligible in the context of a Transport Assessment.

1.6 Potential site locations

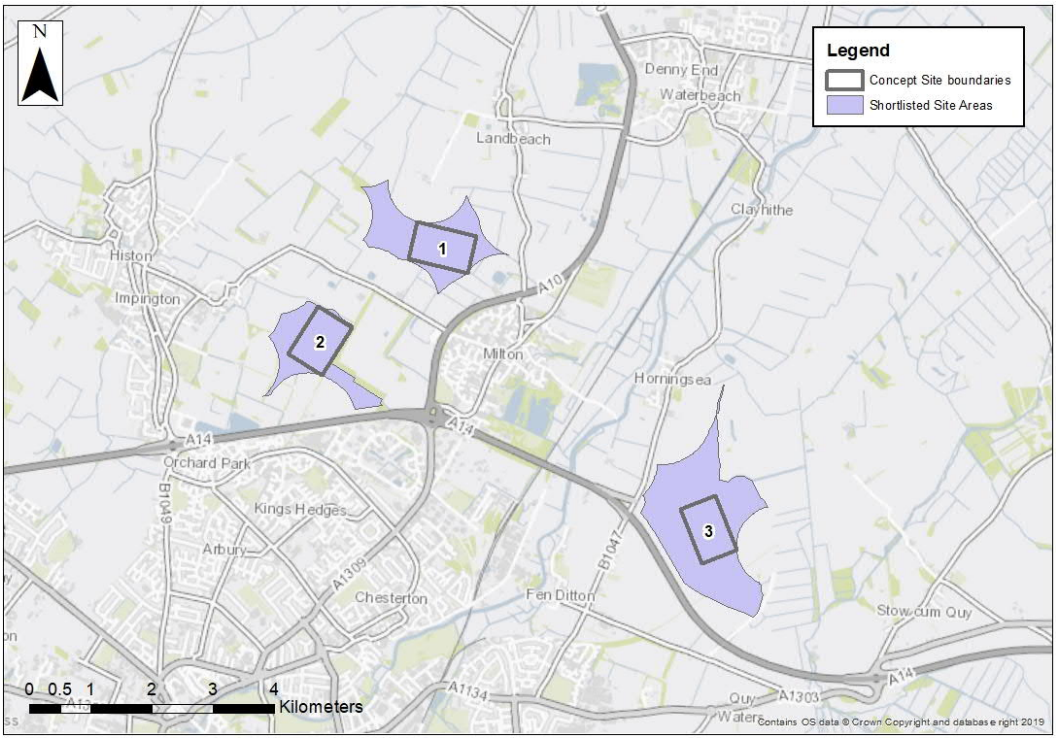
1.6.1 In total, there are three proposed sites for relocation of the Cambridge WWTP. These sites were identified through a site selection study undertaken by Mott MacDonald on behalf of Anglian Water. These sites are as follows:

- Site 1
- Site 2
- Site 3

1.6.2 Site 1 and 2 are located in close proximity to each other, to the west of the A10 (See Figure 1.3). Due to their similar access requirements and close proximities, Site 1 and Site 2 are assessed together.

1.6.3 Site 3 is located further apart, to the east of the A10 (See Figure 1.3) and is therefore assessed separately.

Figure 1.3: Proposed Site Locations: Site 1, 2 and 3



Source: Mott MacDonald

Site 1 and Site 2

1.6.4 The proposed Sites 1 and 2 are located approximately 2km to the north west of the existing WWTP site.

1.6.5 Both Site 1 and 2 are located northwest of the Milton Interchange (Junction 33 of the A14) and to the west of the A10 (See Figure 1.4). As a result of the proposed relocation, operational traffic associated with the WWTP would no longer use the A1309 (Milton Road) and instead would access either of the proposed sites from accesses on Butt Lane, or potentially via Landbeach Road for Site 1 via the A10. Both the proposed relocation sites are within the administrative boundary of South Cambridgeshire District.

1.6.6 Site 1 is located to the north west of Milton village between Butt Lane and the A10, and Site 2 is located to the west of Milton village between Butt Lane and the A14.

1.6.7 To the north of Site 1 lies an area of largely agricultural land use and to the northeast are the villages of Landbeach and Waterbeach. To the east are agricultural fields and the A10. To the south is Butt Lane and to the west of the proposed sites, Butt Lane becomes Milton Road and leads through the villages of Impington and Histon to the A14 junction 32.

1.6.8 To the north of Site 2 is Butt Lane. To the east of Site 2 is Mere Way, the Cambridge Recycling Centre and Milton Park and Ride. To the south of Site 2 lies the A14, the Milton Interchange, Cambridge Science Park and the CNFE/NEC area. To the west, and as noted above, Butt Lane becomes Milton Road and leads through the villages of Impington and Histon to the A14 junction 32.

Figure 1.4: Proposed Site Locations: Site 1 and 2

Source: Mott MacDonald

Site 3

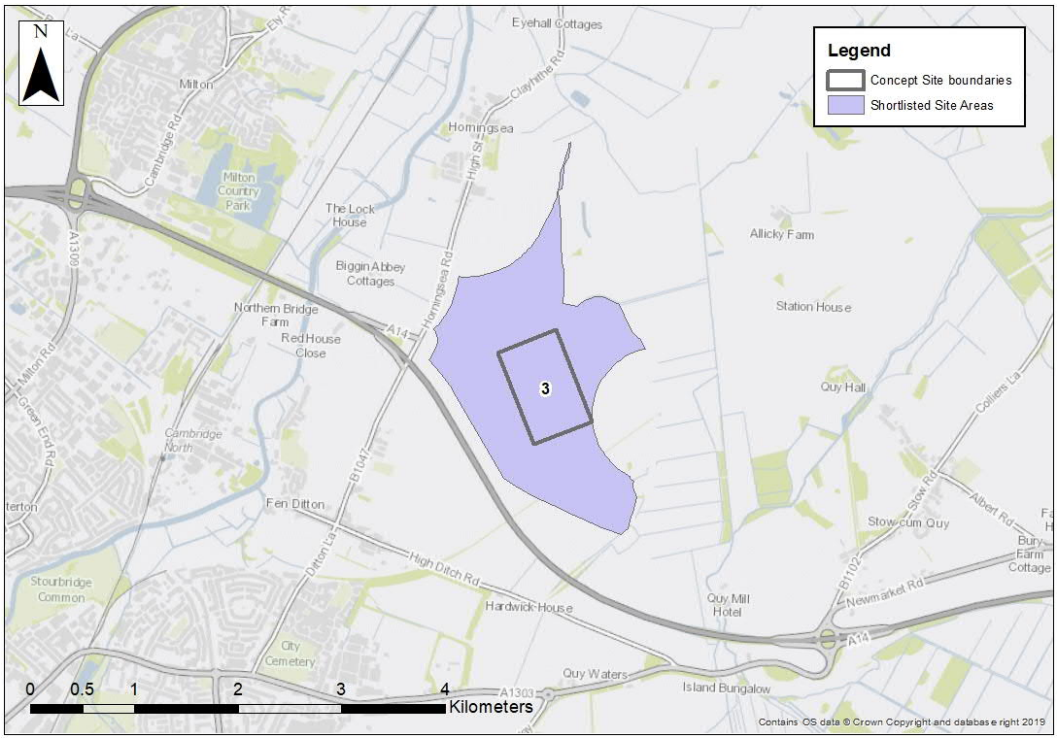
1.6.9 Site 3 is located approximately 2km east of the existing WWTP site, within the administrative boundary of South Cambridgeshire District. Site 3 is located approximately 2.5km due east of the Milton Interchange (Junction 33 of the A14) and east of the B1047 (See Figure 1.5).

1.6.10 As a result of the proposed relocation, operational traffic associated with the WWTP would no longer use the A1309 (Milton Road) and instead would likely access Site 3 from either Horningsea Road, north of Junction 34 of the A14; or via the A1303/Junction 35 of the A14 and route via High Ditch Road and Low Fen Drove Way.

1.6.11 Directly to the north, northeast and east of Site 3 is comprised of largely agricultural land use. Further east (approximately 2km) lies the rural village of Stow-Cum-Quy. Junction 35 of the A14, a key interchange serving the village of Stow cum Quy and the A1303 lies to the southeast. Within Site 3 lies a disused railway line which appears to route northeast from central Cambridge. Whist further south lies the A14, a key strategic link with east to west function routing between Rugby and Ipswich via Huntingdon, Cambridge and Bury St Edmunds.

1.6.12 To the west of Site 3 lies Junction 34 of the A14, a junction intersected by Horningsea Road which provides an on and off slip for A14 traffic traveling from and to the west. Horningsea Road connects Fen Ditton to the south with the village of Horningsea in the north.

Figure 1.5: Proposed Site Location: Site 3



Source: Mott MacDonald

1.7 Local Highway Network, Site 1 and Site 2

1.7.1 The highway network local to Site 1 and Site 2 is detailed below.

Butt Lane/ Milton Road

1.7.2 Butt Lane sits between sites 1 and 2, and is a single carriageway with east to west routing running from the signalised T-junction with the A10, which is approximately 750m north of Junction 33 of the A14. The Butt Lane approach to this junction is restricted to left turn out movements only. Therefore, any vehicles travelling to the A14 from Butt Lane have to turn right into the Butt Lane/ Milton Park and Ride access, which leads to a signalised junction with the A10, allowing vehicles to turn right on to the A10 southbound.

1.7.3 Butt Lane itself is subject to national speed limit at the proposed site locations. A shared use footway/cycleway is present along the south side of Butt Lane, which extends between Impington Village and Milton Park and Ride. The route connects into a footbridge over the A10 to Milton village.

Mere Way

1.7.4 Mere Way (Public Right of Way 162/3) runs north to south and is located to the east of Site 2 and through the approximate centre of Site 1. Mere Way is a predominantly unpaved byway running southwest from the south of Akeman Street, Landbeach, across Milton Road before continuing towards an underpass of the A14. The Byway is currently subject to a Traffic Regulation Order prohibiting vehicles other than cycles utilising this route. There are no formal crossing facilities for Mere Way crossing Butt Lane/ Milton Road. Given the location of Mere

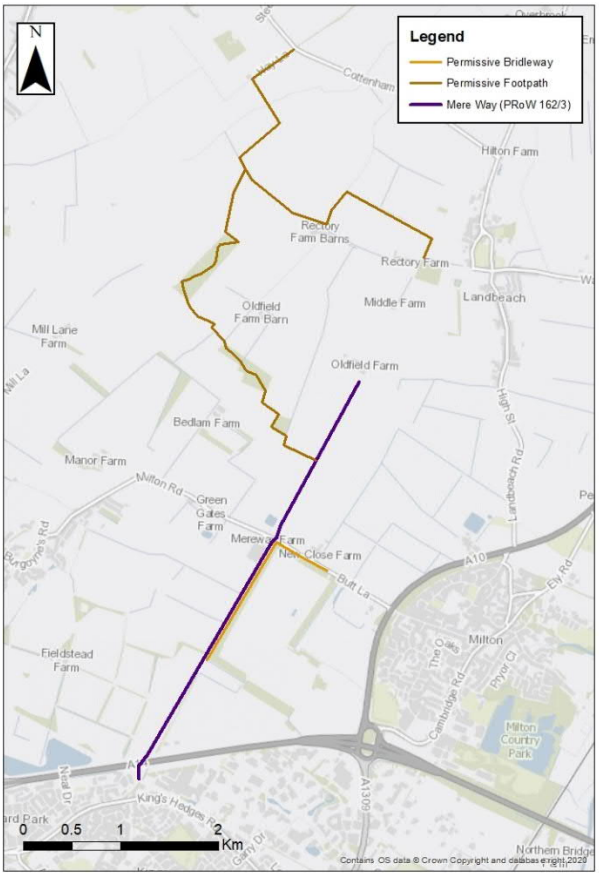
Way this is an important consideration when siting the WWTP as the provision of this facility would likely need to continue going forward.

1.7.5 It is worth noting that there are committed improvements along Mere Way as part of the Phase 1 Waterbeach development. These are discussed in more detail in the sections below. It is anticipated that future improvements to provide a public transport corridor along Mere Way, involving potential widening to allow for a segregated public transport route (or a similar public transport facility, which in the longer term could form part of the wider Cambridge Autonomous Metro (CAM) proposals) and maintenance track, are being considered by the Greater Cambridge Partnership as part of the Science Park to Waterbeach route. This route is identified in the Transport Strategy for Cambridge and South Cambridgeshire as a 'potential cycling improvement for the A10 (N) corridor with provision of a '4m Busway Maintenance track'. This is discussed further in later sections when considering committed and planned infrastructure.

Permissive footways/ bridleways

1.7.6 In addition to the location of Mere Way, Figure 1.6 below shows a permissive footpath located within the site boundary for Site 1 and in close proximity to Site 2. Permissive footpaths and permissive bridleways are not legal rights of way but are routes that the landowner has allowed the public to use through agreement.

Figure 1.6: Permissive footpath and bridleway



Source: Cambridgeshire County Council[3]

[3] my.cambridgeshire.gov.uk

HGV restrictions

1.7.7 To understand the Heavy Goods Vehicle (HGV) restrictions within the local area of the site, Cambridgeshire County Council's HGV Policy and advisory freight map[4] have been reviewed. The advisory freight map indicates there are weight limits in place to the east of the A10, meaning that any HGVs or OGVs needing to access either site would need to do so via the A10 and the relevant access road from Butt Lane or Landbeach Road.

1.7.8 Whilst there are no restrictions in place to prevent HGVs from travelling through Impington and Histon to reach the A14 when travelling to the proposed sites from the west, this may need further discussion with Cambridgeshire County Council (CCC) concerning the appropriate routing of HGVs in this area given constraints on the local network and local amenity issues.

1.8 Local Highway Network, Site 3

1.8.1 The Highway Network specific to Site 3 is detailed below:

Horningsea Road

1.8.2 Horningsea Road is a single carriageway B-road routing north to south between the villages of Horningsea and Fen Ditton and is approximately 5.75m in width. Horningsea Road passes over the A14 via a bridge, which is connected to the A14 to the west via a signalised on-slip and off-slip, Junction 34 of the A14. Vehicles wishing to access Horningsea Road travelling to/ from the east have to either use junction 35 to the east or perform a U-turn at Junction 33, the Milton Interchange.

1.8.3 Horningsea Road (B1047) is subject to national speed limit between Fen Ditton to the south and Horningsea to the north, where the speed limit is reduced to 30mph through these villages. A shared use pedestrian and cycleway approximately 2m wide is present along the west side of Horningsea Road, which extends across the entire stretch between Fen Ditton and Horningsea.

High Ditch Road

1.8.4 High Ditch Road is a single carriageway B-road routing east to west between the village of Fen Ditton and the A1303, approximately 950m west of Junction 35 of the A14 (the Quy Interchange). High Ditch Road is subject to national speed limit for a single-carriageway road (60mph) and varies in width between approximately 4.9m to 5.6m. The road surface appears to have been surface dressed in recent years, with generally intact edgings. The northern side of the carriageway is unbounded by hedges or fencing. High Ditch Road has a weight limit in place of 18 Tonnes, effectively banning most large heavy goods vehicles from using this route.

Low Fen Drove Way

1.8.5 Low Fen Drove Way is a narrow (less than 4m wide) single carriageway road routing northwest to southeast around the proposed site location. At its junction with Horningsea Road to the northwest, Low Fen Drove Way forms a single carriageway of varying width. Approximately 970m east, Low Fen Drove Way becomes a dirt track and a Byway which continues south for the majority of Low Fen Drove Way until its approach to the High Ditch Road junction. Here, Low Fen Drove Way is no longer a dirt track and instead is hard surfaced and joins a single carriageway to form a bridge over the A14. The bridge is arched, with poor forward visibility on approach from both sides. Once across the A14, Low Fen Drove Way forms a forked priority junction with High Ditch Road. This junction has poor edges and surface, and in its current state

[4] https://www.cambridgeshire.gov.uk/residents/travel-roads-and-parking/roads-and-pathways/heavy-or-abnormal-loads-on-the-highway/

is unlikely to support frequent heavy loading by lorries. As Low Fen Drove Way is partly a Byway; it appears to have a national speed limit of 60mph due to an absence of signage to say differently but the formal status of the route would require further checking with the authorities should Site 3 be taken forward for more detailed assessment.

Low Fen Drove Way byway

1.8.6 Low Fen Drove Way byway (Public Right of Way 85/14) runs north to south and is located to the east of Site 3. It follows the existing routing of the unpaved dirt track section of Low Fen Drove Way (See Figure 1.7).

Figure 1.7: Low Fen Drove Way byway: PRoW 85/14

Source: Cambridgeshire County Council

1.8.7 In addition to the Low Fen Drove Way byway (shown above), there are numerous other Public Rights of Way (PRoWs) surrounding Site 3, including an extensive network of footpaths connecting the rural settlements of Stow-cum-Quy, Lode, Waterbeach and Horningsea. To the north, there is a 4.5km long bridleway routing southeast, connecting north Horningsea to Stow-cum-Quy.

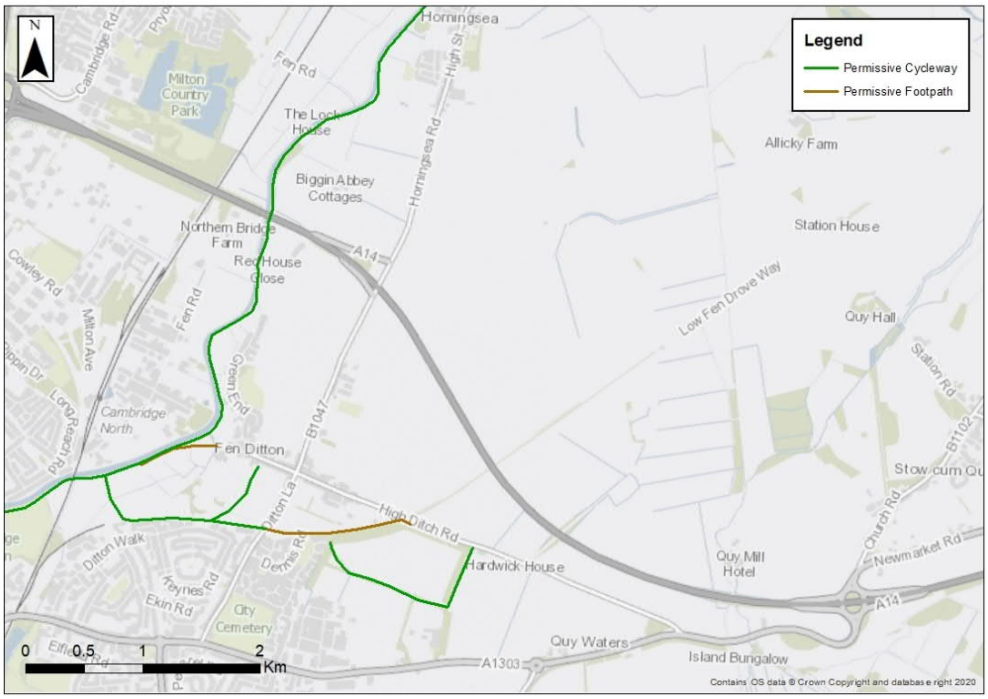
Permissive footpaths/bridleways

1.8.8 Figure 1.8 below shows the permissive footpaths and permissive cycleways located within close proximity to the west of Site 3. Permissive footpaths and permissive cycleways are not legal rights of way but are routes that the landowner has allowed the public to use through agreement.

1.8.9 Alongside the river Cam, there is a permissive cycleway which routes approximately 6km north from Chesterton to Waterbeach. In addition to routing north, this permissive cycleway branches east towards Barnwell, before connecting north with High Ditch Road, approximately 800m east of Fen Ditton. There is also a small 1km section of permissive footpath which serves as a cut through from the north of Barnwell to High Ditch Road (See Figure 1.8).

1.8.10 There are proposals to make improvement to the existing pedestrian and cycle facility alongside Horningsea Road as part of the Horningsea Greenways project.

Figure 1.8: Permissive footpaths and bridleways



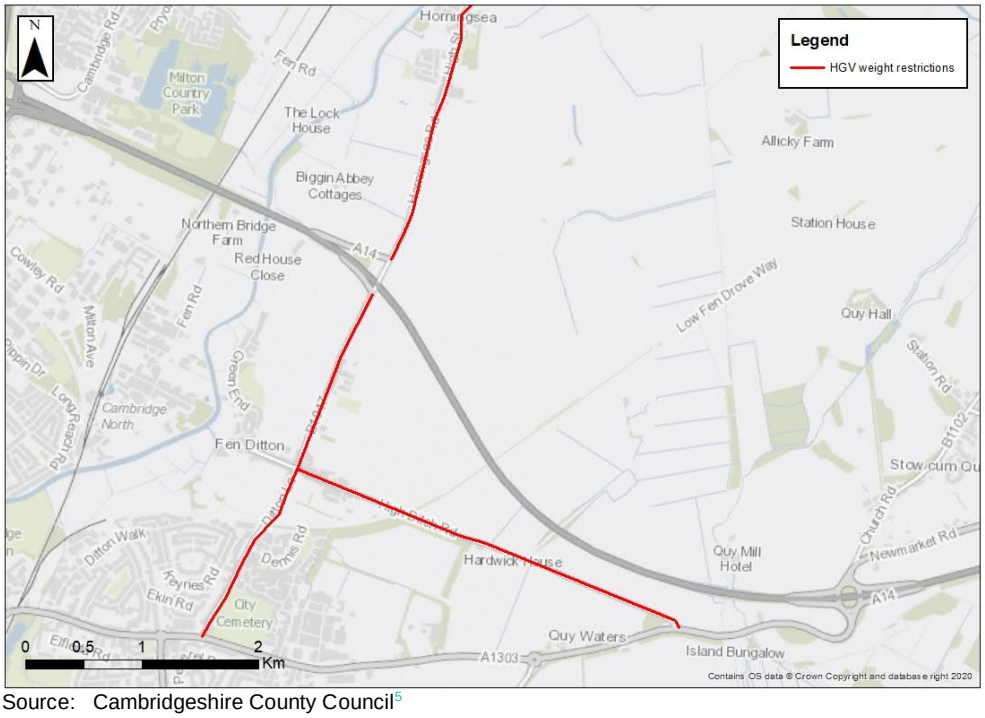
Source: Cambridgeshire County Council

HGV restrictions

1.8.11 To understand the HGV restrictions within the local area of the site, CCC's HGV Policy and advisory freight map have been reviewed. The advisory freight map indicates there are access only weight limits in place along Horningsea Road (B1047) through both Fen Ditton and Horningsea (See Figure 1.9). These restrictions also continue north along the B1047 through Waterbeach, up until the A10.

1.8.12 For HGV's wishing to access the proposed site via Horningsea Road, it may be possible to do so via Junction 34 of the A14. Construction and operation of the site would be dependent on amendment of the current Traffic Regulation Order, which is within the power of CCC, but would be subject to consideration of any objections and therefore any changes could not be guaranteed.

Figure 1.9: Environmental HGV weight limit restriction plan map



Source: Cambridgeshire County Council[5]

1.8.13 It is worth noting that there are additional HGV restrictions along High Ditch Road (See Figure 1.10). However, these (18 T) restrictions are also 'access only' restrictions. For HGV's wishing to access the proposed site via Low Fen Drove Way, it may be possible to do so via High Ditch Road. Access to the proposed site could route from the southeast via the A1303 and Junction 35 of the A14. Construction and operation of the site would be dependent on amendment of the current Traffic Regulation Order, which is within the power of CCC, but would be subject to consideration of any objections and therefore any changes could not be guaranteed.

[5] https://my.cambridgeshire.gov.uk/?tab=maps

2 Construction Impacts

2.1.1 To better understand Heavy Goods Vehicle (HGV) movements associated with the construction of the new site and associated ancillary infrastructures; preliminary analysis was conducted to estimate the number of daily HGV movements.

2.1.2 At each stage of construction, an estimate of the average daily movements associated with each Site is displayed below in Table 2.1.

2.1.3 It is important to note that although the daily HGV movements look largely similar between each site option; the duration of each stage will vary depending on which site option is selected. Duration of construction stage is dependent on both the specific infrastructure requirements chosen as the preferred option, and/or the distance required to tunnel.

Table 2.1: Daily HGV movements during each construction stage

Site	1	2	3	Comments
Typical daily movements for WWTP construction	55	55	55	Every workday throughout entire construction period
Tunnel spoil removal during tunnelling period	36	35	36	Twice per week during tunnelling period (12-24 months)
Movement during large concrete pour	163	163	163	Daily during large concrete pour (approx. 6 days)
Spoil removal related to ancillary infrastructure – (dependant on infrastructure choice)	54 - 108	54 - 108	54 - 108	Daily for 1-2 weeks

Source: Mott MacDonald

2.1.4 Given the above information, it is likely that during peak construction, particularly during the large concrete pour phase, constructional based traffic could equate to an additional 200-300 movements.

2.1.5 Although these estimates are preliminary in nature, it is recommended that once a preferred option has been consulted upon, a Construction Management Plan is put in place to mitigate the associated impacts of constructional base flow on the local transport network.

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3 Assessment Assumptions

3.1.1 For the purposes of this high-level transport assessment, the following assumptions have been applied:

- The majority of vehicle movements to the proposed Sites 1 and 2, follow the A10 corridor between the A14 Milton Interchange and Butt Lane/ Landbeach Road junctions. The assessment for these site locations concentrates on the potential impact at these junctions.
- The majority of vehicle movements to the proposed Site 3, follow the A14 corridor between Junction 33, the A14 Milton Interchange and Junction 35 of the A14 Quy Interchange. The assessment for this site location concentrates on the potential impact at key junctions between these interchanges.
- The number of vehicle trips travelling to and from the site is largely the same across all site locations. For the purposes of HGV movements, it is assumed that these comprise approximately 73 vehicles per day (146 trips) based on survey data and advice provided by Anglian Water, previously referred to in Section 1.5.
- The number of trips by Car and LGV are based on figures provided by Anglian Water, outlined in Section 1.4. However, the accuracy and spatial distribution of these trips would need to be established through surveys for any future Transport Assessment to confirm suitable access layout designs and associated off-site impacts.
- The distribution of trips associated with Site 1 and 2 are assumed to be the same for Milton Interchange, Milton Park and Ride and Butt Lane. However, when considering an alternative access into Site 1, increased trip movements via Landbeach Road would also be considered.
- The distribution of trips associated with Site 3 assumes traffic from/to the west would continue on the A14 and travel either via Junction 34, or Junction 35, while trips to/from the east travel via the Quy Interchange. However, it is noted that distribution to/from this site would be dependent on the location of the site access, and the acceptable routing of HGVs.
- The number of daily vehicle trips associated with construction is largely similar between all site options. However, the routing of these vehicles will vary between sites, dependant on the aforementioned assumptions associated with site access. To fully understand the potential impact of all constructional based impacts of the development on the network, a Construction Management Plan will need to be provided.

4 Potential Access locations

Due to the close proximity of Site 1 and 2, site access location analysis has been considered together. The site access locations for Site 3 are considered separately.

4.1 Site 1 and Site 2

4.1.1 A high-level assessment was undertaken to assess the viability of providing connectivity to the proposed sites 1 and 2 from the existing highway infrastructure and includes the following access options:

- Landbeach Road for Site 1;
- Butt Lane for Site 1 and 2; and
- A10 for Site 1.

4.1.2 A high-level consideration of the positives and negatives associated with each of these is shown in Table 4.1.

Table 4.1: Potential site access location analysis

Access Location	Description	Positives	Negatives	Proposed Junction Type (assumed)
A10	Strategic road network, 50mph, wide two-way single carriageway	Direct access from main highway network; and No access via local highway network required.	High speed road; Construction of new (major) junction required to facilitate access; New junction layout dictated by predominant A10 traffic flows; Existing high accident rate on A10 corridor; Significant infrastructure improvements planned for A10; Unable to access both proposed sites; and Journey times may be affected by traffic queues on A10 during peak times.	Roundabout or signal controlled junction
Butt Lane	Local road network, 50mph, two-way, single carriageway	Existing commercial sites and operations along Butt Lane; and Possible to access both proposed sites	Local highway network; Access to residential settlement of Impington May require improvements to existing A10 junction for capacity reasons; Access to A10 via existing Park & Ride site (may have limited highway tenure);	Priority junction with ghost island
Landbeach Road	Local road network, 50mph, two-way, single carriageway	Existing traffic flows relatively low.	Local highway network; Access to residential settlement of Landbeach; May require improvements to existing A10 junction for safety reasons; Unable to access both proposed sites; High number of accidents recorded at existing A10 junction; and Poor visibility	Priority junction with ghost island

Source: Mott MacDonald

4.1.3 As a result of this initial assessment, further work was conducted to assess the viability of access from each of the identified roads. The locations of the proposed access routes are shown in Appendix A.1 and summarised within Table 4.2 below.

Table 4.2: Viability analysis of identified access roads

Location Ref	Location Description	Approx. Length	Positives	Negatives	Recommendations
A10-01	Access to Site 1, located on western side of A10, approx. 300m NE of junction with Butt Lane	400m	Direct access from main highway network; Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (300m NE of Butt Lane and 300m SW of private access to Milton Maze); Construction of new (major) junction to facilitate access; Located at commencement of existing lay-by; and Access route to site may bisect multiple land parcels.	Not suitable due to existing highway arrangement, uncertainty to future development of highway corridor and potential prohibitive costs associated with new (major) junction.
BTL-01	Access to Site 1, located on northern side of Butt Lane, approx. 275m West of junction with A10.	525m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (200m W of Park & Ride site and 150m E of private access to commercial development); and Access route to site may bisect multiple land parcels.	Preferred access location for Site 1 subject to further design considerations for effective width of Butt Lane.
BTL-02	Access to Site 1, located on northern side of Butt Lane, approx. 525m West of junction with A10.	460m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (90m W of private access to commercial development and 30m E of private access to farm); Construction of new junction may be restricted by existing boundary constraints; and Access route to site may bisect multiple land parcels.	Not recommended due to existing horizontal constraints and close proximity to existing accesses.
BTL-03	Access to Site 1, located on northern side of Butt Lane, approx. 825m West of junction with A10.	475m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (200m W of private access to farm and 125m E of private access to commercial development); Construction of new junction may be restricted by existing boundary constraints; Access route to site may bisect multiple land parcels; and	Not recommended due to existing horizontal constraints and close proximity to Mere Way.

Location Ref	Location Description	Approx. Length	Positives	Negatives	Recommendations
				Uncertainty with respect to future development of Mere Way as NMU route.	
BTL-04	Access to Site 2, located on southern side of Butt Lane, approx. 825m West of junction with A10.	410m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (200m W of private access to farm and 125m E of private access to commercial development); Construction of new junction may be restricted (width) by existing boundary constraints; and Uncertainty with respect to future development of Mere Way as NMU route.	Not recommended due to existing horizontal constraints and close proximity to Mere Way.
BTL-05	Access to Site 2, located on southern side of Milton Road, approx. 975m West of junction with A10.	400m	Located at field boundary to minimise impact upon land parcels;	Close proximity to existing junctions (35m W of private access to farm; and Construction of new junction may be restricted (width) by existing boundary constraints.	Not recommended due to existing horizontal constraints and close proximity to existing accesses.
BTL-06	Access to Site 2, located on southern side of Milton Road, approx. 1175m West of junction with A10.	375m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (100m W of private access track and 200m E of private access to commercial development); Proximity to bend may affect required Sight Stopping Distances; and Proximity to residential property (The almonds at approx. 125m).	Preferred access location for Site 2 subject to further design considerations for sight stopping distances and effective width of Butt Lane
BTL-07	Access to Site 2, located on southern side of Milton Road, approx. 430m West of junction with A10.	800m	Uses existing junction location; Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (125m E of private access track to farm); Joint use of access road to waste disposal site; Trip generation of combined uses may require larger junction layout. Interaction needed to cross Mere Way	Not recommended due to interaction needed to cross Mere Way and greater costs associated with longer access route.
BTL-08	Access to Site 2, located on southern side of Milton Road, approx. 590m West of	645m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (30m W of private access to farm and 30m E of private access to farm);	Not recommended due to proximity to existing accesses.

Location Ref	Location Description	Approx. Length	Positives	Negatives	Recommendations
	junction with A10.				
BTL-09	Access to Site 2, located on southern side of Milton Road, approx. 955m West of junction with A10.	400m	Uses existing junction location; Located at field boundary to minimise impact upon land parcels;	Close proximity to existing junctions (30m W of private access to farm); Construction of new junction may be restricted (width) by existing boundary constraints; and Uncertainty with respect to future development of existing commercial development; Joint use of access road to commercial development; Trip generation of combined uses may require larger junction layout.	Not recommended due to proximity to existing accesses.
LBR-01	Access to Site 1, located on southern side of Landbeach Road, approx. 275m North of junction with A10	550m	Located at field boundary to minimise impact upon land parcels;	Proximity to existing junctions (110m N of private access to Milton Maze and 300m S of private access to Farm and Children's Nursery); and Proximity to bend (approx. 160m) may affect required Sight Stopping Distances.	Not recommended due to existing horizontal alignment and local character of highway.

Source: Mott MacDonald

Recommended site access

4.1.4 Based upon the above initial findings, and a preliminary review of existing highway infrastructure and constraints, the recommended point of access for Site 1 and Site 2 should be from Butt Lane for both sites, with BTL-01 for Site 1 and BTL-06 for Site 2.

4.1.5 It should be noted that due to the effective width of Butt Lane in certain locations, mitigation or remedial works may be necessary beyond the extent of new site access construction to facilitate safer passing widths by predicted large HGVs requiring access to the potential WWTP sites.

4.2 Site 3

4.2.1 A high-level assessment was undertaken to assess the viability of providing connectivity to the proposed Site 3 from the existing highway infrastructure and includes the following access options:

- Low Fen Drove Way via High Ditch Road
- Horningsea Road;

4.2.2 A high-level consideration of the positives and negatives associated with each of these options is shown in Table 4.3.

Table 4.3: Potential Site access location analysis

Access Location	Description	Positives	Negatives	Proposed Junction Type (assumed)
Low Fen Drove Way via High Ditch Road	Local road network, one-way, single carriageway and dirt track	Existing traffic levels are low.	Local highway network; Access to residential settlement of Fen Ditton	Priority junction with ghost island
Horningsea Road	Local road network, 60mph, two-way, single carriageway with cycleway	Close proximity to major highway infrastructure - Junction 34 of the A14	Local highway network; Access to residential settlement of Horningsea; HGV restrictions present along entire section May require improvements to Junction 34 for safety reasons; May require U-turn movements at Junction 33 (Milton) to allow travel to/ from A14 east; and, Future of Junction 34 is uncertain	Priority junction with ghost island

Source: Mott MacDonald

4.2.3 As a result of this initial assessment, further work was conducted to assess the viability of access from each of the identified roads. The locations of the proposed access routes are shown in Appendix A.8 and summarised within Table 4.4 below.

Table 4.4: Viability analysis of identified access roads

Location Ref	Location Description	Approx. Length	Positives	Negatives	Recommendations
HDR-01	Access to Site 3 via Low Fen Drove Way, located approximately 900m west of junction of High Ditch Road with Newmarket Road	1350m	Uses existing infrastructure for over half of the route and uses routes that are expected to have lower levels of existing traffic flows than the proposed access route options for Site 1 and 2.	May require highway improvements at junction with Newmarket Road to facilitate new HGV trips; Requires highway improvements to increase the width of High Ditch Road (approx. 5m to 6m); Requires highway improvements at junction with High Ditch Road to facilitate new HGV trips; Highway improvements to increase the width of Low Fen Drove Way (approx. 5.5m) may also result in an increased width of existing earthwork embankments; Existing bridge structure over the A14 is too narrow for two-way traffic (approx. 5.0m) which may result in the introduction of signal-controlled operation; Forward sight visibility is restricted over the existing bridge structure over the A14; Access commences within '18T Except for Access' restriction; and; Access route to the site may bisect multiple land parcels.	Although plausible, the costs associated with highway improvements to facilitate vehicular access may be prohibitive.
HSR-01	Access to Site 3, located East of Horningsea Road, approx. 280m North of junction with A14	540m	Within close proximity to major highway infrastructure. Shorter approx. access length	Highway improvements at the junction with Horningsea Road to facilitate new HGV trips; Within close proximity to existing farm track junction (40m south); Highway improvements to increase the width of Low Fen Drove Way (approx. 3.5m); A14 access only for trips to and from the west, access from the east would take place via local road network; Route via local road network for access to and from east would pass through '18T Except for Access' restriction;	Existing access constraints in the form of environmental weight restrictions may preclude this option unless alternative route(s) are considered.

Location Ref	Location Description	Approx. Length	Positives	Negatives	Recommendations
				Access commences within '7.5T Except for Access' restriction; Access route to the site may bisect multiple land parcels; and; Future of Junction 34 is uncertain.	

Source: Mott MacDonald

Recommended site access: Site 3

4.2.4 Based upon the above findings, there are limited options for access to Site 3 and both proposed routes have significant issues to overcome to enable access for the predicted traffic levels associated with the proposed site. These are discussed further below:

4.2.5 The access route via High Ditch Road as shown as HDR-01 in Appendix A.6 would need significant highway improvement to accommodate the safe movement of predicted HGVs. HDR-01 would also require a one-way 'shuttle' operation across the existing structure over the A14 to address both the restrictive passing width and forward visibility constraints. The existing structure over the A14 is of sufficient structural integrity to accommodate HGVs, although it is recommended that further investigations be carried out to confirm that this is still valid for this scheme. In addition to this, access from High Ditch Road would require the removal of existing 18T weight restrictions so that HGVs can access/egress the site via Low Fen Drove Way.

4.2.6 The access route shown as HSR-01 (Appendix A.7) would require highway improvements to accommodate the safe movement of predicted HGVs but not to the extent of HDR-01. However, access from the A14 via Junction 34 (Fen Ditton) is restrictive and only currently caters for movements to and from the west. Similarly, to HDR-01, any origins and destinations to the east would need to leave/enter the A14 from Junction 35 (Stow-cum-Quy) and follow the local road network, on which there are 18T weight restrictions (except for access). Further consideration should be given to using Junction 33 (Milton) for vehicles routing to and from the East by means of a 'U'-turn at the junction, although the capacity implications would need to be considered in greater detail.

4.2.7 As stated above, access to Site 3 via HSR-01 is entirely dependent upon the future of Junction 34, which at present, is being consulted upon as part of a wider Cambridge Eastern Access Study. Taking the possibility of future removal into consideration, access to Site 3 may only be possible from Junction 35, via HDR-01. The Cambridge Eastern Access Study is outlined in greater detail in Section 0.

4.3 Preliminary Design

4.3.1 An initial concept design for each of the proposed access locations has been developed to further assess the viability of new junctions at these locations and is shown in Appendix A.2 for access location BTL-01 into Site 1, Appendix A.3 for BTL-06 into Site 2 and Appendix A.7 for HSR_01 into Site 3. The proposed access arrangements are based upon a priority junction with ghost island as defined within the DfT's highway design guidance DMRB CD123. A swept path analysis has also been undertaken using Autodesk Vehicle Tracking software which shows that the proposed junction arrangements can accommodate a maximum legal articulated vehicle (See Appendix **A.4, A.5** and **A.8**).

4.4 Further commentary

4.4.1 Based upon this preliminary assessment there is minimal difference between either Site 1 or Site 2, assuming that access would be from Butt Lane. There is benefit to Site 1 in having an access location closer to the A10, marginally reducing travel times and having a lower overall construction cost due to a reduced works requirement on Butt Lane. However, further consideration may also need to be given to co-ordination with wider highway and junction improvement proposals along the A10 corridor, currently being considered by the CPCA, to ensure continuity and validity of design.

Site 3 has greater access route constraints than sites 1 and 2. The option of accessing Site 3 from Horningsea Road is considered preferable from a cost perspective assuming that the 'U' turn provision via Junction 33 could be accommodated. However, considerations should remain for access via High Ditch Road as the associated infrastructure improvements could provide a suitable mitigated alternative.

5 Location of potential off-site impacts to the A10 corridor

This section considers the potential off-site access impacts associated with the relocation of the WWTP to Sites 1 or 2. The section highlights where authorities might seek mitigation in the event of the site being granted development consent at either of these sites. There is also consideration of the committed development and infrastructure in the local area that would need to be considered as part of a Transport Assessment for either of the proposed sites.

The same exercise is undertaken for Site 3 in Section 6.

5.1 Current conditions

5.1.1 The A10, north of Cambridge, is a key transport link running north to south between Cambridge and King's Lynn via Ely. It forms part of the Primary Route Network, with CCC being the highway authority for the section through Cambridgeshire. To the south, the A10 connects to junction 33 of the A14, known as the Milton Interchange. This grade separated junction serves as a main access junction into Cambridge and provides vital access to jobs in the science park and the northern fringe area of Cambridge. To the north the A10 passes through numerous towns and villages and serves as a key radial route into Cambridge.

5.1.2 The majority of junctions along the A10 are simple priority junctions, with only four roundabouts along the entire stretch between Ely and Cambridge. Within the study area, between Cambridge Science Park and Waterbeach, the speed limit along the A10 is 50mph. North of Waterbeach the posted speed limit increases to 60mph, outside of residential areas.

5.1.3 Within the study area, the A10 west of Milton carries in the order of 22,000 vehicles daily (2-way flow). The two-way flow for each peak period along sections of the A10 are shown in Table 4.1. Flow was sourced from automatic traffic counts recorded in December 2014. Given these flows are 5 years old they are anticipated to now be higher than shown.

Table 5.1: AM and PM 2-Way Peak Hour Base Flow

Section of A10 (2014 traffic counts)	AM (vehicles)	PM (vehicles)
A10 north of Cambridge Research Park (CRP) roundabout	1,229	1,348
A10 north of Denny End Road	1,294	1,409
A10 between Denny End Road and Car Dyke Road	1,157	1,339
A10 south of Car Dyke Road	1,283	1,634
A10 west of Milton	1,562	1,911

Source: Peter Brett Associates: Waterbeach Barracks and Airfield Outline Planning Application, based on 2014 data.[6]

5.2 Future growth and infrastructure proposals

5.2.1 The Local Plan policies for both City and South Cambridgeshire Districts identify extensive growth in the A10 corridor which include the new town north of Waterbeach, the Cambridge Science Park, North East Cambridge and at sites around Ely (these being considered by East Cambridgeshire District Council as Local Planning Authority for that district). Between them,

[6] Waterbeach Barracks & Airfield Outline Planning Application: Environmental Statement - Chapter_9_Transport

these developments could bring up to around 17,000 new homes and 14,000 new jobs into the wider corridor.

5.2.2 The Cambridge Science Park has numerous small to medium scale applications which have been permitted, but mitigation has been limited to the local highway network south of the Milton Interchange, and therefore does not require significant further consideration at this stage.

5.2.3 An area action plan is currently being devised for North East Cambridge (NEC) by South Cambridgeshire and Cambridge City Councils. NEC is an allocated site in the South Cambridgeshire District Local Plan but is not committed in planning application terms at this stage beyond a limited number of specific sites. It has therefore not been given further consideration as part of this preliminary transport assessment, although it is acknowledged that this may need to be considered as part of a formal Transport Assessment for the WWTP in the future. This would need to be confirmed through pre-application scoping discussions with CCC and Highways England (HE) as the relevant Highway Authorities. The relocation of the WWTP is expected to remove traffic flow from Milton Road to the south of the A14 as trips reroute on approach to the Milton interchange to travel north on the A10.

5.2.4 The Waterbeach New Town (WNT) development is located north of the proposed sites, on the former Waterbeach Barracks site. The WNT has planning permission for the initial 'early phase development' (otherwise known as phase 1) which comprises 1,600 dwellings, a primary school, and 411 jobs. A transport mitigation package has been secured through planning conditions and S106 agreement to mitigate the impacts of the development. This first phase of development is considered to be committed and therefore the assessments of the proposed infrastructure local to the proposed sites including improvements to the Butt Lane/ A10/ Park and Ride junctions, Landbeach Road/ A10 junction and Milton Interchange have been considered in later sections.

5.2.5 There are also infrastructure improvements to Mere Way as part of WNT Phase 1 to surface it and provide suitable crossing facilities on Butt Lane. This would not typically be considered in terms of junction performance but should be a consideration in siting and planning the proposed development. It is also worth noting that, although not yet committed in planning terms, the route along Mere Way is also being considered as part of the GCP's Science Park to Waterbeach scheme and referred to specifically in the WNT S106 agreement to ensure the developer works proactively with GCP to ensure the designs of both schemes are aligned.

5.2.6 The future WNT phases will be subject to a monitoring and management approach. This is where the transport performance of built-out phases of development are monitored, and additional transport assessments undertaken in advance of each additional phase being permitted. Each assessment would be required to assess the transport impacts of each phase both individually and cumulatively (with already permitted phases). The associated mitigation measures would need to be identified where the transport impacts are considered to be severe in order to satisfy National Policy Planning Framework requirements. This approach has enabled the first phase of development to be permitted in advance of the A10 improvements being fully developed by the CPCAs Ely to Cambridge Transport Study (ECTS), through securing alternative interim measures that could be implemented in the event that the A10 improvements are not be realised within timescales needed to facilitate the WNT Phase 1 development.

5.2.7 At present the A10 improvements are identified in the Combined Authority's Local Transport Plan and the Combined Authority's 2019/20 Business Plan. The CPCA has made a bid to dual the A10 between Cambridge and Ely through the Large Local Majors (LLM) investment programme run by the Department for Transport. The bid refers to a start date for the A10 dualling of 2024. The scheme is not committed in planning terms and has therefore not been

considered further at this stage. However, this should continue to be considered as a having a potentially significant impact on the WWTP as proposals for the site are developed.

5.2.8 The A14 improvements currently being built by HE include capacity improvements to the Milton Interchange and an additional lane on the A14 Cambridge Northern Bypass in each direction between Histon and Milton Interchange. These improvements are expected to be completed by the end of 2020, given their advanced status, these were considered as part of the WNT Phase 1 assessment.

5.2.9 The anticipated and committed developments and infrastructure in the local area, with timescales are set out in Appendix B. It should be noted that some forthcoming development and infrastructure improvements are in their early stages and have not been considered further as part of this assessment due to their current planning status and the assumption that only committed development and infrastructure would need to be considered at this time. Going forward the status of these developments and infrastructure proposals may change, and therefore it is important to review and monitor these and other schemes as the development progresses. It would also be advisable to agree with CCC and HE which schemes need to be formally considered as part of the Transport Assessment for the site.

Junction performance

5.2.10 The Transport Assessment accompanying the WNT planning application details the performance of key junctions in the area in 2021 for the Phase 1, the full development and without the development scenario in place.

5.2.11 Within the amended WNT Paramics Modelling report[7], microsimulation modelling was conducted to assess the impacts of the proposed development with the proposed mitigation measures in place, compared to the future year scenario without the development included.

5.2.12 For the purposes of the WWTP relocation we are most interested in how the local junctions operate with the committed development and infrastructure improvements in place, e.g. including WNT Phase 1. With this considered, the so-called HE&A10_Dev (Core Test) scenario best represents the future do-minimum conditions of the surrounding A10 network before the relocation of the WWTP.

5.2.13 The HE&A10_Dev (Core Test) scenario includes Phase 1 of WNT with the following mitigation measures also included:

- A10/Humphries Way/ Landbeach Road junctions
- A10 capacity enhancement between Butt Lane and Milton Park and Ride
- Widening of the A10 south of the Park and Ride site
- Changes to Denny End Road signals
- Vehicular access from Research Park roundabout
- HE A14 improvement Scheme at Milton Interchange
- Signalisation of Landbeach / A10 junction
- Toucan crossing over A10 north of Waterbeach Road
- Toucan crossing over A10 south of CRP roundabout
- Toucan crossing over A10 at Denny End Road

[7] Transport_Assessment_Paramics_Modelling_Addendum_August_2018

5.2.14 Additional tests were also undertaken to identify the junction performance if the sustainability aspirations (including trip banking, mode shift and re-assignment as reported in the May 2018 modelling and TA) of the WNT site are achieved, and with 'split link' tests. These included adjustments made to lane allocation and traffic signals on Milton Road south of Milton Interchange to prevent traffic blocking back to the A14 westbound off slip.

5.2.15 The section below provides the results of the LinSig modelling extracted from the WNT Transport Assessment Addendum Appendix G (Part 2[8],3[9] and 4[10]) and identifies the potential implications for the WWTP.

5.2.16 LinSig modelling indicates the performance of each arm through demonstrating the mean max queues, degree of saturation and the practical reserve capacity of the junction. The Degree of Saturation (DoS) values indicates the following:

- Between 0 and less than 90 the arm is within practical capacity
- Between 90 and less than 100 the arm is within theoretical capacity
- 100 and over the arm is over theoretical capacity

5.2.17 Practical Reserve Capacity (PRC) values indicate:

- A positive PRC indicates that the junction has spare capacity as demonstrated for the AM peak and therefore may be able to accept more traffic.
- A negative PRC indicates that the junction is over capacity and is suffering from traffic congestion and would experience queuing and delay as a result.

Butt Lane/ Park and Ride/ A10 junction

5.2.18 The proposed improvements to the Butt Lane/ Park and Ride/ and A10 junctions comprise the removal of a left turn stop line into Butt Lane for A10 northbound traffic, the widening of the southbound flare on the A10 on approach to the Milton Interchange, and reduction/ removal of hard standing islands at the Park and Ride junction to ease movements and maximise capacity.

Table 5.2: Core Test with mitigation: Park and Ride/ A10 junction

	AM			PM		
Arm	Demand (pcu)	Mean Max Queue	Degree of saturation	Demand	Mean Max Queue	Degree of saturation
Park and Ride	75	2.8	53.2%	127	7.9	91.8%
A10 northbound	1024	10.7	58.1%	1702	60.9	96.4%
A10 southbound	1446	33.9	88.9%	932	10.5	91.6%

Source: Transport_Assessment_Addendum_Appendix_G_(2_of_5)_October_2018

5.2.19 Table 5.2 above displays LinSig outputs for the Park and Ride/ A10 Junction under the Core Test with mitigation scenario during 2021. The LinSig outputs demonstrate that the Park and Ride/ A10 Junction performs within practical capacity during the AM peak with a maximum Degree of Saturation (DoS) of 88.9% on the worst performing arm. In the PM Peak, the junction

[8] Transport_Assessment_Addendum_Appendix_G_(2_of_5)_October_2018
[9] Transport_Assessment_Addendum_Appendix_G_(3_of_5)_October_2018
[10] Transport_Assessment_Addendum_Appendix_G_(4_of_5)_October_2018

is operating over practical capacity but within theoretical capacity as all three arms have a DoS over 90%.

5.2.20 It is worth noting that the sustainability sensitivity test, with the mode share and trip banking aspirations for the WNT Phase 1 being achieved, showed that the junction operated within practical capacity in the PM peak with a lower maximum DoS of 83.3%.

5.2.21 Further tests were also conducted at the junction to represent 25% more traffic to and from WNT. In the AM peak it caused the A10 to go over practical capacity with 90.8% DoS. In the PM peak, the A10 northbound had a DoS of 99.9% whilst the Park and Ride exit had a DoS of 91.6%.

Table 5.3: Core Test with mitigation: Butt Lane/ A10 junction

	AM			PM		
Arm	Demand (pcu)	Mean Max Queue	Degree of saturation	Demand	Mean Max Queue	Degree of saturation
Butt Lane	60	2.1	35.4%	144	7.4	84.5%
A10 northbound	1004	2.3	56.8%	1694	13	95.7%
A10 southbound	1544	5.1	80.2%	1044	4.5	54.4%

Source: Transport_Assessment_Addendum_Appendix_G_(2_of_5)_October_2018

5.2.22 Table 5.3 above displays LinSig outputs for the Butt Lane/ A10 Junction under the Core Test with mitigation scenario during 2021. The LinSig outputs demonstrate that the Butt Lane/ A10 Junction performs within practical capacity during the AM peak with a maximum Degree of Saturation (DoS) of 80.2%. In the PM Peak, the junction is operating over practical capacity as the A10 northbound displays a DoS of 95.7%.

5.2.23 It is worth noting that with the sustainability sensitivity test, the junction remains within capacity with maximum DoS of 82.6% during the PM peak.

5.2.24 Further tests were also conducted at the junction to represent 25% more traffic to and from WNT at the request of CCC. In the AM peak the A10 southbound arm goes over capacity with DoS of 90.8%. In the PM Peak, Butt lane is pushed over practical capacity with a DoS of 92.8% and the A10 northbound is worsened further with a DoS of 98.3%.

5.2.25 The practical reserve capacity of the combined Butt Lane/Park and Ride/ A10 junction is 1.4 and -7.1 during the AM and PM peaks respectively. Meaning there is some available capacity in the AM Peak scenario, but the PM peak scenario the junction has no available capacity with the Phase 1 mitigation measures in place.

Implications for the WWTP

5.2.26 The potential impacts at these junctions would be dependent on the traffic levels associated with the WWTP. It is assumed, for the purposes of this high-level assessment, that most traffic associated with the relocated WWTP would travel from the A14 to both proposed sites via the Park and Ride junction. On this basis the northbound A10 approach to the Park and Ride/ A10 junction has limited available capacity during the AM Peak for those travelling to either of the proposed sites via Butt Lane. During the PM peak vehicles are expected to exit from the Park and Ride arm on to the A10 and travel southbound. This movement was shown to be over practical capacity resulting in some delay and queuing with the Phase 1 WNT proposals and mitigation in place. Therefore, this junction is expected to require further consideration and

assessment as part of the WWTP application once more is known about the existing and proposed traffic generation for the relocated site. At this preliminary stage in the assessment process, it is not expected that any increases in inter-junction link capacity would be needed including on the A10.

5.2.27 In addition, assessment would also be needed of the Park and Ride/ Butt Lane access, given this would be used by all vehicles travelling to and from the A14 via the A10.

5.2.28 Should proportions of vehicles, such as HGVs, travel differently to the above assumption e.g. from the proposed sites in the AM peak or to the site during the PM peak this would follow the tidal flow experienced by traffic on the A10 at present and in the future, then it is likely to result in additional delay and congestion unless mitigation measures are identified.

A10/ Humphries Way/ Landbeach Road

5.2.29 The A10/Humphries Way/ Landbeach Road junction proposals include signalisation of the junction, and provision of a 3m wide cycleway on either side of the carriageway traveling in each direction. This design resulted from safety concerns at the junction, by providing allocated gap for vehicles to travel into and out of Landbeach Road onto the A10.

Table 5.4: Core Test with mitigation: A10/ Humphries Way/ Landbeach Road junction

	AM			PM		
Arm	Demand (pcu)	Mean Max Queue	Degree of saturation	Demand	Mean Max Queue	Degree of saturation
Humphries Way	194	3.0	45.0%	149	3.0	59.6%
A10 eastbound	598	7.7	55.3%	1239	28.5	89.5%
Landbeach Road	232	7.2	77.8%	128	5.8	81.5%
A10 westbound	957	12.9	74.2%	714	7.9	51.4%

Source: Transport_Assessment_Addendum_Appendix_G_(3_of_5)_October_2018

5.2.30 Table 5.4 above displays LinSig outputs for the A10/ Humphries Way/ Landbeach Road Junction under the Core Test with mitigation scenario. The LinSig outputs demonstrate that the A10/ Humphries Way/ Landbeach Road Junction performs within capacity during both the AM and PM peak periods with a maximum Degree of Saturation (DoS) of 89.5%.

5.2.31 The practical reserve capacity of the Milton Interchange junction is 0.6 in the PM peak, which although positive, means it is within capacity it is close to being over capacity.

5.2.32 The additional sustainability test showed that the junction to operate within capacity for both the AM and PM peaks with a maximum DoS of 79.7% and 78.8% respectively.

5.2.33 Further tests were conducted at the junction to represent 25% more traffic to and from WNT. In the AM peak the junction remained under capacity with a maximum DoS of 77.4%. In the PM peak, the A10 eastbound was over practical capacity with a DoS of 91.6%.

Implications for the WWTP

5.2.34 The Landbeach Road junction improvements are shown to remain within capacity but with very little available reserve capacity during the PM peak. This junction would require further

consideration and assessment should access be taken from Landbeach Road for Site 1 and would need to consider the trip generation associated with the proposed sites.

Milton interchange

5.2.35 The proposals for the Milton Interchange are to provide additional capacity at the junction. It should be noted that the HE schemes for this junction are committed, although interim measures were also identified as part of the WNT Phase 1 development.

Table 5.5: Core Test with mitigation: Milton Interchange

	AM			PM		
Arm	Demand (pcu)	Mean Max Queue	Degree of saturation	Demand (pcu)	Mean Max Queue	Degree of saturation
A10 southbound	1157	19.3	87.3%	914	12.6	77.1%
Cambridge Road	1276	1.3	67.2%	1127	1.8	59.3%
A14 westbound	1485	183.6	126.8%	641	7.7	58.9%
Milton Road	563	7.6	71.1%	900	13.2	83.2%
A14 eastbound	564	9.0	67.4%	1124	16.4	86.6%

Source: Transport_Assessment_Addendum_Appendix_G_(4_of_5)_October_2018

5.2.36 Table 4.5 above displays LinSig outputs for the Milton Interchange Junction under the Core Test with mitigation scenario. The LinSig outputs demonstrate that the Milton Interchange performs within capacity during the PM peak with a maximum Degree of Saturation (DoS) of 86.6%. In the AM Peak, the junction is operating over capacity on the A14 westbound off slip, here the arm has a DoS of 126.8%. In addition, this arm has a mean max queue length of 184 PCU's, extending beyond the available length of slip road, meaning vehicles queue onto the A14 mainline flow.

5.2.37 The practical reserve capacity of the Milton Interchange junction is -41.1 in the AM peak and 4.0 in the PM peak. This indicates that, during the AM Peak, the Milton Interchange is operating over capacity and is very little capacity headroom in the PM peak

5.2.38 Further tests were conducted at the junction to represent 25% more traffic to and from WNT. In the AM peak these caused the A14 westbound to remain over capacity with an increased DoS of 127.9% as well as also causing the A10 arm to operate marginally over practical capacity with a DoS of 90.0%. In the PM peak, the A14 eastbound increased over practical capacity to a DoS of 92.7%.

Implications for the WWTP

5.2.39 It is assumed, for the purposes of this high-level assessment, that most traffic associated with the relocated WWTP would travel predominantly from the A14 to proposed sites via the A10 and Park and Ride junction. The assessment undertaken as part of the WNT Phase 1 has indicated that both eastbound and westbound approaches to the Milton Interchange would need to be considered for the assessment of the WWTP development. In particular, the westbound approach is expected to operate over capacity in the 2021 AM Peak with the WNT phase 1 and mitigation in place. During the PM peak vehicles are expected to exit on to the A10 and travel southbound towards the Milton Interchange junction. Although this junction is not operating near

capacity in the PM peak, the potential impacts of the WWTP on this junction would be dependent on the traffic levels associated with the relocated WWTP.

5.2.40 Should other vehicles such as HGVs travel in the opposite direction, such as away from the proposed sites in the AM peak and to the site during the PM peaks, they are likely to experience additional congestion and delay as they would follow the tidal flow experienced at the Milton Interchange and on the A14.

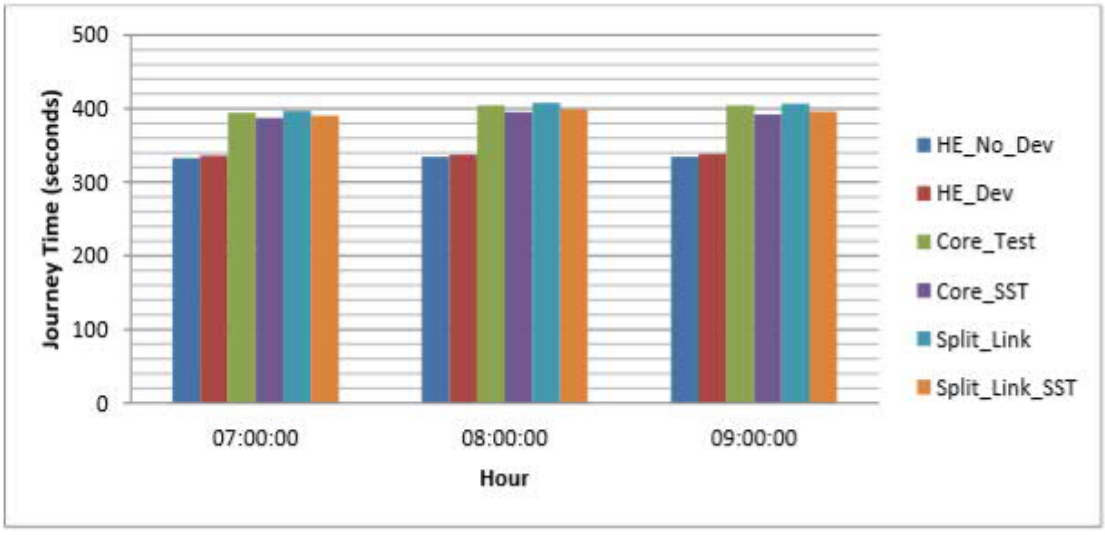
A10 Journey times

5.2.41 The WNT TA considered modelled journey times for both northbound and southbound journeys along the A10 between Milton Interchange and Cambridge Research Park (CRP). For the purposes of considering journey times under the HE&A10_Dev (Core Test) scenario, it is assumed that most traffic travelling to Site 1 and 2 would travel from the A14 (northbound on the A10) during the AM peak and towards the A14 (southbound on the A10) during the PM peak.

5.2.42 Journey times under the HE&A10_Dev (Core Test) scenario are highlighted and compared with the HE_No_Development scenario below, which is the future year without the WNT or mitigation in place.

Northbound journey times between Milton Interchange and CRP in the AM peak

Figure 5.1: AM Milton Interchange to CRP roundabout journey times

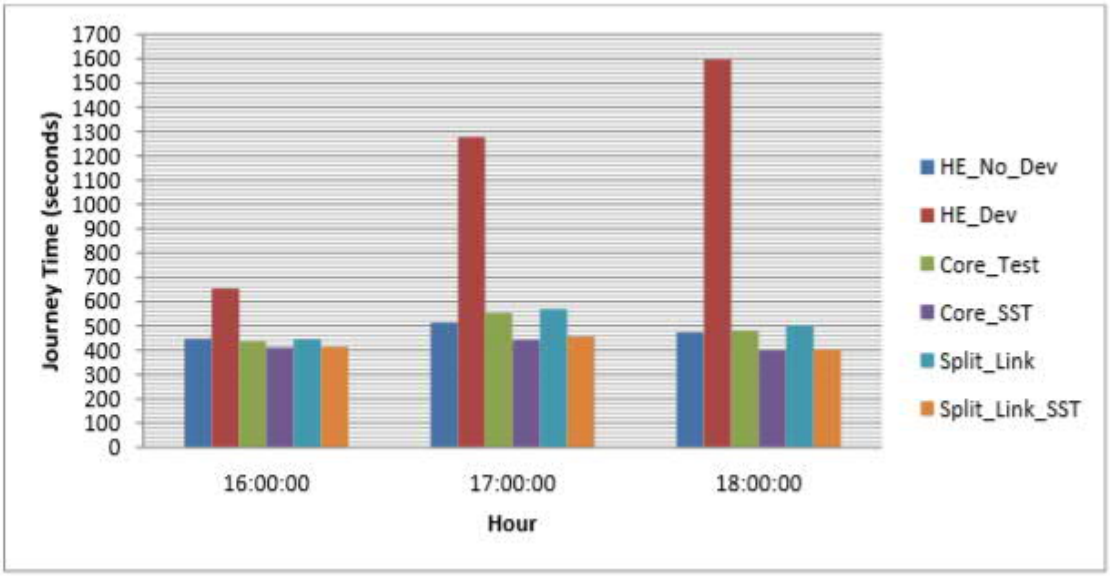


Source: Transport Assessment Paramics Modelling Addendum – August 2018

5.2.43 Figure 5.1 shows that in the AM peak, northbound journey time increases in the order of around 60 seconds from approximately 340 seconds to 400 seconds between the with development and without development scenarios.

Southbound journey times between CRP and Milton Interchange in the PM peak.

Figure 5.2: PM CRP roundabout to Milton Interchange journey times



Source: Transport Assessment Paramics Modelling Addendum – August 2018

5.2.44 Figure 5.2 shows that in the PM peak, southbound journey times do not increase at all, except marginally in the PM peak hour starting at 17:00 by approximately 50 seconds from 510 seconds to 560 seconds between the without development and with development scenarios.

5.3 Junction Impacts Summary

5.3.1 The Milton Interchange, and Butt Lane/ Park and Ride/ A10 junctions are shown to perform over capacity with the Waterbeach Phase 1 development in place. These junctions would need further analysis with consideration of the actual trip generation for the relocated site to understand the potential implications and whether short term mitigation measures could be implemented in advance of the A10 improvements being fully developed and implemented.

5.3.2 For further commentary on transport proposals being promoted for the area including those associated with development (e.g. Waterbeach New Town) and those by the public bodies (e.g. A14 improvements by HE) please see Appendix B – Committed Developments and Transport proposals.

6 Location of potential off-site impacts to the A14 corridor

This section considers the potential off-site access impacts associated with the relocation of the WWTP to Site 3. This highlights where authorities might seek mitigation in the event of the site being granted development consent. There is also consideration of the committed development and infrastructure in the local area that would need to be considered as part of a Transport Assessment for the proposed site.

6.1 Current conditions

6.1.1 The A14, north of Cambridge, is a key transport link running east to west between Rugby and Ipswich via Huntingdon, Cambridge and Bury St Edmunds. It forms part of the Primary Route Network, with Cambridgeshire County Council being the highway authority for the section through Cambridgeshire. To the west, the A14 connects to Junction 19 of the M1, before merging to form the M6 towards Birmingham. To the east, the A14 connects Cambridgeshire with Suffolk via Bury St Edmunds and Ipswich before terminating at Felixstowe, one of the UK's major ports. Centrally the A14 is intersected by the A1(M) and the M11, providing a good onwards connection to both London and the North. To the north of Cambridge, the A14 is connected to the A10 at Junction 33, known as the Milton Interchange. This grade separated junction serves as a main access junction into Cambridge and provides vital access to jobs at the Cambridge Science Park and the northern fringe area of Cambridge.

6.1.2 Within the study area of the A14, between Junction 33, the Milton Interchange and Junction 35, the Quy Interchange, the speed limit along the A14 is 70mph. Along this section, the A14 east of Milton carries in the order of 50,000-75,000 vehicles daily (2-way flow). Average Annual Daily Flow (AADF) for each section of interest along the A14 are shown in Table 5.1 below.

Table 6.1: AADFs (2-way) along the A14 corridor

Year	A14 AADF (2-way) flow between Junction 33 and Junction 34	A14 AADF (2-way) flow between Junction 34 and Junction 35
2016	71,229	55,394
2017	68,587	56,068
2018	68,994	51,965

Source: Department for Transport Traffic Flows – AADF[11]

6.2 Future Growth and Infrastructure proposals

6.2.1 As outlined in Section 5.2, Local Plan policies for both City and South Cambridgeshire Districts identify extensive growth along the A10/A14 corridor which include the new town north of Waterbeach, the Cambridge Science Park and North East Cambridge.

6.2.2 Further to this, there are infrastructure proposals and future growth propositions found further east, within the wider A14 corridor, which include the development of land both North of Cherry

[11] https://data.gov.uk/dataset/208c0e7b-353f-4e2d-8b7a-1a7118467acc/gb-road-traffic-counts

Hinton (S/1231/18/OL)[12] and North of Newmarket Road (S/2682/13/OL), which form part of the Cambridge East Area Action Plan.

6.2.3 The North of Cherry Hinton development comprises 1,200 residential dwellings, including retirement living facilities, a local centre, primary and secondary schools. Although the traffic associated with this development would need to be considered as committed as part of any assessment for the WWTP, the TA doesn't cover the junctions of interest for the purposes of this preliminary transport assessment.

6.2.4 The "Cambridge Wing development", north of Newmarket Road is proposed to be located on the northeast edge of Cambridge, approximately two miles northeast of Cambridge City Centre. It aims to provide affordable housing for Cambridge and cater for the increasing growth at key employment centres, such as the Cambridge Science Park. Outline planning consent was granted in 2016 for the development which includes the following:

- Up to 1,300 new homes;
- Primary School;
- Community hall;
- Flexible mixed-use units;
- Public Open spaces;
- Mixed use recreational facilities including club houses and a pavilion.

Junction performance

6.2.5 The Transport Assessment (TA) accompanying the Cambridge Wing development planning application[13] (S/2682/13/OL) details the performance of the surrounding road network for the 2013 base year. Whilst now somewhat dated, and therefore not suitable for formal assessment, the data can still usefully be used to provide a high-level indication of potential network issues that would need more formal consideration in due course.

6.2.6 Base year flows were determined through local surveys and were then factored up to 2026 'Do minimum' (DM) and 'Do something' (DS, including CWWTPR) scenarios using proportional growth rates obtained from 2011 and 2026 Cambridge Sub-Regional Model (CSRM) modelling results.

6.2.7 With and without development modelling results were further investigated and 12 key junctions were assessed through junction modelling using the LinSig, PICADY and ARCADY tools as appropriate. The junctions pertinent to the location of potential off-site impacts associated with Site 3 include:

- Newmarket Road/High Ditch Road Priority T-Junction
- A14 Junction 35 Roundabout (Quy Interchange)
- Horningsea Road/A14 Westbound on-slip signalised T-Junction
- Horningsea Road/A14 Eastbound off-slip signalised T-Junction

[12] North of Cherry Hinton Development: S/1231/18/OL - 1200 residential dwellings (including retirement living facility (within Use Class C2/C3)) a local centre comprising uses within Use Class A1/A2/A3/A4/A5/B1a/D1/D2 primary and secondary schools community facilities open spaces allotments landscaping and associated infrastructure.

[13] Wing Development Planning Application: S/2682/13/OL - up to 1300 homes primary school food store community facilities open spaces landscaping and associated infrastructure and other development. | Land North Of Newmarket Road Cambridge. Received 18/12/2013.

6.2.8 Table 6.2, Table 6.3 & Table 6.4 below provide Paramics model flows and junction modelling results extracted from the Cambridge Wing Development Transport Assessment. The potential implications for the WWTP are identified and referenced to the proposed Site 3.

6.2.9 It is worth noting that the flow data obtained for the Wing Development Transport Assessment, on which both the base and forecast year are based, dates back to 2013. Cambridgeshire County Council Transport Assessment guidance[14] states that any data used for assessment must be no more than 3 years old. Therefore, although the junction performance may provide an insight into the potential network performance in the area, we would recommend erring on the side of caution in drawing any definitive conclusion from the data. Should Site 3 be taken forward, there would need to be up to date traffic surveys collected for the area.

Newmarket Road/High Ditch Road Priority T-Junction

6.2.10 PICADY results for the Newmarket Road/High Ditch Road Priority T-Junction were not published within the Wing Development TA. However, modelling results were commented on anecdotally in the Wing Development TA, stating that, the Newmarket Road/High Ditch Road junction is over capacity on the minor arm during the AM Peak.

6.2.11 It is important to note that the CSRM model was displaying evidence of 'rat running' along High Ditch Road during this period and therefore no improvements were proposed to alleviate the capacity at this arm to prevent further encouragement of this behaviour. Any proposed improvements to this junction as a result of improving access into Site 3 would need to take this possibility into account.

A14 Junction 35 Roundabout (Quy Interchange)

6.2.12 Table 5.2 below displays ARCADY outputs for the Quy Interchange Junction (Junction 35) under the Do-Something 2026 scenario with the Wing development in place. The ARCADY outputs demonstrate that the Quy Interchange Junction does not perform within capacity during either of the AM or PM peaks, with a maximum Ratio of Flow to Capacity (RFC) value greater than 1 in both cases. An RFC value of above 0.85 indicates that a junction is operating above its desirable capacity. Whilst, an RFC value above 1.0 indicates that the junction is operating outside of its theoretical capacity.

6.2.13 In the AM Peak, the junction is operating well above theoretical capacity on both the A1303 Newmarket Road North approach as well the A14 (East) approach, with RFC values of 1.72 and 1.19 and mean max queue lengths of 575 and 78 PCU's respectively. In the case of the A1303 Newmarket Road North, a queue length of 575 PCU's results in queues extending far beyond the available flare length of the roundabout. Vehicles would be forced to queue onto the A1303 mainline flow, for up to 3km in length. For the A14 (East), a queue length of 78 PCU's results in queues extending to almost the entire length of the available 250m long two lane off-slip.

Table 6.2: A14 Junction 35 Performance (Quy Interchange)

A14 Junction 35 (Quy Interchange)	AM			PM		
	Demand (PCU/hr)	Max Queue (PCU's)	Max RFC	Demand (PCU/hr)	Max Queue (PCU's)	Max RFC
A1303 Newmarket Road (North)	1684	575	1.72	1247	4	0.79

[14] Cambridgeshire County Council Transport Assessment Guidance: https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Transport%20Assessment%20Guidelines%20Sept%202019%20Publication%20Version.pdf

A14 Junction 35 (Quy Interchange)	AM			PM		
A14 (East)	709	78	1.19	566	0	0.07
A1303 Newmarket Road (South)	987	1	0.48	1620	12	0.93
A14 (West)	1221	14	0.95	1387	422	1.75

Source: ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_1_WSP_Response_to_AECOM[15]

6.2.14 In the PM Peak, the junction is operating well above theoretical capacity for the A14 (West) approach, with an RFC value of 1.75. Here, a queue length of 422 PCU's results in severe safety issues. The entire length of the 300m long, two lane off-slip is fully saturated, causing heavy block backs onto the A14. Queues on the A14 (West) itself could stretch as far as 2km.

Horningsea Road/A14 Westbound on-slip signalised T-Junction

6.2.15 Table 5.3 below displays LinSig outputs for the Horningsea Road/A14 Westbound on-slip Junction (Junction 34) under the revised Do-Something 2026 scenario. The outputs demonstrate that this half of Junction 34 performs well within theoretical capacity during both the AM and PM peaks, with a maximum Degree of Saturation (DoS) below 1.0 in all cases[16]. Degree of Saturation (DoS) is defined above in Section 5.2.16.

Table 6.3: Horningsea Road/A14 Westbound on-slip junction performance

A14 Westbound on-slip	AM		PM	
	Max DoS	Queue (vehs)	Max DoS	Queue (vehs)
Horningsea Road South	0.58	7	0.89	34
Horningsea Road North	0.73	4	0.52	5

Source: ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_2_WSP_Response_to_CCC[17]

6.2.16 In the PM peak Horningsea Road South has a max DoS value of 0.89, meaning this arm is typically operating over practical capacity, but below theoretical capacity. A queue length of 34 vehicles here would result in queuing along Horningsea Road South. However, queues would not extend back far enough to cause any safety concern or further delay at other junctions.

6.2.17 In all other scenarios, the junction appears to be operating without congestion, below practical capacity, with all DoS values below 0.85.

Horningsea Road/A14 Eastbound off-slip signalised T-Junction

6.2.18 Table 5.4 below displays LinSig outputs for the Horningsea Road/A14 Eastbound off-slip Junction (Junction 34) under the revised Do-Something 2026 scenario. The outputs demonstrate that this half of Junction 34 performs well within practical capacity during both the AM and PM peaks, with a max DoS value below 0.85 in all cases. As a result, queues are minimal and there are no safety concerns concerning tail backs onto the A14.

[15] Wing Development Planning Application: S/2682/13/OL - ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_1_WSP_Response_to_AECOM

[16] The original planning application (S/2682/13/OL) actually reports junction performance in terms of RFC values. However, this has been corrected to DoS as the junction is clearly stated to have been modelled in LinSig.

[17] Wing Development Planning Application: S/2682/13/OL - ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_2_WSP_Response_to_CCC

Table 6.4: Horningsea Road/A14 Eastbound off-slip junction performance

A14 Westbound on-slip	AM		PM	
	Max DoS	Queue (vehs)	Max DoS	Queue (vehs)
Horningsea Road South	0.32	4	0.49	7
A14 Eastbound off-slip	0.62	4	0.60	7
Horningsea Road North	0.65	10	0.43	9

Source: ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_2_WSP_Response_to_CCC[18]

Implications for the WWTP

6.2.19 It is assumed, for the purposes of this high-level assessment, that most traffic associated with the relocated WWTP would travel predominantly from Junction 35 of the A14 to Site 3 via High Ditch Road.

6.2.20 The assessment undertaken as part of the Cambridge Wing development has indicated that by 2026, multiple approaches to Junction 35 (Quy Interchange) will be above current theoretical capacity in both the AM & PM peak. Although this assessment is dated, all approaches to the Quy Interchange would need to be considered for the assessment of the WWTP development.

6.2.21 In the AM peak, vehicles are expected to exit Junction 35 and travel southbound towards the Newmarket Road/High Ditch Road junction. Although there is currently no evidence to suggest that this junction is operating near capacity in the AM peak, the potential impacts of the WWTP on this junction would be dependent on the traffic levels associated with the relocated WWTP. Therefore, careful consideration should also be given to the Newmarket Road/High Ditch Road Junction.

6.2.22 More up to do date traffic flow information will need to be surveyed to replace the existing 2013 survey data and careful consideration will need to be made regarding the emerging Cambridge Eastern Access Project (below).

6.3 Cambridge Eastern Access Project

6.3.1 As highlighted in Section 4.2.7, one of the key factors, to be taken into consideration when assessing the reliability of Site 3, is the Cambridge Eastern Access Project.

6.3.2 As part of the Greater Cambridge Partnerships (GCP's) aim to create better and greener transport networks; access to Cambridge from the east has been identified as one of four high quality public transport routes into Cambridge that could also form an integral part of the Cambridgeshire Autonomous Metro (CAM).

6.3.3 The Cambridge Eastern Access Project is looking at access to and from the city from the east to enable greater utilisation of more sustainable modes of transport.

6.3.4 The projects aims and objectives are to:

- Identify a variety of options which will improve the reliability, safety, capacity and speed of sustainable transport connections for those accessing Cambridge from the east;

[18] Wing Development Planning Application: S/2682/13/OL - ES_Addendum_-_Appendix_5_-_TA_Updates_-_Part_2_WSP_Response_to_CCC

- Improve connections between existing settlements and identify the best measures that could be put in place to ensure connections are in place at the opening of new developments, thereby reducing the need for trips to be made by private car.

6.3.5 The scheme is not committed in planning terms and has therefore not been considered further at this stage. However, the potential removal of Junction 34 should continue to be considered moving forward, as there is potential to significantly impact upon the relocation of WWTP to Site 3.

6.3.6 As proposals for the site are developed further, it would be advisable to agree with GCP, CCC and HE if the removal of Junction 34 needs to be formally considered as part of the Transport Assessment for the site.

7 Assessment Summary

7.1.1 This preliminary transport assessment has included a review of the current and future highway network conditions in order to establish the potential implications for the relocation of the WWTP. The recommended location for site access to Site 1 and Site 2 is from Butt Lane, despite the analysis of the Butt Lane/ Park and Ride/ A10 junction for 2021 with all committed development and infrastructure in place, indicating that during the PM peak the junction is likely to operate at capacity without the WWTP included. As a result, further assessment would likely be needed to determine the peak hour trip generation for the site (including employee movements) and what implications this might have on this junction and others in the local area. In addition, there are other developments and infrastructure improvements likely to come forward in the corridor in the shorter and longer term. Although some schemes such as the A10 improvements may provide a betterment for the corridor, additional growth at the CNFE/NEC and the remaining phases of WNT, would attract additional demand to the corridor.

7.1.2 Based upon access route provision alone, this preliminary transport assessment has shown that, before mitigation, it would be harder to promote Site 3 over the other site locations currently proposed. However, if other factors influence the preference to Site 3 then access from either Horningsea Road or High Ditch Road may be suitable.

7.1.3 Despite existing weight restrictions in place along Horningsea Road, access to Site 3 via this route is considered more feasible due to the higher costs associated with the infrastructure changes needed to mitigate the impact of access to Site 3 from High Ditch Road. However, access via High Ditch Road should still be considered as an option, particularly with further mitigation measures in mind as it provides an additional routing option through a less sensitive area, with lower recorded flows.

7.1.4 In any event, the WWTP, along with the other developments coming forward in the corridor would be required to mitigate any impacts on the network that are considered to be severe. Next steps and recommendations for the transport aspects of the site are therefore detailed in the next section.

8 Recommendations

This preliminary transport assessment has provided an overview of the site access options, the committed development and infrastructure in the local area, and the off-site junctions which would be likely to require further assessment and consideration.

8.1 Potential survey requirements

8.1.1 The likely survey requirements based on further assessment being required for Sites 1, 2 and 3 are detailed below. We would recommend that the below survey specification be discussed and agreed with Cambridgeshire County Council and Highways England, as the relevant highway authorities, to ensure the scope and timing of the surveys are acceptable for use in a Transport Assessment for the site.

8.1.2 Cambridgeshire County Council Transport Assessment guidance (2019)[19] recommends that all traffic surveys undertaken for that purpose should be:

- Undertaken in neutral months during normal traffic flow and usage condition
- Avoiding non-school holiday periods
- In typical weather conditions
- Based on data that is no more than three years old.

8.1.3 The guidance also notes that Automatic Traffic Count (ATC) surveys should be undertaken within the vicinity of the proposed site access to provide speed data and justification for the peak periods used within the assessment. We would therefore recommend that surveys described in the following sections are undertaken going forward.

8.2 Surveys of the existing site

8.2.1 To fully understand the trip generation for the existing site, and the route that vehicles take to get to the site, the following surveys are likely to be needed:

- Multimodal surveys would be required for the existing WWTP site to identify the all-day/hour-by-hour trip generation by each mode across 1-2 working days
- To identify the distribution of staff trips on the network, Automatic Number Plate Recognition (ANPR) surveys would ideally be needed for 1-2 working days, to isolate vehicles travelling to and from the existing site, at the following locations:
  - Site access (in and out),
  - Milton Road (north and southbound),
  - A14 on and off slips,
  - A10 (north and southbound)

8.3 Surveys of the Local and Strategic Network

8.3.1 Review existing survey information available to determine whether it is suitable for use in the transport assessments for site. We initially suggest that the following junctions be considered for assessment:

[19] Cambridgeshire County Council Transport Assessment Guidance: https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Transport%20Assessment%20Guidelines%20Sept%202019%20Publication%20Version.pdf

c. For sites 1 and 2
   i. Landbeach Road/A10,
   ii. Butt Lane/ A10,
   iii. Butt Lane/ Park and Ride Link Road,
   iv. Park and Ride/ A10 junction,
   v. A14 Junction 33,
   vi. Mere Way/ Butt Lane,
d. For Site 3[20]
   i. A14 Junction 33
   ii. A14 Junction 34,
   iii. Horningsea Road/Low Fen Drove Way,
   iv. A14 Junction 35,
   v. A1303/High Ditch Road.

8.3.2 The survey data required for the above locations would include:

- Manual Classified Count surveys for each of the junctions on 2 weekdays covering the 3-hour peak periods.
- An ATC for a two-week period at the location of the site access and potentially on the A10.

8.3.3 The existing survey data concerning Site 1 and 2 available through the Waterbeach New Town Transport Assessment was mostly collected in 2014-2016. The existing survey data concerning Site 3 available through the Wing Development Transport Assessment was collected in 2013. As a result, new surveys would be needed as the County Council typically requires surveys to be no older than three years old[21]. More recent survey data may be available from Cambridgeshire County Council or the Greater Cambridge Partnership (at a cost) which we would explore with them.

8.4 Proposed analytical approach and initial scope of a future Transport Assessment

8.4.1 The scope of analysis needed for a Transport Assessment for the purpose of relocating the site would be dependent on the scale of traffic movements expected to be generated by the proposed development. Although it is recognised that some of this traffic will already be on the network, for Site 1 and Site 2, it is likely to reassign to the A10 and either Butt Lane or Landbeach Road, on which there are junctions which are at or approaching capacity in peak periods. For Site 3, traffic is likely to reassign across the A14 and re-route through either Junction 33, 34 or 35, dependent on the existing sites origin and destination matrix and the chosen access location.

8.4.2 It is anticipated that, for low levels of traffic flow reassigning during peak periods, the assessment may require junction capacity assessments using Junction 9 software for priority junctions and roundabouts, and LinSig for signalised junctions.

8.4.3 In the event that the relocated site is shown to result in significant reassignment of traffic flows and/ or additional trip generation, the Cambridgeshire County Council (CCC) and Highways England (HE) may require use of the County Council's Paramics model. This is a

[20] Depending on the access location chosen

[21] Cambridgeshire County Council Transport Assessment Guidance: https://www.cambridgeshire.gov.uk/asset-library/imported-assets/Transport%20Assessment%20Guidelines%20Sept%202019%20Publication%20Version.pdf

microsimulation model which, unlike LinSig or Junctions 9, is better able to assess congested networks particularly where blocking back occurs between junctions.

8.4.4 The Transport Assessment for lower levels of increase would be expected to have the following structure:

- **Policy Review** – this section would provide a summary of the relevant and emerging planning policy at a national and local level that relate to the proposed site and surrounding transport network;
- **Baseline Transport Conditions** – this section would provide an audit of the existing transport conditions in the area surrounding the development including highway conditions, public transport availability and personal injury collision analysis;
- **Development Proposals** - outlines the details of the proposed development;

  Development Trip Generation, Distribution and Assignment - this section would detail the trip generation for the proposed site through interpretation of the existing site surveys and re-distribute these trips on the network based on the results of the ANPR survey. Should the proposed site trips be expected to expand or result in additional trips on the network beyond those at the existing site, the trip generation would be appropriately factored up to reflect the trip increase;
- **Junction Capacity Modelling and Impact Assessment** – would present the results of the junction modelling assessment with and without the proposed development for the future year. This would assess the impact of the development on the highway network and determine whether this is 'severe' in accordance with the requirements of the National Planning Policy Framework and therefore additional mitigation measures are needed;
- **Mitigation Measures -** identifies suitable measures to help mitigate the transport impacts of the development should the impact assessment demonstrate that such measures are needed; and
- **Summary and Conclusions** - this would draw together the findings of the TA.

8.4.5 It is anticipated that, given the complexities of the construction works needed for the site, that a Construction Management Plan would also need to be submitted as an outline at the development consent application stage, with a final version secured through planning obligation or condition.

8.4.6 The numbers of staff employed at the WWTP are not available at this stage, although it is anticipated that a Travel Plan is likely to be needed to demonstrate how workers would be encouraged to travel to the site by sustainable modes.

8.5 Engagement with transport authorities

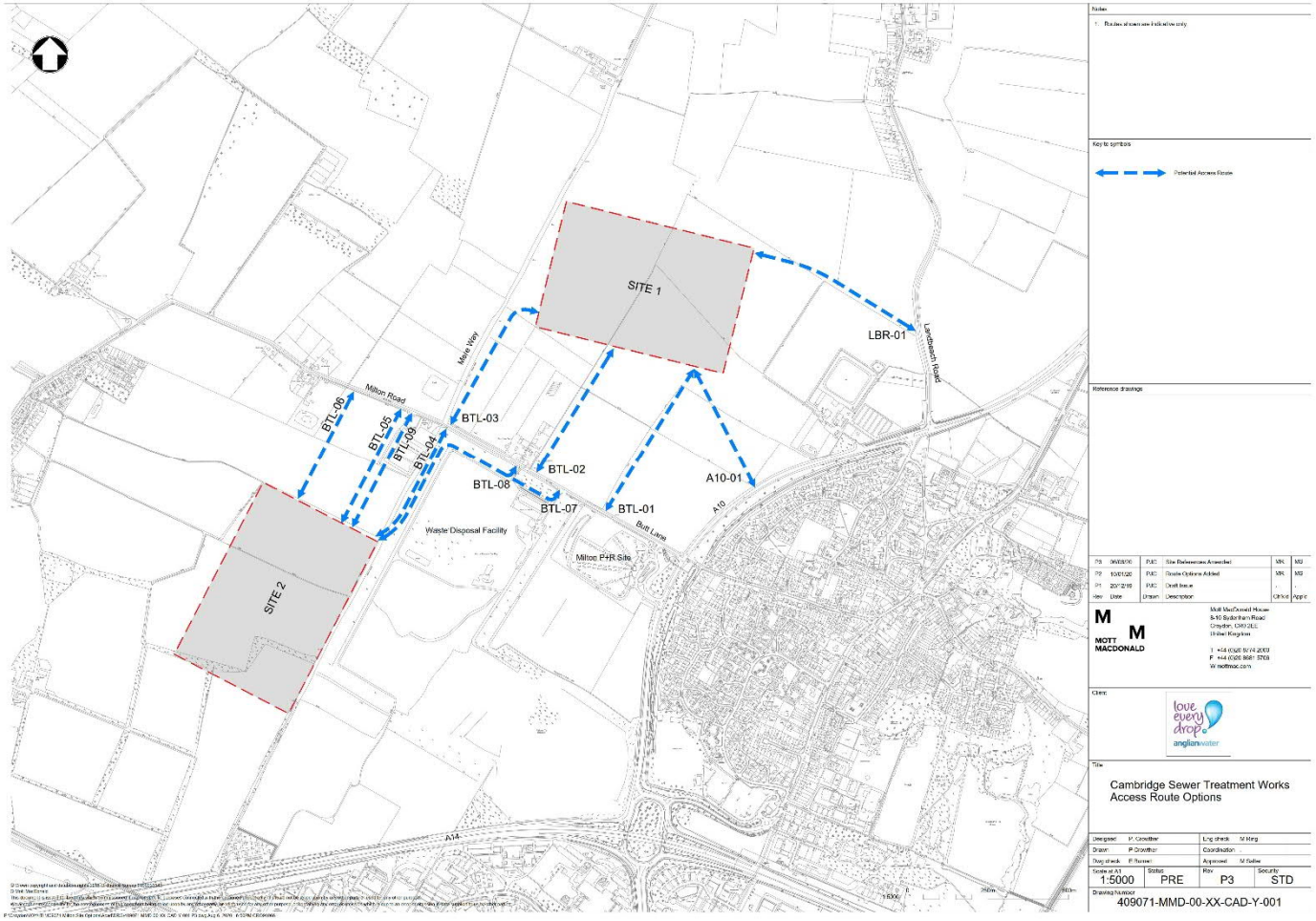
8.5.1 We would recommend early engagement with CCC and HE to make them aware of the preferred site/s and discuss the principle of development and site access. In order to inform these discussions, we would recommend further surveying of the existing site to identify the distribution of site traffic in the first instance, and then identify whether there are likely to be any changes in trip generation resulting from the relocation proposals.

8.5.2 Following this, we would look to undertake pre-application scoping discussions with CCC and HE as the development progresses. This would involve preparing a Transport Assessment Scoping Note and undertaking an initial face to face pre-application meeting to discuss and agree the assessment methodology in advance of developing the Transport Assessment. We would also look to consult with the authorities throughout the development of the TA.

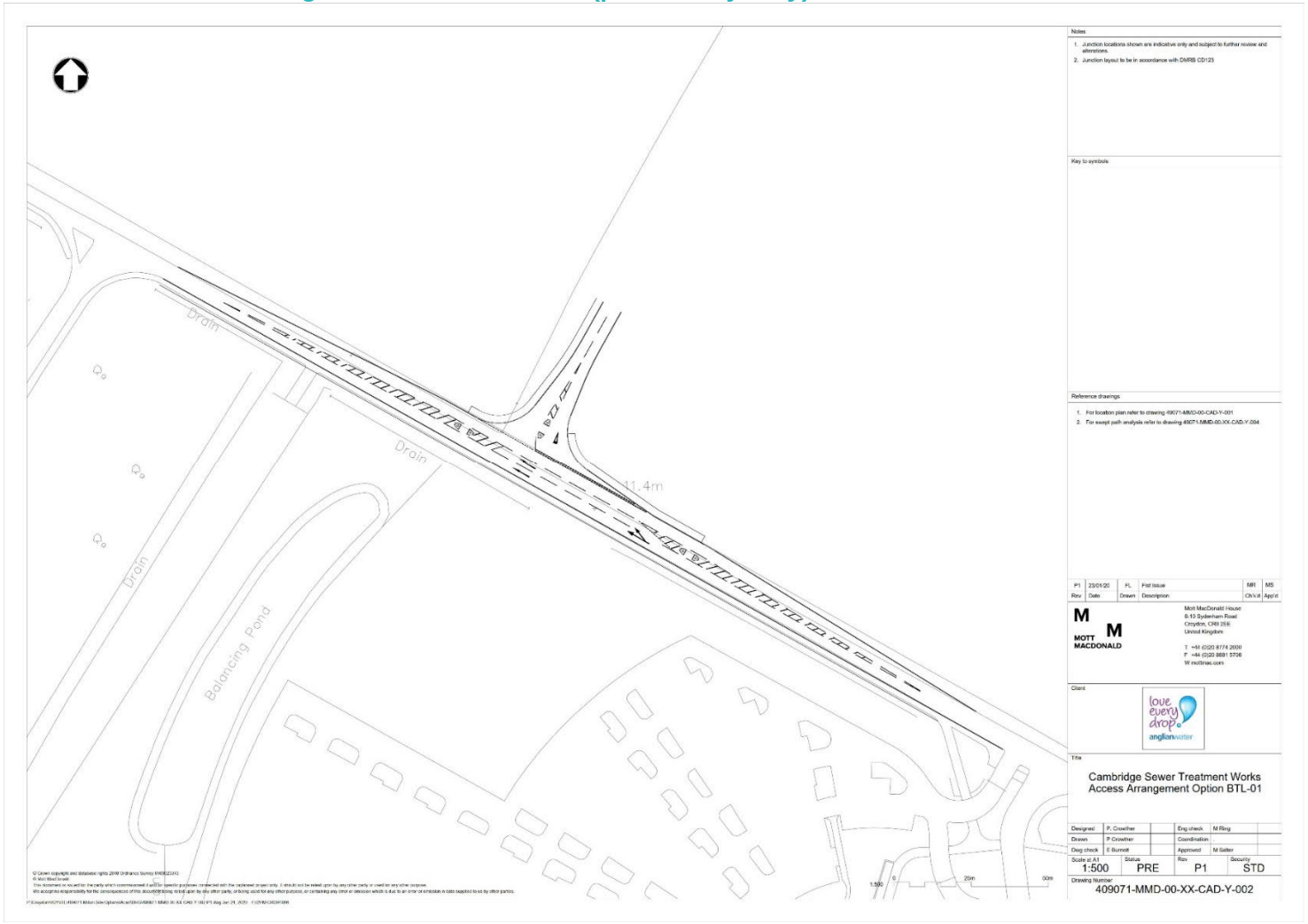
Appendices

A. Drawings

A.1 Proposed access routes into Site 1 and Site 2 for further viability analysis (indicative only).

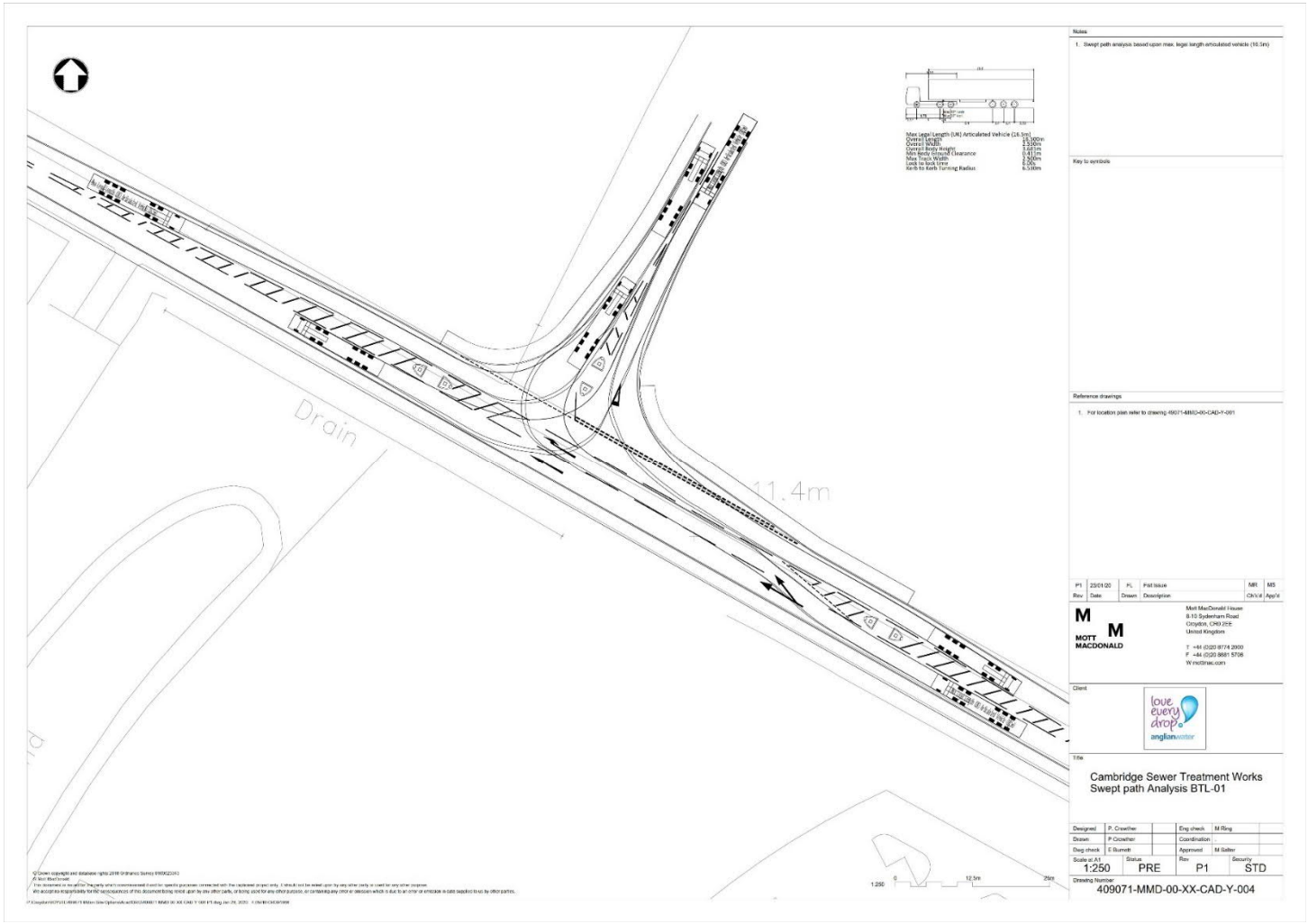


A.2 BTL-01 access drawing for access into Site 1 (preliminary only)

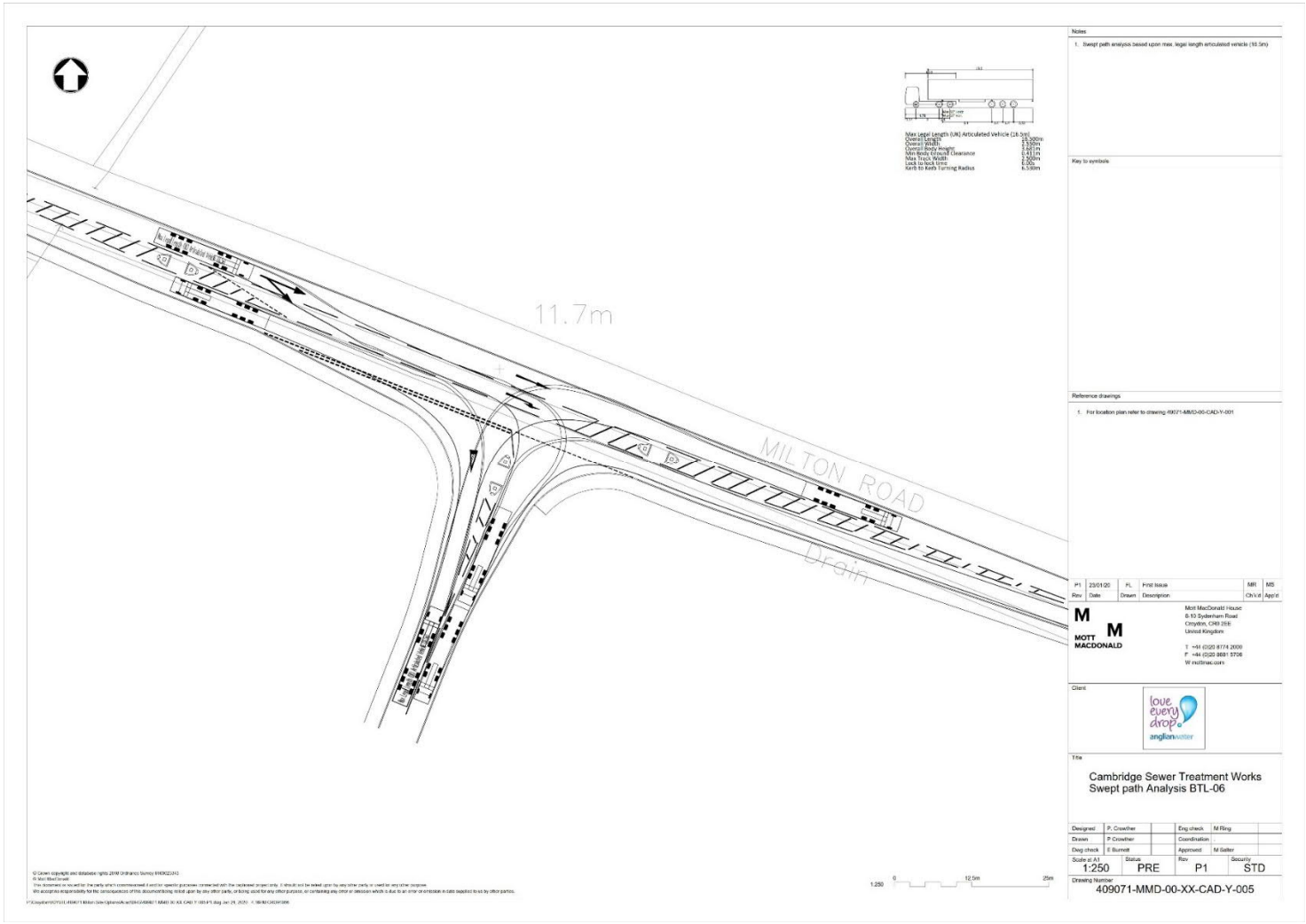


A.3 BTL-06 access drawing for access into Site 2 (preliminary only)

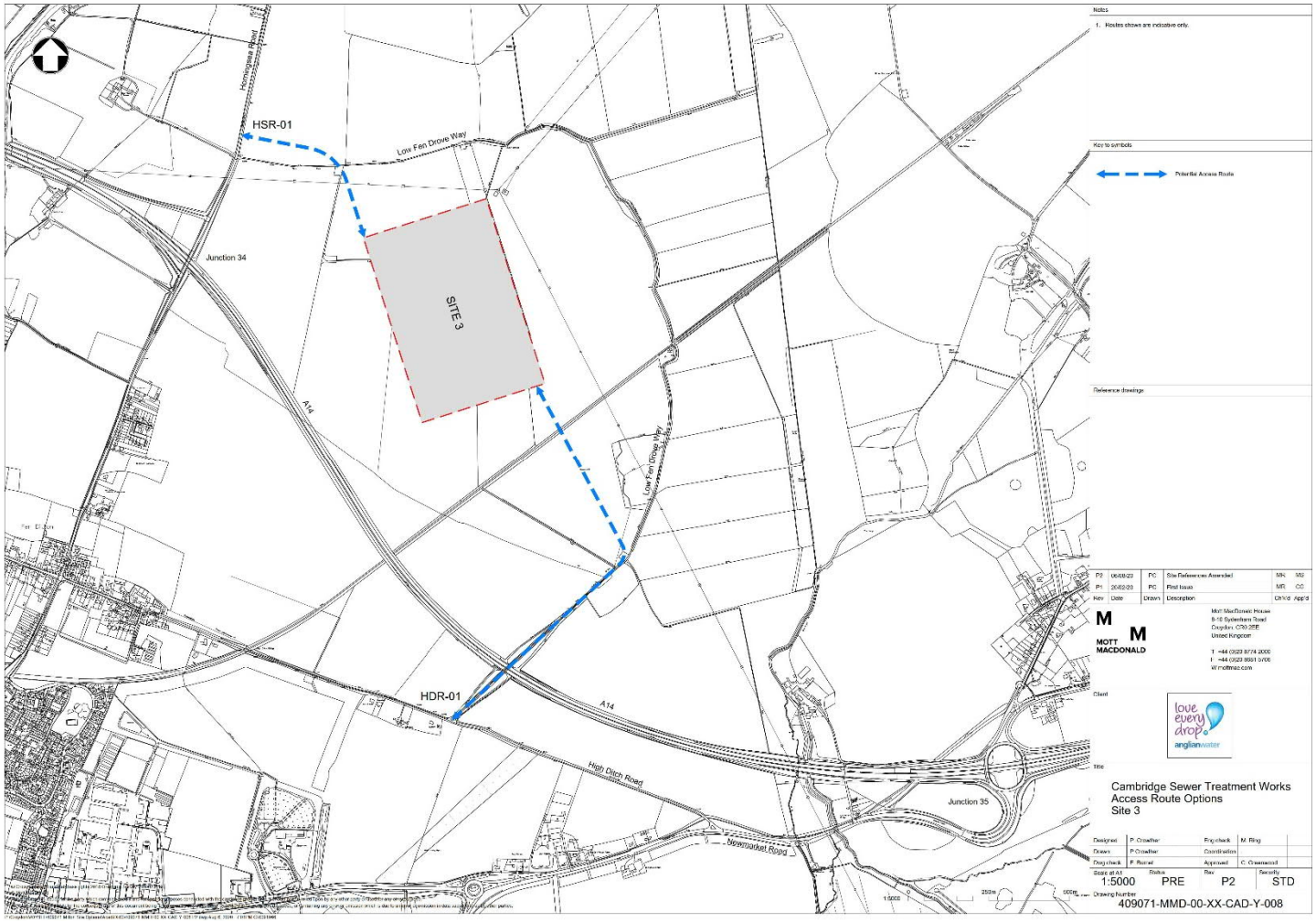
A.4 Swept Path Analysis: Access location BTL-01



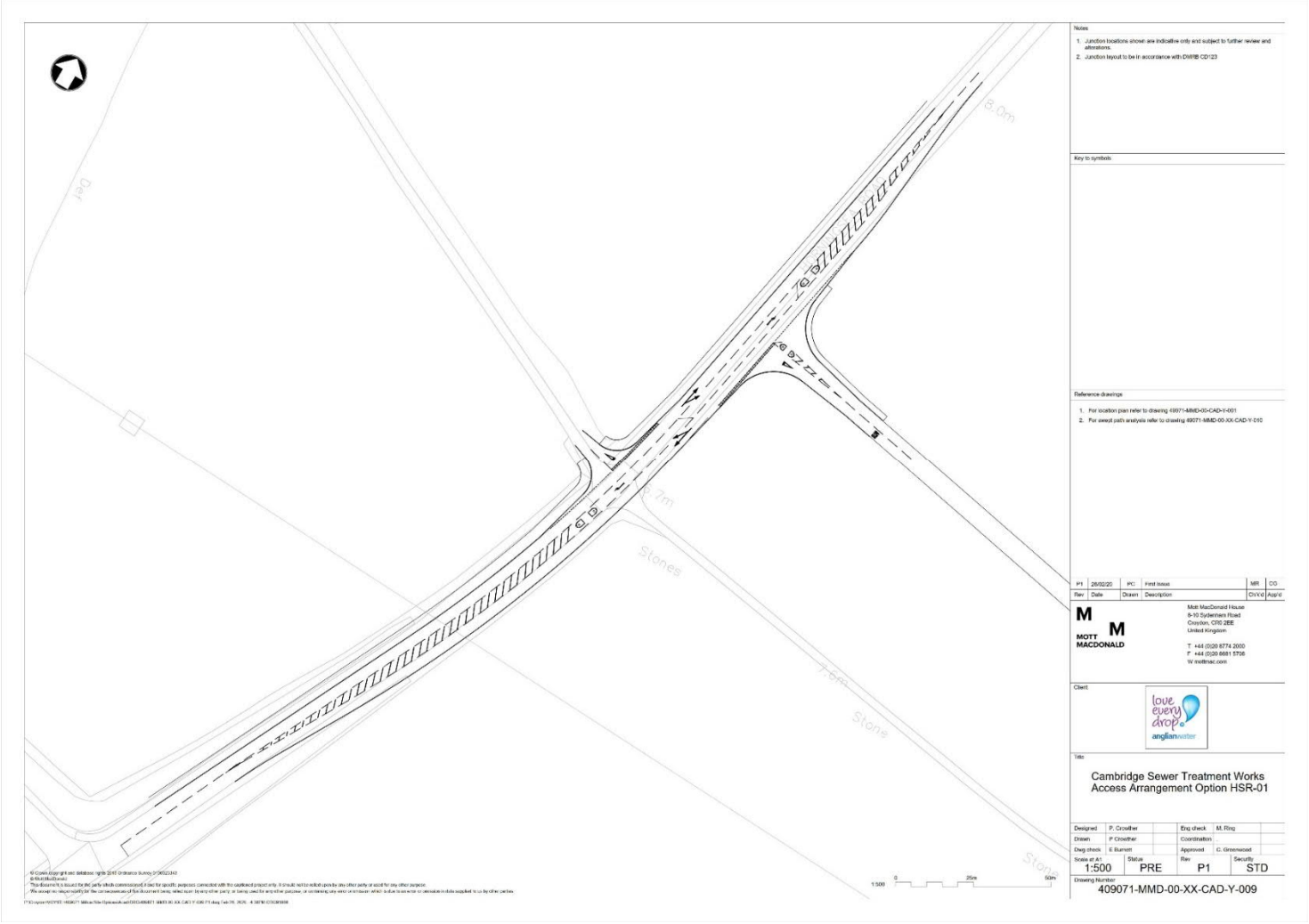
A.5 Swept Path Analysis: Access location BTL-06



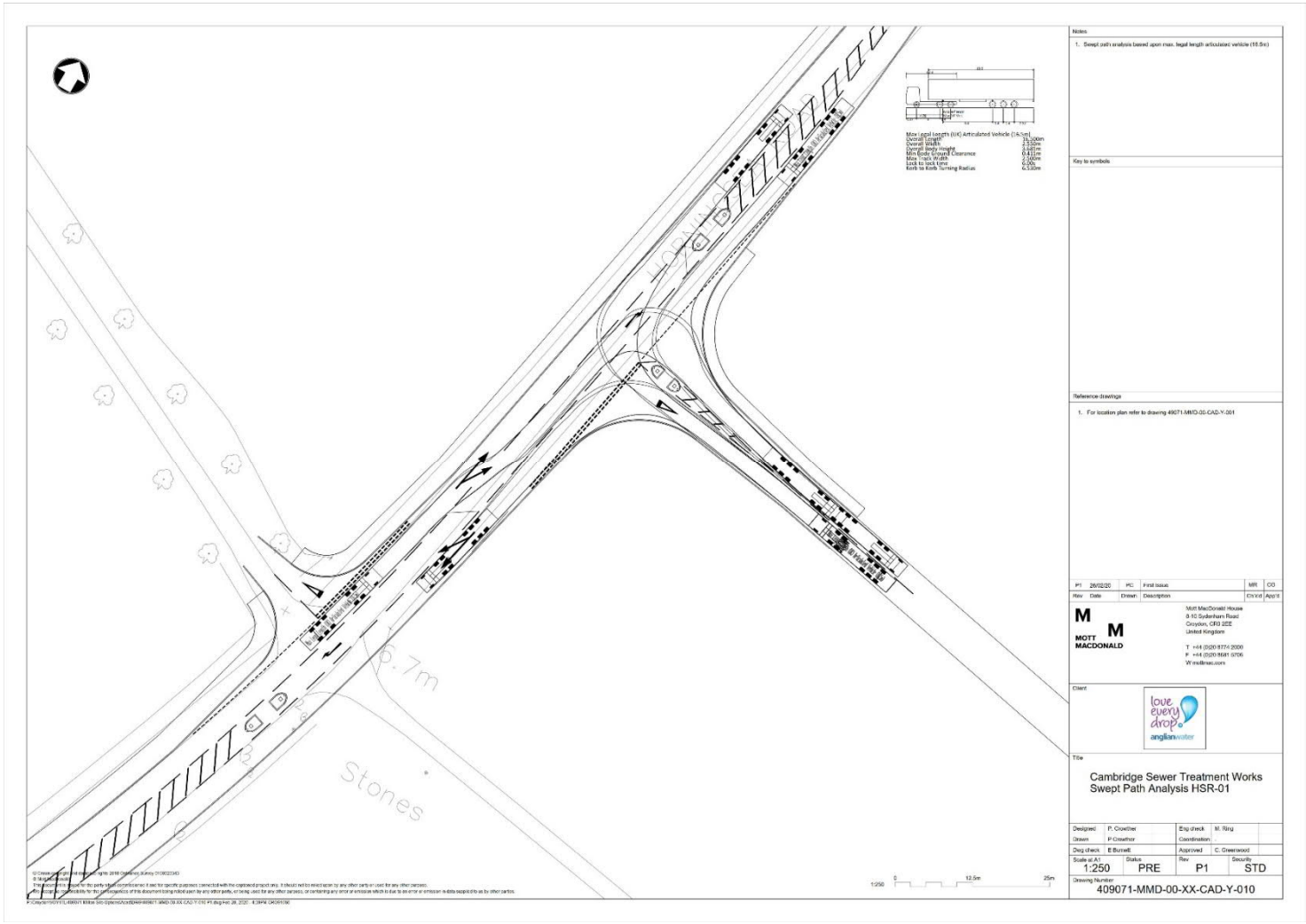
A.6 Proposed access routes into Site 3 for further viability analysis (indicative only).



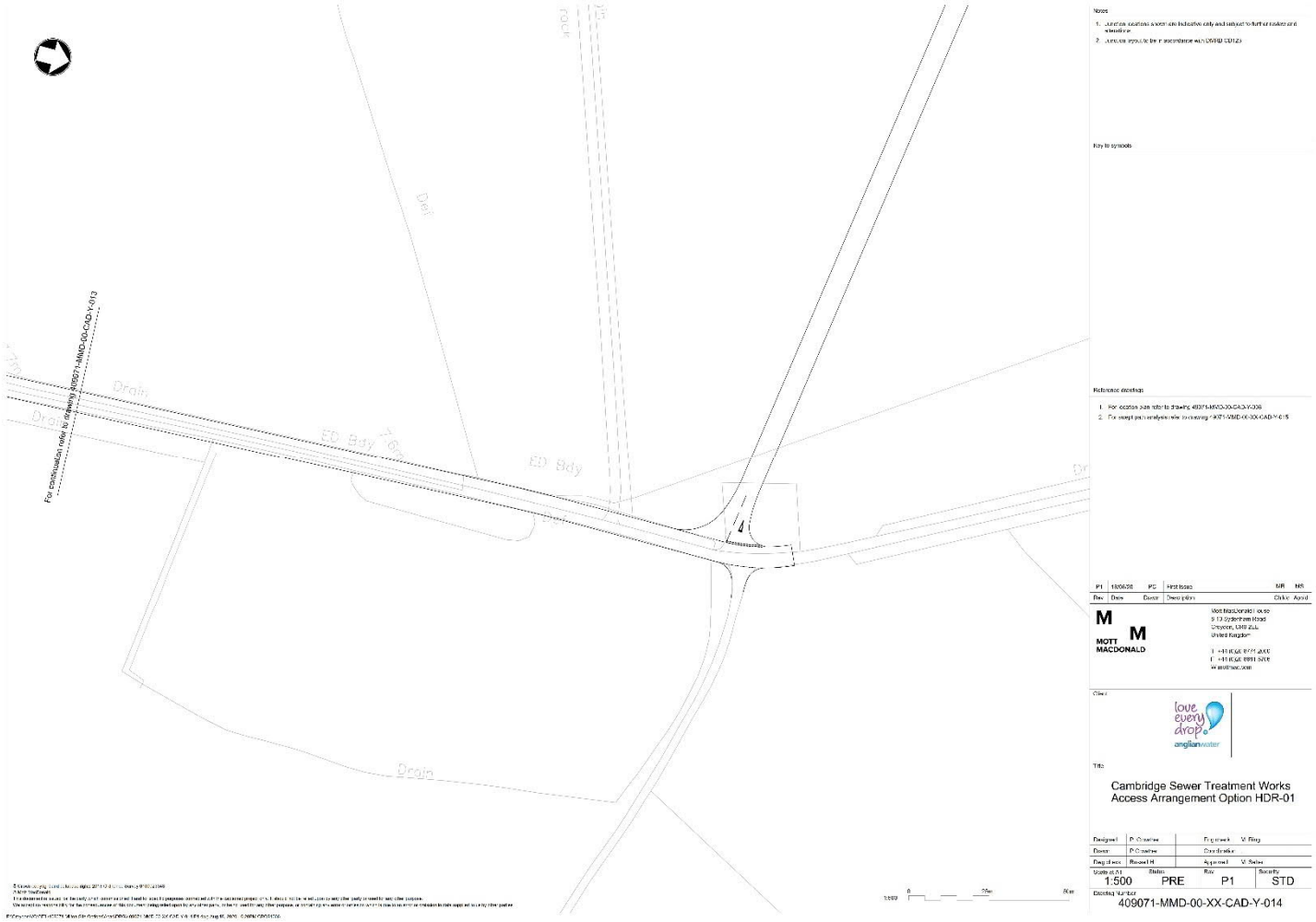
A.7 HSR-01 access drawing for access into Site 3 (preliminary only)



A.8 Swept Path Analysis: Access location HSR-01



A.9 HDR-01 access drawing for access into Site 3



B. Committed developments and transport proposals

Table B.1: Committed developments and transport proposals

Scheme/ Development	Description	Implications for WWTP	Current status	Timescales
Waterbeach New Town – Early Transport Scenario (1600 dwellings, 411 jobs and primary school)	- **Milton interchange** - the proposals include investment in the short-term improvements at the junction. Indicative proposal for improvement works (drawings: Drawings 30509-001-011, 30509-M-001-014 and 30509-M-001-015) are to support development occupation up to 1,350 units. A longer-term scheme will be subject to the A10 Ely to Cambridge Transport Study. - The S106 outlines the PBA short-term solution to increase the capacity of the A10 at its junction with the Milton Interchange, including but not limited to the construction of an extension to the southbound flare. - Signal timing changes to allow better egress from Cambridge Road arm by increasing the inter-green at the A10 North entry. - **Landbeach Road/ A10 junction** - Signalisation to improve safety. - **Landbeach NMU bridge** - A bridge across the A10 for non-motorised users to provide connection between the southern end of the WNT site towards Landbeach.	At present WNT would either provide a financial contribution towards the HE scheme (see A14 improvements), or a similar short term improvement using the PBA design. Any longer-term solution will be subject to the A10 improvements study. Cars and HGVs travelling to/ from WWTP are likely to use this junction to access the strategic road network. The implications in terms of capacity are considered in Section 5 of this report. Signals would have to cope with potential increase in traffic to and from WWTP, the signal timings may need to be revisited depending on the level of traffic associated with the proposed site. The changes associated with this junction would need to be modelled with potential increase in cars and HGV traffic to/from WWTP. This is mostly likely to impact the citing of the site access if off Landbeach Road.	committed	Completion 2020/2021 Year 5 is the expected trigger point Occupation of 300-500 dwellings. Occupation of 1600 dwellings Occupation of 150 dwellings

Scheme/ Development	Description	Implications for WWTP	Current status	Timescales
	- **Butt Lane** and **Park & Ride/ A10** –Widening the A10 southbound lane south of Butt Lane and reducing the size of existing traffic islands to facilitate increased A10 capacity and turning movements. - **Mere Way** – includes improvements to provide a high-quality cycle connection into Cambridge. From Landbeach the route continues along Akeman Street to cross Butt Lane and connect to existing Cambridge Guided Busway. The improvements comprise providing 3m minimum width, resurfacing, solar stud lighting, improved access controls and crossing facilities on Butt Lane. See PBA drawing 30509_2003_SK06 - Extension of Milton Park and Ride services every 30 minutes for up to 874 dwellings and every 10 minutes thereafter.	A bridge across the A10 would be beneficial to the WWTP as it would reduce potential conflict between HGV traffic and non-motorised users. Widening the southbound lane on the A10 to the south of Butt Lane would improve capacity, the junctions would need to be modelled to understand fully the implications for WWTP. Mere Way is an existing Byway that would need to remain/ be considered as part of siting of the proposed WWTP. Increased number of buses left turning out of and right turn into Butt Lane, are unlikely to pose significant implications for junction performance		
Waterbeach New Town – Outline - Phase 2 onwards (6,500 dwellings)* *Total allocation 10,000 although it's only the above proposals that outline planning has been sought for	Future phases to be monitored and managed through a scheme led transport mitigation package policy refers to: - New P&R at or close to The Application site - New Busway to serve the site - A Capacity enhanced A10 - Strategic Improvements to the A14 and A10 Milton Interchange - Relocation of the Rail Station Safe and direct access into the site from the A10 with two new junctions. These accesses would be designed to encourage and prioritise access by bus.	At present the Phase 2 and onwards for WNT are subject to further assessment and suitable mitigation measures being identified. It is questionable whether this would need to be considered as part of the Planning application for the development.		Anticipated build out completion 2033-2038
A10 improvements – highways and public transport	The A10 Ely to Cambridge Transport Study recommended a suite of improvements to the corridor encompassing walking and cycling measures, improved public transport from	The A10 improvements, if implemented would add significant highway capacity to the corridor which would benefit WWTP. Preliminary	Business Case work ongoing by	To be defined through business case process. A10 dualling potentially

Scheme/ Development	Description	Implications for WWTP	Current status	Timescales
	Waterbeach to Cambridge with accompanying travel hubs, junction improvements, and dualling of the A10.	alignment has been released and will likely provide implications for site location, particularly Site 1. The client team may wish to engage with the CPCA at an appropriate time to understand and influence this.	CPCA for highway works and GCP on non-highway works.	within 7-10 years subject to scheme delivery programme and statutory processes.
CNFE (now known as North East Cambridge)	Includes the last remaining significant brownfield site in Cambridge (land east of Milton Road). Would likely include significant residential and employment development, extent of which is still to be defined through a forthcoming Area Action Plan (AAP). Any accompanying transport improvements yet to be defined.	Unknown at this stage pending AAP but unlikely to include significant highway works.	Commitment in terms of AAP but details as yet undefined	Draft AAP anticipated during 2020
A14 improvements	Milton Interchange - Initial scheme is to be implemented as part of the A14 upgrades being implemented by Highways England to improve the on/off slip roads to the west of the junction, as well as adding a further southbound lane across the A14 overbridge. The scheme was designed anticipating 1,400 dwellings at Waterbeach		construction	Completed by the end of 2020
Science Park developments	Various recent applications on the site for further employment uses. Some reworking of main site access arrangements secured (i.e.: on Milton Road, Cambridge).	Would bring local operational benefits on Milton Road in vicinity of Science Park but implications for WWTP would be marginal.	Secured via planning applications	Depending on development delivery timescales

Source: Mott MacDonald

L. Historic environment report

MOTT MACDONALD

Cambridge Waste Water Treatment Plant Relocation

Stage 4 Final Site Selection: Historic Environment Assessment

November 2020

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Cambridge Waste Water Treatment Plant Relocation

Stage 4 Final Site Selection: Historic Environment Assessment

November 2020

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Executive summary

Following the results of Stage 3: Fine Screening for the relocation of Cambridge Waste Water Treatment Plant (WWTP), three sites (site areas 1, 2 and 3) were identified as best performing when assessing the outcome of screening across all disciplines. Detailed additional screening of the three shortlisted sites is being undertaken, alongside consultation, to determine the best performing site for the project.

This Stage 4 – Final Site Selection focusses on the potential for impact on the historic environment for the three shortlisted sites. This report provides a baseline for each of the three site areas and presents an initial impact appraisal, which identifies the potential for impact on the built historic environment, historic landscape and on archaeology for each of the three site areas, and their associated infrastructure. Based on this initial impact appraisal and the criteria set out in the methodology section of this report (section 2), each site area has been assigned a Red, Amber or Green (RAG) outcome.

This report provides a more detailed assessment of the three shortlisted sites than was provided at Stage 3, including: a more detailed baseline, a site walkover, and potential impacts on heritage assets identified within a 10km Zone of Theoretical Visibility (ZTV) for the tallest part of the proposed scheme (based on a digester height of c.26m at an indicative location within the indicative WWTP footprint).

Based on the criteria described in section 2 and the impact appraisal in section 4, the RAG outcome for the development of the proposed scheme at **site area 1** is **AMBER**. This is due to the potential for moderate or major impact on archaeological remains of moderate value associated with Iron Age and Roman activity and potential impact on the grade I listed Church of All Saints from change within its setting. With mitigation this rating would remain amber.

Based on the criteria described in section 2 and the impact appraisal in section 5, the RAG outcome for the development of the proposed scheme at **site area 2** is **AMBER.** This is due to the high potential for Iron Age and Roman archaeological remains. With mitigation this rating would remain amber.

Based on the criteria described in section 2 and the impact appraisal in section 6, the RAG outcome for the development of the proposed scheme at **site area 3** is **RED.** This is due to the potential impact on the setting of the Grade II* listed Biggin Abbey. With extensive mitigation, there is potential for this impact to be reduced to **AMBER**.

It is recommended that a tunnel is used instead of a pipeline for the treated effluent corridor to minimise impact on the historic environment, as this would have a lesser impact on buried archaeology. For sites 1 and 2 option A for the corridor is marginally preferable due to previous development within the corridor, which reduces the potential for archaeology as it is likely to have removed or truncated remains. These options do not affect the RAG outcomes above for each site.

1 Introduction

This historic environment report forms part of Stage 4 – Final Site Selection for the relocation of Cambridge Waste Water Treatment Plant (WWTP), conducted by Mott MacDonald for Anglian Water. This report identifies the potential historic environment impacts from the development of the new WWTP ('the proposed scheme') at each of the three shortlisted site areas. These three site areas have been selected for this stage of assessment based on the results of prior stages of site selection, also conducted by Mott MacDonald for Anglian Water, including the results of Stage 3: Fine Screening. This report provides a more detailed assessment of the three shortlisted site areas than was provided in stage 3, including: a more detailed baseline, the results of initial site surveys and potential impacts on designated heritage assets identified within a 10km Zone of Theoretical Visibility (ZTV) for the tallest part of the proposed scheme. This report also includes recommendations for mitigation at each of the proposed site areas (1, 2 and 3) and a reassessment of the likely impact on the historic environment if all mitigation is undertaken.

2 Methodology

This section outlines the methodology used in the production of this report.

2.1 Desk-Based Research

Information on the historic environment has been collected for each shortlisted site area, access routes, pipeline/tunnel options and diversions for the existing waste water transfer network.

The information collected comprised:

- Designated Heritage Assets – Those offered specific legal protection due to their heritage significance, which includes: World Heritage Sites, Listed Buildings, Locally Listed Buildings Scheduled Monuments, Registered Parks and Gardens, Registered Historic Battlefields and Conservation Areas.
- Non-Designated Heritage Assets – Those whose importance is acknowledged and are identified as having a degree of significance meriting consideration in planning decisions, but which are not formally designated assets, including: Historic Buildings, Historic Parks and Gardens, Monuments, Sites, Places, Areas and Landscapes.

Data relating to these assets was obtained from the following sources:

- The National Heritage List for England (NHLE) as held by Historic England[1];
- The Cambridgeshire Historic Environment Record (CHER);
- Geological Mapping information from The British Geological Society (BGS)[2];
- Available online heritage and archaeology reports, including those held by the Archaeological Data Service[3],
- A rapid historic walkover survey of the shortlisted sites; and
- Available online historic maps.

2.2 Study Area

For the purposes of the Stage 4 – Final Site Selection, a study area of 100m from the indicative boundary was used for non-designated assets identified within the CHER. This 100m study area was used to identify the potential for direct impact to non-designated heritage assets. Data was collected for up to 500m from the edge of each option. Where non-designated assets identified in the CHER in the wider context of site areas 1, 2 and 3 inform archaeological potential, historical development or background, these are also referenced in the text. However, non-designated assets outside of the 100m buffer have not been appraised for potential impact at this stage of the assessment. This study area is appropriate for the high-level appraisal of the options.

A study area of 500m from the indicative boundary of each of the site area options was used to identify the potential for impact to designated assets.

[1] Historic England (2020) *The National Heritage List for England* [online]. Available at: https://historicengland.org.uk/listing/the-list/ (Accessed August 2020)

[2] British geological Society (2020) *Geological map of Britain* [online] Available at: www.mapapps.bgs.ac.uk (Accessed August 2020)

[3] The Archaeological Data Service (2020) Available at: https://archaeologydataservice.ac.uk/ (Accessed August 2020)

In addition, a Zone of Theoretical Visibility (ZTV) was produced to identify assets within 10km from which the relocated WWTP may be visible for all three site areas. This has been used to highlight additional assets with the potential to affect the Red, Amber or Green (RAG) outcome (see below) of the three site area options. For the purpose of the Stage 4 – Final Site Selection, the following assets within the ZTV have been appraised for setting impacts; grade II* and grade I buildings (and associated grounds if relevant), registered parks and gardens (all grades), scheduled monuments (where setting contributes to significance) and conservation areas. Non-designated assets and grade II listed buildings within the ZTV have not been considered at this stage, unless they fall within the stated study areas, due to the distance limiting the potential impacts on their settings.

This approach aims to apply a methodology proportionate to the level of this report and is anticipated to identify all assets within the ZTV that have the potential to increase the RAG rating of a site (see section 2.5). There are no world heritage sites or other designated heritage assets within the ZTV, therefore impacts on these have not been assessed. The ZTV uses an indicative location for the tallest part of the scheme, the digesters at an assumed 26m in height. This is not a finalised height or design but is intended to give an indication of where the proposed scheme may be visible, therefore assets identified in the ZTV at this stage of assessment may experience no impact following detailed design; similarly additional assets may be identified as the scheme/ZTV is refined. As listed building data is recorded as points, a 10m buffer was applied to these points when extrapolating data. This aims to better capture listed buildings that may fall within the ZTV, which have the potential to be impacted.

When assessing tunnel and pipeline corridors for the proposed site areas, all options have been considered (i.e. options A and B for site areas 1 and 2 are both considered in this report). A study area of 200m for designated assets has been used from the tunnel and pipeline corridors for the proposed sites, for the following reasons:

- This report is intended to provide a high-level assessment, additional impacts on designated assets outside this search area will be captured in detailed assessment, design and mitigation as part of an Environmental Impact Assessment (EIA) following site selection.
- This boundary captures direct impact (including potential for impact during construction, e.g. from vibration) which would result in major, moderate or minor impact to designated heritage assets.
- The potential for impacts relates to tunnels or buried pipelines, which are not anticipated to impact on the setting of any heritage asset after their construction.
- Additional impacts on designated assets outside this boundary are likely to be very small or negligible, relating to small temporary changes in setting.

A study area of 100m has been used for non-designated assets.

2.3 Site Survey

A rapid site walkover of each of the three site areas and key heritage assets relating to them was undertaken by a heritage professional from Mott MacDonald on Tuesday 18th August 2020 to inform this assessment.

2.4 Consultation

Consultation with stakeholders is ongoing. Where consultation comment has been received before the finalisation of this report it has been factored into site selection where relevant. This includes an initial response from the Cambridgeshire County Council Historic Environment Team and Historic England.

2.5 Assessment of Impact

An understanding of the value of heritage assets is required to assess the potential impact of the proposed scheme on the historic environment. Where the value of heritage assets is discussed, the following criteria have been used:

- High Value – a designated heritage asset of potentially national importance, including scheduled monuments, grade I and grade II* registered parks and gardens and grade I and II* listed structures.
- Moderate Value – a heritage asset of regional importance, including non-designated assets, conservation areas and listed buildings and registered parks and gardens with a grade II designation.
- Low value – non designated assets of local importance or no notable significance.

An initial impact appraisal has been undertaken using the following criteria, for an unmitigated and mitigated scenario. It must be noted that archaeological fieldwork and the ability to record the archaeological remains does not reduce the level of loss/impact.

Table 1: Criteria for assessing impact

Level of impact	Criteria
Major	Total loss or fundamental alteration to a heritage asset's significance or setting. Addition of new features that substantially alter the setting of a high value heritage asset.
Moderate	Partial loss or alteration to a heritage asset or its setting. Addition of new features that form largely inconspicuous elements in the setting of a high value heritage asset to the extent that its significance is slightly impacted.
Minor	Minor loss of an element of a heritage asset or its setting. Addition of new features that form largely inconspicuous elements in the setting of a moderate value heritage asset to the extent that its significance is slightly impacted.
Negligible	Very minor loss of elements of a heritage asset or its setting. Addition of new features that do not alter the setting of a heritage asset.
No change	No change to the heritage asset.

An overall Red/Amber/Green (RAG) assessment was given to each of the site area options. The criteria for the defining the overall score is defined below.

Table 2: RAG criteria for historic environment

Green	Amber	Red
No anticipated impact on non-designated and designated heritage assets. Potential **negligible to moderate** impact on **non-designated** assets of **low value**. Potential **negligible to minor** impacts on **non-designated** and designated assets of **moderate value.**	Potential **major** impact on **non-designated** asset of **low value**. Potential **moderate to major** impact on **non-designated** and designated assets of **moderate value.** Potential **negligible to minor** impacts on **designated and non-designated** assets of **high value**.	Potential for **moderate to major** impact on **non-designated and designated** assets of **high value**.

Comment is made within the impact appraisal sections of this report as to how this assessment relates to the planning terminology of no harm, less than substantial harm and substantial harm. This is intended to inform how this assessment relates to planning context. It should be noted that this terminology may not always provide a useful representation of anticipated impact due to broad categories, and should be understood in the context of the explanatory text and assessment as described above, rather than taken alone.

3 Planning Policy and Legislation

3.1 Legislation

The following legislation is of relevance to the proposed relocation of the WWTP with regard to the historic environment.

3.1.1 Planning (Listed Building and Conservation Areas) Act (1990)

This Act sets out the protection given to buildings of special architectural or historic interest through listing. It also sets out the process for designation of conservation areas, which are recognised as areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance.

3.1.2 Ancient Monuments and Archaeological Areas Act (1979)

This Act sets out the legal protection given to archaeological remains in England, Scotland and Wales. The Act outlines the process for scheduling and the protections afforded scheduled monuments and other ancient monuments.

3.2 National Policy Statement (NPS) for Waste Water (2012)

The National Policy Statement (NPS) for Waste Water was issued in March 2012[4] and sets out the government policy for the provision of major water infrastructure. This framework is the primary basis against which consent for waste water developments that fall within the definition of Nationally Significant Infrastructure Projects (NSIP) as defined in the Planning Act 2008[5] are decided.

Section 4.10 is concerned with the historic environment. Paragraphs 4.10.1 to 4.10.6 introduce the standard for what is considered to be included in the historic environment, what constitutes a heritage asset and guidance for including non-designated assets in impact assessment. Discussion of heritage assets within this report is conducted in line with the terminology included in these paragraphs.

Paragraphs 4.10.7 to 4.10.9 set out the requirements for the historic environment for the applicant when applying for consent, these relate to the Environmental Statement (ES) which should be prepared and related reports (e.g. desk-based assessment) and are:

4.10.7 *"As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on the significance of the heritage asset. As a minimum the applicant should have consulted the relevant Historic Environment Record and assessed the heritage assets themselves using expertise where necessary according to the proposed development's impact."*

4.10.8 *"Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry*

[4] H M Government (2012) *National Policy Statement for Waste Water.* Via: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69505/pb13709-waste-water-nps.pdf (accessed July 2020)

[5] H M Government (2008) *Planning Act.* Via: https://www.legislation.gov.uk/ukpga/2008/29/contents (accessed July 2020)

out appropriate desk-based assessment and, where such desk based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, representative visualisations may be necessary to explain the impact."

4.10.9 *"The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents."*

Whilst these requirements relate to later stages of assessment for the proposed scheme, this report aims to identify the potential for the impacts described above, including heritage assets and archaeology with the potential to be impacted, at each of the three potential sites (site area 1, site area 2 and site area 3).

Paragraphs 4.10.10 to 4.10.17 identify the impacts that should be accounted for during the decision-making process. Of relevance to the historic environment and the proposed scheme are the following:

4.10.11 *"In considering the impact of a proposed development on any heritage assets, the decision maker should take into account the particular nature of the significance of the heritage assets, and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between conservation of the significance and proposals for development."*

4.10.12 *"The decision maker should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution they can make to sustainable communities and economic vitality. The decision maker should take into account the desirability of new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials and use. The decision maker should have regard to any relevant local authority development plans or local impact report on the proposed development…"*

4.10.13 *"There should be a presumption in favour of the conservation of designated heritage assets and the more significant the designated heritage asset, the greater the presumption in favour of its conservation should be. Once lost, heritage assets cannot be replaced and their loss has a cultural, environmental, economic and social impact. Significance can be harmed or lost through alteration or destruction of the heritage asset or development within its setting. Loss affecting any designated heritage asset should require clear and convincing justification. Substantial harm to or loss of a grade II listed building, park or garden should be exceptional. Substantial harm to or loss of designated assets of the highest significance, including Scheduled Monuments, registered battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional."*

4.10.14 *"Any harmful impact on the significance of a designated heritage asset should be weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss. Where the application will lead to substantial harm to or total loss of significance of a designated heritage asset the decision maker should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm."*

4.10.15 *"Not all elements of a World Heritage Site or Conservation Area will necessarily contribute to its significance. The policies in paragraphs 4.10.10 – 4.10.14 apply to those*

elements that do contribute to the significance. The decision maker should take into account the relative significance of the element affected and its contribution to the significance of the World Heritage Site or Conservation Area as a whole."

4.10.16 *"Where the decision maker considers that the loss of significance of any heritage asset has been justified by the applicant based on the merits of the new development, they should consider imposing a requirement on the consent, or requiring the applicant to enter into an obligation, that will prevent the loss occurring until it is reasonably certain that the relevant part of the development is to proceed."*

4.10.17 *"When considering applications for development affecting the setting of a designated heritage asset, the decision maker should treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the decision maker should weigh any negative effects against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval."*

Paragraphs 4.10.18 to 4.10.21 detail the framework for the mitigation and recording requirements for the application relating to the historic environment. Due to the aims and nature of this report, it does not detail recommended recording or mitigation relating to the historic environment. Therefore, these paragraphs are not of relevance to this report.

3.3 Local Planning Policy

The following local planning policy applies to all shortlisted site options (site areas 1, 2 and 3).

3.3.1 South Cambridgeshire Local Plan

The South Cambridgeshire Local Plan was adopted in 2018[6] and applies to the whole of the South Cambridgeshire district until 2031; this contains all three shortlisted sites. The following policies from this local plan are of relevance to the proposed scheme with regard to the historic environment.

Policy NH/14: Heritage Assets

1. *Development proposals will be supported when:*
   a. *They sustain and enhance the special character and distinctiveness of the district's historic environment including its villages and countryside and its building traditions and details;*
   b. *They create new high quality environments with a strong sense of place by responding to local heritage character including in innovatory ways.*
2. *Development proposals will be supported when they sustain and enhance the significance of heritage assets, including their settings, as appropriate to their significance and in accordance with the National Planning Policy Framework, particularly:*
   a. *Designated heritage assets, i.e. listed buildings, conservation areas, scheduled monuments, registered parks and gardens;*
   b. *Non-designated heritage assets including those identified in conservation area appraisals, through the development process and through further supplementary planning documents;*

[6] South Cambridgeshire District Council (2020) *South Cambridgeshire Local Plan 2018.* Via: www.scambs.gov.uk/planning/local-plan-and-neighbourhood-planning/the-adopted-development-plan/south-cambridgeshire-local-plan-2018 (accessed August 2020)

c. *The wider historic landscape of South Cambridgeshire including landscape and settlement patterns;*
d. *Designed and other landscapes including historic parks and gardens, churchyards, village greens and public parks;*
e. *Historic places;*
f. *Archaeological remains of all periods from the earliest human habitation to modern times.*

4 Site area 1

4.1 Baseline

4.1.1 Site Location

Site area 1 is located north-west of Milton and south-west of Landbeach. It is located over Akeman Street/ Mere Way, which follows the route of a Roman Road. It is surrounded on all sides by agricultural land, with the A10 and Landbeach Road close to the east and Butt Lane close to the south. The pipeline corridor to Waterbeach runs north-east, to the east of Landbeach. The waste water transfer pipeline corridor to the existing Cambridge WWTP runs south-east. There are two proposed treated effluent pipeline corridors for site area 1. Option A runs south-east following a similar route to the waste water transfer corridor. Option B runs east, to the north of Horningsea.

4.1.2 Previous Assessment

Site area 1 was referred to as Site I in prior stages of screening for the relocation of the WWTP. Site area 1 underwent an initial archaeology and built heritage appraisal during Stage 2: Coarse Screening and Stage 3: Fine Screening. Site area 1 was assessed as Amber during Stage 2, due to the high archaeological potential associated with Mere Way Roman Road and potential for assets of moderate value within the site boundaries. Site area 1 was again assessed as Amber during Stage 3 due to the Roman Road and high archaeological potential.

4.1.3 Topography and Geology

The bedrock geology is Gault Formation – Mudstone, sedimentary bedrock formed approximately 101 to 113 million years ago. The overlying drift is largely unrecorded, with some inclusions of River Terrace Deposits, 4 - Sand and Gravel, formed up to 3 million years ago.

The topography of site area 1 is mostly level and low, at 9-10m AOD. The land rises slightly in the south towards Butt Lane. Mere Way, a former Roman road and modern trackway, bisects site 1, which is largely farmland.

4.1.4 Historical Development

There is limited early prehistoric evidence for occupation in the study area for site area 1. The exception to this is a single Mesolithic blade (CHER: 05273) which was recovered within 100m of site area 1. No substantial artefact scatters or monuments relating to the Neolithic – Early Bronze Age periods have been recovered within the study area for site area 1. There is some evidence for the use of the wider landscape by early prehistoric peoples, but little within the immediate context of site area 1. There was limited Neolithic material recovered during excavations at Milton Landfill, to the south, however this site was dominated by later prehistoric and Roman activity.[7]

Bronze Age and Iron Age activity is identified in the CHER data for site area 1. No monuments have been identified within the site, however a Bronze Age findspot is recorded (CHER: 08788A). Iron Age finds have been recovered in the wider setting of Site area 1. An aerial photography survey covering a large area at Limes Farm, Landbeach, 250m north-east of site

[7] Cambridgeshire County Council Archaeological Field Unit (1995) *Evaluation at Milton Landfill Site.*

area 1, found numerous cropmarks[8]. Some of these were later investigated revealing an Iron Age ditched enclosure system[9]. This is evidence of Iron Age activity in the broader landscape, in sites with similar topography and geology, but not of activity directly within the study area for site area 1. Also, in the wider context of the site, considerable prehistoric activity was recovered in excavations for Milton Landfill, largely dating to the Iron Age period and continuing into Roman occupation.

Mere Way/Akeman Street is a Roman Road, which has been in continuous use since this period and is still in use today. Findspots within the study area for site area 1 largely relate to the Roman period and are likely associated with the use of this route. To the south, at Milton Landfill, occupation of the identified Iron Age site continued into the Roman period. This is consistent with the trend of the reutilisation of Iron Age settlement, by Roman invaders as well as the continued use of existing farmsteads by Romano British peoples. The former Roman road bisects site area 1 (to the west of the indicative WWWTP location), increasing the potential for additional Roman remains within site area 1. A field walking survey which extended into site area 1, in the south-west corner, found cropmarks and pottery relating to Roman activity.

To the north in Landbeach is a shrunken medieval village (NHLE: 1006870) with surviving areas south-west and north-east of the modern settlement. Occupation of a settlement at Landbeach likely dates to at least the early medieval period, possibly due to the accessibility of the location from Mere Way/ Akeman Street Roman Road. The population peaked into the 11th, 12th and 13th centuries, resulting in the large area which is scheduled representing the former village (NHLE: 1006870). Population declined at Landbeach from the 14th century, before rising again c.1550 when new cottages were constructed on former waste land. Some 16th and 17th century buildings still survive within Landbeach. New building throughout the post-medieval period has largely not expanded into the surrounding farmland but remained around the settlement core. The roads to Cambridge/Ely and to Waterbeach are believed to originate in the post-medieval period, therefore Mere Way/ Akeman Street was likely the main access route to the settlement prior to the construction of these.[10] Today, the settlement is smaller than many surrounding villages, with semi-rural town character centred around one main street and surrounded by open farmland on all sides and contains a conservation area. The church spire is dominant within internal views in Landbeach.

The earliest available historic maps[11] of the area show site area 1 under agricultural use. Two medieval findspots are identified in the CHER within the boundary of site area 1, however no medieval sites have been identified. It is likely that the area was under agricultural use from at least the medieval period and may have been farmed to serve the medieval village. Agricultural land use of the site area has continued into the modern period, with no substantial non-agricultural features or structures recorded on historic mapping.[12]

To the south-east the settlement at Milton is larger than that to the north, separated from Cambridge and the existing WWTP by the A14. The A10 borders the settlement to the east and creates a disconnect between site area 1 and the settlement. Like much surrounding settlement it has developed on a raised gravel platform, with evidence of use since the Mesolithic period. The current settlement at Milton was established some time prior to 1066, when the timber churches were replaced with stone. It expanded between the 13th and 17th centuries, with some

[8] Air Photo Services, Cambridge (1999) *AP assessment, Limes Farm, Landbeach.*

[9] Palmer, R. and Connor, A. (2000) *An Iron Age ditched enclosure system at Limes farm, Landbeach, Cambridgeshire*. Antiquity 74; 284 (p281-282).

[10] A P M Wright and C P Lewis (1989) 'Landbeach: Introduction', in *A History of the County of Cambridge and the Isle of Ely: Volume 9* pp. 138-141. Via: British History Online http://www.british-history.ac.uk/vch/cambs/vol9/pp138-141 (accessed August 2020)

[11] Historic maps accessed via: www.old-maps.co.uk

[12] Historic maps accessed via: www.old-maps.co.uk

post-medieval properties remaining today, including a cluster of 16th and 17th century dwellings near All Saint's Church. In the second world war, land surrounding Milton was used for barracks, a rail depot and a POW camp.[13] The A10 Milton Bypass was constructed in the late 20th century and the A14 c.1990, separating Milton from Cambridge. It is bordered to the east by the River Cam. The character of Milton is more modern than settlements further into the South Cambridgeshire countryside, however there are areas of strong historic character in key locations, such as surrounding the Church of All Saints.

Today the site area is used for agriculture, with the exception of the Mere Way route, which is a pedestrian and cycle track.

4.1.5 Designated Assets

The details of all designated assets within the study area for site area 1 are given in the gazetteer in Appendix A.1.

4.1.5.1 Site area 1

There are no designated assets located within site area 1, or within 500m of site area 1. The nearest designated asset (c.700m north-east) is:

- Baptist Chapel, grade II listed (NHLE: 1179106).

Designated assets within 500m of site area 1 can be viewed in map 409071-MMD-00-XX-GIS-Y-0472 in Appendix C.1.

4.1.5.2 ZTV for site area 1

In the given criteria (see methodology in section 2) within the ZTV for site area 1 there are:

- 33 grade I listed buildings
- 34 grade II* listed buildings
- 28 scheduled monuments
- One grade I registered park and garden
- Six grade II* registered parks and gardens
- Ten grade II registered parks and gardens
- 22 Conservation Areas

Designated assets within the ZTV for site area 1 can be viewed in map 409071-MMD-00-XX-GIS-Y-0473 in Appendix C.1.

4.1.5.3 Waterbeach transfer pipeline

Assets within the study area for all pipeline corridors for site area 1 can be viewed in map 409071-MMD-00-XX-GIS-Y-0474 in Appendix C.1.

There are no designated assets within the pipeline corridor. Within the 200m study area of the proposed corridor for the Waterbeach transfer pipeline for site area 1 are the following designated assets:

- Baptist Chapel (NHLE:1179106), the same grade II listed building as discussed above
- The Limes, a grade II listed property in Landbeach (NHLE: 1127389)

[13] Booth, D. (2017) *A Brief History of Milton*. Via: www.milton.org.uk/a-brief-history-of-milton (Accessed August 2020)

4.1.5.4 Treated Effluent Pipeline Option A

There are no designated heritage assets within treated effluent pipeline corridor option A, or within 200m of the pipeline.

4.1.5.5 Treated Effluent Pipeline Option B

There are no designated heritage assets within treated effluent pipeline corridor option B. Within the 200m study area for the treated effluent pipeline corridor option B are the following designated assets:

- Multi-phased settlement east of Milton, a scheduled monument (NHLE: 1457437)
- Lodge to Milton Hall, a grade II listed building (NHLE: 1331320)

4.1.5.6 Access Road

There are no designated heritage assets within the corridor proposed for access to site area 1, or within 200m.

4.1.5.7 Diversions for the Existing Waste Water Transfer Network

There are no designated heritage assets within the corridor for the diversions for the existing waste water transfer network, or within 200m.

4.1.6 Non-Designated Assets

The sections below outline all non-designated assets within the study area for site area 1. These assets are detailed in the gazetteer in Appendix B.1.

Non-designated assets within the study area for site area 1 can be viewed in map 409071-MMD-00-XX-GIS-Y-0475 in Appendix C.1.

4.1.6.1 Site area 1

There are no non-designated assets within the CHER within site area 1. Four non-designated assets are identified within 100m, as follows:

- Mesolithic flint blade, Milton (CHER: 05273)
- Roman Pottery, Milton (CHER: 05273A)
- Medieval Pottery, Milton (CHER: 05273B)
- Post-medieval Pottery, Milton (CHER: 05273C)

In addition, Mere Way/ Akeman Street Roman Road, which may with its associated features hold moderate value, is located running north-south through the centre of site area 1, between 10 and 30m west of the indicative site boundary.

Site area 1 is also located north-west of Milton Cemetery. This cemetery is first shown on historic mapping from 1901 and is considered a heritage asset of local importance, and therefore a low value heritage asset. The countryside setting of the cemetery to the north and west contributes to the sense of place of the cemetery, which are traditionally peaceful and isolated. The presence of the A10 bypass to the south has introduced noise within this setting.

4.1.6.2 Waterbeach transfer pipeline

Assets within the study area for all pipeline corridors for site area 1 can be viewed in map 409071-MMD-00-XX-GIS-Y-0474 in Appendix C.1.

Within the proposed Waterbeach transfer pipeline corridor and 100m of this, there are ten non-designated assets identified in the CHER:

- Cropmarks near Landbeach (CHER: 08317)
- Roman pottery and coin, Landbeach (CHER: 08314)
- Cropmark ditches, Lime Farm (CHER: 11175)
- Cropmark complex, Lime Farm, Landbeach (CHER: 08312a)
- Roman cropmark evidence, Landbeach (CHER: 08844)
- Roman ditch, Landbeach (CHER: 05343)
- Roman cropmark site, Landbeach (CHER: 08847)
- RAF Waterbeach (CHER: CB15155)
- Roman settlement and cemetery, Area 6, Waterbeach Barracks (CHER: MCB24602)
- Roman finds, Waterbeach (CHER: 11331)

4.1.6.3 Treated Effluent Corridor Option A

Within the treated effluent pipeline corridor for site area 1 Option A, there are six non-designated assets identified in the CHER, dating from the Iron Age period to the Second World War. These are:

- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Medieval windmill, Milton Park and Ride (CHER: MCB18210)
- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)
- Cropmark enclosure, Milton (CHER: 08320)
- WWII vehicle depot, Trinity Farm, Milton (CHER: MCB17527)

Within 100m of this pipeline are an additional three assets, one is post medieval and two are Roman; one of which (CHER: 05281) has an associated inhumation. These are;

- Post-Medieval and undated features, St. John's Innovation Park, Cowley (CHER: 08330)
- Roman settlement, Milton (CHER: 05281)
- Roman pottery and ditches, Milton (CHER: 05308)

4.1.6.4 Treated Effluent Corridor Option B

Within the treated effluent pipeline corridor for site area 1 Option B, there are nine assets dating from the Roman period to the second World War. These are:

- Site of Rectory Farm, Milton (CHER: MCB27069)
- Milestone, Ely Road, Milton (CHER: MCB18343)
- Cropmark complex, Milton (CHER: 08471)
- Roman pottery, Milton (CHER: 05538)
- Roman site, Penfold Farm (CHER: 08873)
- Roman site, Penfold Farm (CHER: 08313)
- Romano-British features, Cambridge Rowing Lake site (CHER: MCB16009)
- Destroyed pillbox, N of Milton (CHER: MCB27485)
- Destroyed pillbox, N of Milton (CHER: MCB27483)

Within 100m of this corridor are an additional eight assets dating from the prehistoric period to the Second World War. These are:

- Possible rectilinear feature, Milton (CHER: 08315)
- Dubious linear features, Milton (CHER: 08316)
- Roman urns, Horningsea (CHER: 05547)
- Prehistoric remains, Cambridge Rowing Lake site (CHER: MCB16002)
- Flint implement, Horningsea (CHER: 05404)
- Roman pottery scatter, Milton (CHER: MCB17094)
- Destroyed pillbox, N of Milton (CHER: MCB16401)
- Earthwork remains Ridge and furrow, N and NW of Horningsea village (CHER: 05615)

4.1.6.5 Waste water transfer corridor

The following assets are located within the waste water transfer corridor:

- WWII vehicle depot, Trinity Farm, Milton (CHER: MCB17527)

The following assets are located within the 100m study area for the waste water transfer corridor:

- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Medieval windmill, Milton Park and Ride (CHER: MCB18210)
- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)
- Cropmark enclosure, Milton (CHER: 08320)
- Post-Medieval and undated features, St. John's Innovation Park, Cowley (CHER: 08330)
- Post-medieval boundary ditch, S t John's Innovation Park, Cambridge (CHER: MCB15916)
- Cropmark site, Fen Ditton (CHER: 08327)
- Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6 (CHER: 11193)
- Medieval settlement remains, Fen Ditton (CHER: 05535)
- Extractive Pit, Off Green End (CHER: MCB20562)
- Public air raid shelters, Fen Ditton (CHER: MCB25354)
- Roman cropmark system, Horningsea (CHER: 11555)
- Roman pottery, A45 Quy fieldwalking survey field 16 (CHER: 11203)
- Ridge and Furrow, Abbots Ditch Field (CHER: MCB6677)
- Medieval pottery, A45 fieldwalking project field 10 (CHER: 11197)

4.1.6.6 Access Road

There are two non-designated assets within the access area for site area 1, both relating to findspots:

- Roman pottery, Milton (CHER: MCB6755)
- Mesolithic flint blade, Milton (CHER: MCB6424)

An additional five assets are identified in the CHER as being within 100m of the access area for site area 1, mostly relating to Roman settlement at Milton landfill:

- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)

- Medieval windmill, Milton Park and Ride (CHER: MCB18210)
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)
- Roman bronze jug handle, Milton (CHER: 08778)

4.1.6.7 Diversions for Existing Waste Water Transfer Network

There are two non-designated heritage assets within the corridor for the diversions for the existing waste water transfer network, as follows:

- Former Impington Hall Park and Gardens (HER: 12129)
- Tile finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 22 (HER: 11209)

4.1.7 Archaeological Potential

4.1.7.1 Site area 1

There is moderate potential for archaeological remains of the prehistoric period, with two existing CHER points in the study area and further activity identified by archaeological investigation. The numerous prehistoric remains recovered at Milton Landfill demonstrate the high archaeological potential for remains of this period within the context of site area 1 and of Mere Way.

There is a very high potential for archaeological remains relating to the Romano-British period, due to the site area's location adjacent to Mere Way/Akeman Street Roman Road. Roadside Romano-British activity is anticipated, based on the precedent for findspots within the area and the activity identified adjacent to Mere Way at Milton Landfill.

There is a low potential for early medieval remains, as there is no specific evidence for early medieval activity within site area I or its immediate surroundings.

There is moderate to high archaeological potential relating to medieval and post medieval agriculture, as this land use is believed to date back to the medieval period. If recovered, agricultural remains are likely to inform of local farming practices but not have significance beyond this and therefore be of low value. There is low potential for remains of other nature dating to the medieval and post-medieval period.

There is low potential for archaeological remains dating to the modern period within site area 1, as there is no recorded land use associated with this period within the study area, with the exception of continuation of agricultural practice.

4.1.7.2 Waterbeach transfer pipeline

The Waterbeach transfer pipeline has high potential for Roman and Late Iron Age archaeology in the south, surrounding site area 1. In addition, the route crosses through an identified crop mark enclosure, likely late prehistoric (CHER: 08314) and two further cropmark settlements, likely Roman. Therefore, there is high potential for archaeology relating to this period along much of the pipeline.

There is also moderate potential for medieval and post medieval remains to the east of Landbeach, associated with the settlement. However, it is likely this land was mostly used for agriculture in these periods.

To the north of the pipeline corridor it crosses centrally through the remains of the former RAF Waterbeach (CHER: CB15155) There is high potential for second world war remains associated with this.

4.1.7.3 Treated Effluent and Waste water Transfer Corridors

Due to the depth of the tunnels for the treated effluent and waste water transfer corridors there is low potential for archaeological remains relating to all periods to be present within these routes. At the access to these tunnels from the site the archaeological potential is the same as discussed above in section 4.1.7.1 until at sufficient depth to be below the archaeological horizon. The output for the waste water transfer corridor has low potential due to prior development in this area. The outputs for options A and B for the treated effluent corridor have low potential for in situ remains due to the presence of the river, and the negative impact of moving water on the survival of archaeological remains. However, the river has been in use since the prehistoric period, with use for transport of goods in particular. Therefore, some remains may be encountered.

If pipelines are used instead of tunnels for the treated effluent corridor, there is greater archaeological potential due to the shallower depth. Options A and B for the treated effluent corridor all have high potential for late prehistoric and Roman archaeology north of the A10. Option A for the waste water transfer corridor has moderate potential for roman and second world war remains. Option B has moderate to high potential for roman remains across its route, except adjacent to the road and railway.

4.1.7.4 Access Road

The access area for site area 1 has high potential for archaeological remains relating to the Late Iron Age and Roman periods, associated with Mere way / Akeman Street Roman Road and the prevalent late prehistoric and early roman activity in the immediate area.

4.1.7.5 Diversions for the Existing Waste Water Transfer Network

The diversion corridor has moderate potential archaeological remains relating to the Late Iron Age and Roman periods, associated with Mere way / Akeman Street Roman Road and the prevalent late prehistoric and early roman activity in the immediate area. The corridor has high potential for archaeological remains relating to the former post-medieval Impington hall park and later post-medieval agriculture.

4.2 Site walkover survey

Site area 1 was surveyed on Tuesday 18th August 2020. Full access was not possible along Mere Way due to road works, however the western half of the site area could be partially observed. This western half of the site area was covered with polytunnels at the time of survey. Mere Way is a wide byway lined with trees, hedges and scrub. It was noted on the site visit that it is in regular use by pedestrians, dog walkers and cyclists.

Figure 4.1: Site 1 polytunnels. Mere Way tree line visible

Source: Mott MacDonald (2020)

Significant road noise was observed from the A10 and the A14. Viewed from the A10, the eastern part of site area 1 was observed to be open farmland. Mere Way is delineated in this landscape by the tall tree/hedge line. The spire of All Saints Church is visible across site area 1 from the A10 (over the Mere Way tree line).

Figure 4.2: Site 1 looking north west. Spire of All Saints Church visible over tree line.

Source: Mott MacDonald (2020)

4.3 Impact Appraisal

This section describes the potential for impact on the historic environment if the proposed scheme is developed at site area 1.

4.3.1 Site area 1

There is potential for all assets identified within the ZTV to experience a negligible to minor impact to their significance as a result of change within their setting. The extent of this impact will depend on the design of the final scheme. As the ZTV has been produced assuming the

tallest height of the new WWTP (26m relating to the height of digesters in an indicative location), assets identified may not be impacted by the final scheme; similarly additional assets may be identified at later stages.

The grade I and II* assets in closest proximity to site area 1 mostly do not fall within the ZTV, therefore the potential for impact to their setting is much lower. High value designated assets identified within the ZTV are mostly at greater distance (1km+) without direct or historic connection to site area 1, therefore change in setting is likely to result in small or negligible, if any, impact to these assets. The exception to this is the grade I listed parish Church of All Saints (NHLE: 1127385) in Landbeach. The spire of this church was designed to dominate within views in the village and be a prominent landscape feature. There is potential that the construction of the digesters at site area 1 may draw attention from the height of the spire, which could result in impact on an asset of high value.

The nearest conservation area is Landbeach Conservation Area. The setting of Landbeach Conservation Area relative to farmland surrounding it makes a positive contribution to its value, due to its historical connection to buildings within the conservation area. Part of this setting would be altered by the construction of the CWWTP at site area 1. However, the area altered represents only part of this element of the setting of the conservation area and does not immediately abut it, therefore this context would not be entirely removed from the setting of the conservation area. The construction of CWWTP at site area 1 has the potential to impact views towards the Landbeach Conservation Area from the south, by detracting from the country feel of existing views. The above considerations for the Church of All Saints are also of consideration for Landbeach Conservation Area, in which it sits. Other listed buildings within the conservation area are mostly of moderate value. It is unlikely that views extending outwards from the conservation area would experience substantial change from the construction of the WWTP at site area 1. Views outward from the conservation area are mostly directed along two key routes; east to west on Cockfen Lane and Waterbeach Road and north-north-west to south-south-east on High Street and Green End. The tallest elements of the WWTP may be visible from within the green space at the centre of the village, although it is not anticipated to dominate when within this space. In an unmitigated form, the WWTP has the potential to change how the village centre is experienced and by introducing urbanising elements. Therefore, this may result in impact to the conservation area. Unmitigated, construction of the WWTP at the indicative footprint within site area 1 is likely to result in a minor impact to the significance of Landbeach Conservation Area, a moderate value heritage asset, as a result of a change within its setting.

There is high archaeological potential for Iron Age and Roman remains within site area 1 related to the presence of a Roman Road (Mere Way/Akeman Street) and the known archaeology of the landscape surrounding the site area. Therefore, construction of the proposed scheme at site area 1 represents the potential for truncation or removal of these remains, if present. This could result in a moderate to major impact on a non-designated asset of moderate value. There are no anticipated impacts on any scheduled monument, the nearest being the Shrunken Medieval Village of Landbeach (NHLE: 1006870), which is located over 1km north. These remains are buried, without above ground earthworks relating to the setting, their value being derived from their archaeological interest and its associated context with the surviving historic core of Landbeach (located adjacent to the scheduled area). Therefore, it is anticipated that there will be no impact on the setting or context of the asset from the construction of the WWTP in site area 1.

The presence of the WWTP has the potential to impact the setting of Milton Cemetery, by impacting the peaceful sense of place by altering the countryside setting. The peaceful sense of

place is however already disturbed by road noise from the A10 to the south. Dependant on the scheme design, there is potential for a minor to moderate impact on a low value heritage asset.

4.3.2 Waterbeach transfer pipeline

The pipeline to Waterbeach is unlikely to impact the designated assets identified within the study area for it, with the exception of a temporary change in their setting. However, the pipeline route has very high archaeological potential for remains across multiple periods along its route. Where archaeological remains are present, these remains would be truncated or removed by excavations for the Waterbeach transfer pipeline. There is potential for Iron Age and Roman remains along most of the pipeline, in addition to remains associated with RAF Waterbeach. Therefore, the Waterbeach transfer pipeline for site area 1 has the potential to result in moderate to major impact to unknown archaeological remains of low and moderate value.

4.3.3 Treated Effluent and Waste water Transfer Corridors

There is no anticipated impact on designated assets from the Waste water Transfer Corridor for site area 1, or the Treated Effluent Corridor, if this is a tunnel. There is unlikely to be an impact on archaeology from below ground works to create the tunnels for these routes, due to their depth and low potential at their outputs.

If pipelines are excavated from the top down this presents the risk of moderate to major impact to unknown and known archaeological remains of moderate value, due to recorded and potential late prehistoric and Roman archaeology on all routes. Within the corridor for Option A, there is an asset with associated inhumation; this option therefore may present greater potential impact to the historic environment than Option B. Option B, however, has greater archaeological potential along its entire length due to being located in a less developed area.

A tunnel is preferable to a pipeline as it would result in a lesser impact to buried archaeology, there is no strong preference between the corridor options, however option A is anticipated to result in slightly lesser impact to the historic environment due to previous development within this corridor. These impacts do not affect the overall RAG rating of the site.

4.3.4 Access Road

The access route for site area 1 has the potential to remove or truncate archaeology relating to the Iron Age and Roman periods. Therefore, there is potential for moderate to major impact of unknown archaeological remains of potentially moderate value.

4.3.5 Diversions for the Existing Water Transfer Network

The diversions for the existing waste water transfer network have the potential to remove or truncate archaeology relating to the Iron Age and Roman periods, as well as the post-medieval period. Therefore, there is potential for moderate to major impact of unknown archaeological remains of potentially moderate value, and likely low value.

4.4 RAG Outcome

Based on the criteria described in section 2 and the above impact appraisal, the RAG outcome for the development of the proposed scheme at site area 1 is **AMBER.**

4.4.1 Reason for RAG outcome

The primary reason for the Amber rating for site area 1 is the high archaeological potential for Roman and Iron Age remains. This results in a likelihood of moderate to major impact to

archaeological remains which may be of low to moderate value, which amounts to substantial harm in accordance with the NPS.

In addition, the pipeline to Waterbeach encounters remains identified in the CHER with potentially moderate value and would result in a moderate to major impact to these. Therefore, the excavation for the pipeline to Waterbeach is anticipated to result in substantial harm to assets of low to moderate value.

In addition, potential for impact to the grade I listed Parish Church of All Saints contributes to the RAG outcome. The change within its setting is likely to result in minor impact to a designated heritage asset of high value. Additionally, minor impact to the grade II listed Baptist Chapel from change within its setting contributes to this outcome. In accordance with the NPS, this amounts to less than substantial harm to designated heritage assets.

4.5 Mitigation

4.5.1 Proposed mitigation

Design considerations should aim to minimise change within the setting of designated heritage assets, with particular consideration to the grade I listed Parish Church of All Saints. Strategic planting and other landscaping between the WWTP and these designated assets may soften the visual impact, especially in conjunction with design measures for the buildings. Buildings and structures over 10m, including the digesters, should be designed to be the minimal feasible height, to further reduce impact on the setting of heritage assets. The exterior of tall elements should be designed to retreat into the landscape, for example by using gradated painting. This mitigation would also reduce potential impact on the Landbeach Conservation Area.

Archaeological investigation would be required if site area 1 is selected. The extent of this investigation would be dependent on the results of further assessment and site survey, as well as consultation with the relevant stakeholders. This is likely to include geophysical survey and archaeological trial trenching as a minimum. Archaeological investigation, importantly, does not amount to mitigation as the remains would still be removed by the proposed scheme; the potential for impact to the buried archaeological remains is therefore the same. However, this does not undermine the importance of undertaking archaeological investigation.

Geophysical survey, trial trenching and/or other survey may identify areas of greater archaeological potential or specific remains of moderate value within the site area. This may allow for the targeting of building and service locations to reduce impact on buried archaeology. However, as the landscape contains a high density of remains and the historic environment is not the only factor of consideration in the scheme design, this is unlikely to materially reduce the potential for impact.

4.5.2 Mitigated RAG Outcome

The proposed mitigation would reduce potential impact on the setting of the grade I listed Parish Church of All Saints. The proposed archaeological mitigation would reduce harm to the historic environment and comply with the requirements of planning policy, however this would not alter the impact on archaeology which results in the RAG rating for the site area. Therefore, even with mitigation in place, site area 1 would still receive an **AMBER** rating.

5 Site area 2

5.1 Baseline

5.1.1 Site Location

Site area 2 is located in farmland between Impington/Histon and Milton. The Waterbeach transfer pipeline corridor runs north before joining the same route as proposed for site area 1. There are two pipeline corridor options for treated effluent from site area 2. Option A runs north, then west, then south, then west, joining a similar route to option A for site area 1. Option B curves to the north-east, north of Milton. The waste water transfer corridor to the existing WWTP runs north, before curving back to the south and taking a similar route as site area 1.

5.1.2 Topography and Geology

The bedrock geology is Gault Formation – Mudstone, sedimentary bedrock formed approximately 101 to 113 million years ago. The superficial geology is primarily River Terrace Deposits, 3 – Sand and Gravel, formed up to 3 million years ago. The topography of site area 2 is mostly level, at 11-14m AOD. The land rises slightly in the south towards a number of hedgerows which divide the farmland in the area.

5.1.3 Previous Assessment

Site area 2 was referred to as Site J in prior stages of screening for the relocation of the WWTP. Site area 2 underwent an initial archaeology and built heritage appraisal during Stage 2: Coarse Screening and Stage 3: Fine Screening, from a longlist of potential relocation sites. Site area 2 was assessed as Amber during Stage 2, due to the high archaeological potential associated with Mere Way Roman Road and potential for assets of moderate value within the site boundaries. Site 2 was again assessed as Amber during Stage 3, due primarily to its high archaeological potential.

5.1.4 Historical Development

Late prehistoric and Roman remains have been identified adjacent to site area 2. During archaeological investigation prior to the construction of Milton Landfill site, evidence of prehistoric and Romano-British settlement was found (CHER: CB15707, MCB19563, CB15711, MCB19987, CB15708, MCB19987, 10211A, 10211E). The vast majority of these features were Iron Age or Roman. Mere Way/ Akeman Street is a known Roman Road, still in use as a route today, and it is likely that Roman activity identified in the area relates to this route.

The wider landscape surrounding site area 2 also shows late prehistoric and Roman activity. The site shown on historic maps as ‘site of camp’ at King’s Hedges is likely prehistoric, but there is little mention of it in available online resources. This is likely due to development at King’s Hedges in the mid-20th century, as the last map showing earthworks dates to 1959. There is a precedent for prehistoric, multi-phase hillforts that are later reused in the Romano-British period in the area, for example Arbury Hillfort followed this pattern and was located approximately 1.5km south of site area 2. This site has since been lost underneath the Orchard Park development.[14] The earthworks shown on historic maps adjacent to site area 2 may be

[14] Historic England (2015) *Arbury Camp.* Via: www.pastscape.org.uk/hob.aspx?hob_id=372005 (accessed August 2020).

Romano-British additions or may show use of the Mere Way route predating the roman road. The roman road crosses north-south through the eastern portion of site area 2.

There is little evidence for activity in the early medieval period, however there is evidence for the use of site area 2 during the medieval and post-medieval periods. Ridge and furrow within the site boundaries (CHER: MCB20022) is indicative of agricultural use of the site during the medieval period. Site area 2 is located in closer proximity to Milton, to the west, than site area 1. The history of the development of Milton is described above in section 4.1.4. Site area 2 also lies in proximity to Impington to the east, and Histon beyond. The land at Histon and Impington belonged to a series of large manors and estates from the 11th century AD until the late post-medieval period. The land was mostly under agricultural use during this period, serving the villages under the manor's control.[15] However, the land at site area 2 was eventually incorporated into Impington Hall park and gardens (CHER: 12129), which covers the whole of site area 2 and beyond to the west.

Impington Hall Park and Gardens (CHER:12129) originates in the early post medieval period. Impington Hall was located to the south of the settlement, and at one time had 34 hectares of formal gardens and associated parkland. The formal gardens were in existence by 1661, by 1770 canals had been constructed in the grounds and an ornamental lake was also later added. Some of these features still survived on mapping by the late 19th century, however within site area 2 there is little evidence of ornamental features such as these. By the time the area was first mapped, the park had been reduced to a much smaller area in the west, and the land within site area 2 was in agricultural use. There are several trackways leading to Impington Hall Park and Gardens displayed on post medieval maps. During the early 20th century, a building existed within site area 2; this may have been a house or could have related to Impington Hall and was built adjacent to Mere Way. The building has since been demolished and the area has been returned to agricultural use. Hedgerows now divide the land and there is little evidence of the former park and gardens, with the exception of some boundary banks (CHER: MCB25715), although these themselves may relate to the prior agricultural use of the site area. The house was also demolished in the 20th century[16], therefore these grounds no longer relate to an extant building.

During the Second World War, the Cambridgeshire countryside was utilised for various defensive purposes. It was suitable for vehicle storage, rail depots and airfields due to the level topography and was strategically situated a short distance from London, the east coast and the centre of England as well as populous Cambridge. The former site of the Trinity Second World War Depot (CHER: MCB17527) extends into the eastern part of site area 2. This depot was used partially for tank and vehicle storage and may also have contained a POW camp late in the war. It is believed amphibious vehicles used in the D-Day landings were housed here. The facility was demolished in the post-war period and little evidence remains above ground, however below ground deposits associated with the depot may still be present.[17]

Today, the land use is agricultural, divided into several fields. The route of Mere Way is still utilised as a pedestrian and cycling track.

[15] A P M Wright and C P Lewis (198) 'Histon: Manors and other estates', in *A History of the County of Cambridge and the Isle of Ely: Volume 9.* Via: British History Online /www.british-history.ac.uk/vch/cambs/vol9/pp94-97 (accessed August 2020)

[16] Parks and Gardens (2020) *Impington Hall, Cambridgeshire.* Via: https://www.parksandgardens.org/places/impington-hall-cambridge (accessed August 2020)

[17] CHER record: WWII vehicle depot, Trinity Farm, Milton, MCB17527.

5.1.5 Designated Assets

This section outlines the designated assets within the study area for site area 2. The details of all designated assets within the study area for site area 2 are given in the gazetteer in Appendix A.2.

5.1.5.1 Site area 2

There are no designated assets located within site area 2 or its respective pipeline corridors. There are no designated assets within 500m of site area 2.

The study area for designated assets for site area 2 can be seen in map 409071-MMD-00-XX-GIS-Y-0476 in Appendix C.2.

5.1.5.2 ZTV for site area 2

In the given criteria (see methodology) within the ZTV for site area 2 there are:

- 29 grade I listed buildings;
- 33 grade II* listed buildings;
- 30 scheduled monuments;
- 1 grade I registered park and garden;
- 7 grade II* registered parks and gardens;
- 9 grade II registered parks and gardens;
- 20 Conservation Areas

Heritage assets within the ZTV for site area 2 can be viewed in map 09071-MMD-00-XX-GIS-Y-0477 in Appendix C.2.

5.1.5.3 Waterbeach transfer pipeline

Heritage assets within the study area for all pipeline corridors for site area 2 can be seen in map 409071-MMD-00-XX-GIS-Y-0478 in appendix C.2.

Within the 200m study area for the proposed corridor for the Waterbeach transfer pipeline for site area 2 are the following:

- Baptist Chapel (NHLE:1179106), the same grade II listed building as discussed above for site area 1.
- The Limes (NHLE: 1127389), the same grade II listed building as discussed above for site area 1.

5.1.5.4 Treated Effluent Corridor Option A

There are no designated heritage assets within 200m of treated effluent pipeline corridor option A.

5.1.5.5 Treated Effluent Corridor Option B

Within the study area for the treated effluent pipeline corridor option B are the following;

- Multi-phased settlement east of Milton, a scheduled monument (NHLE: 1457437), as discussed above for site area 1.
- Lodge to Milton Hall, a grade II listed building (NHLE: 1331320), as discussed above for site area 1.

5.1.5.6 Waste water Transfer Corridor

There are no designated assets within the study area for the waste water transfer pipeline corridor for site area 2

5.1.5.7 Access Road

There are no designated heritage assets within the corridor proposed for access to site area 2, or within 200m of this.

5.1.5.8 Diversions for the Existing Waste Water Transfer Network

There are no designated heritage assets within the corridors proposed for the diversion for the existing waste water transfer network, or within 200m of these.

5.1.6 Non-Designated Assets

The below outlines all non-designated assets within the study area for site area 2. These assets are detailed in the gazetteer in Appendix B.2.

5.1.6.1 Site area 2

The following non-designated assets were identified within the HER as being within the indicative site boundary for site area 2:

- Impington Hall park and garden, Impington (CHER: 12129)

The following non-designated assets were identified as being within 100m of this boundary:

- Medieval and post-medieval boundary banks east of Impington (CHER: MCB25715)
- Former Ridge and furrow, Milton (CHER: MCB20022)
- WWII vehicle depot, Trinity Farm, Milton (CHER: MCB17527)
- Iron Age remains (Area C), Milton Landfill Site (CHER: CB15708)
- Features at Milton Landfill Site (CHER: MCB19563)
- Post medieval finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 23 (CHER: MCB13191)

In addition, Mere Way/ Akeman Street Roman Road, which may with its associated features hold moderate value, is located running north-south at the eastern boundary of site area 2.

Non-designated heritage assets within the study area for site area 2 can be seen in map 409071-MMD-00-XX-GIS-Y-0479 in appendix C.2.

5.1.6.2 Waterbeach transfer pipeline

Heritage assets within the study area for all pipeline corridors for site area 2 can be seen in map 409071-MMD-00-XX-GIS-Y-0478 in appendix C.2.

No assets were identified within the HER as being within the proposed pipeline corridor to Waterbeach. Within 100m of Waterbeach transfer pipeline corridor 23 monuments and findspots dating from the prehistoric period to the second world war were identified, these are:

- Medieval and post-medieval boundary banks east of Impington (CHER: MCB25715)
- Cropmarks near Landbeach (CHER: 08317)
- Roman pottery and coin, Landbeach (CHER: 08314)
- Cropmark ditches, Lime Farm (CHER: 11175)

- Cropmark complex, Lime Farm, Landbeach (CHER: 08312a)
- Roman cropmark evidence, Landbeach (CHER: 08844)
- Roman ditch, Landbeach (CHER: 05343)
- Roman cropmark site, Landbeach (CHER: 08847)
- RAF Waterbeach (CHER: CB15155)
- Roman settlement and cemetery, Area 6, Waterbeach Barracks (CHER: MCB24602)
- Roman finds, Waterbeach (CHER: 11331)
- Cropmarks near Landbeach (CHER: 08317)
- Roman pottery and coin, Landbeach (CHER: 08314)
- Cropmark ditches, Lime Farm (CHER: 11175)
- Cropmark complex, Lime Farm, Landbeach (CHER: 08312a)
- Roman cropmark evidence, Landbeach (CHER: 08844)
- Roman ditch, Landbeach (CHER: 05343)
- Roman cropmark site, Landbeach (CHER: 08847)
- RAF Waterbeach (CHER: CB15155)
- Roman settlement and cemetery, Area 6, Waterbeach Barracks (CHER: MCB24602)
- Roman finds, Waterbeach (CHER: 11331)

5.1.6.3 Treated effluent corridor option A

There are seven assets identified in the HER within proposed treated effluent corridor option A for site area 2. These mostly relate to Iron Age and Roman activity around the route of Mere Way (CHER: MCB18209, MCB17518, 07610, MCB17609, as well as Trinity WWII Vehicle Depot (CHER: MCB17527). These are:

- WWII vehicle depot, Trinity Farm, Milton (CHER: MCB17527)
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Medieval windmill, Milton Park and Ride (CHER: MCB18210)
- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)
- Section through Akeman Street Roman road, Milton (CHER: 07610)
- Cropmark enclosure, Milton (CHER: 08320)
- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)

Nine features relating to the Mesolithic to post-medieval periods were identified within 100m of proposed treated effluent corridor option A. The roman site (CHER: 05281) has an associated inhumation.

- Post-Medieval and undated features, St. John's Innovation Park, Cowley (CHER: 08330)
- Roman settlement, Milton (CHER: 05281)
- Roman pottery and ditches, Milton (CHER: 05308)
- Mesolithic flint blade, Milton (CHER: 05273)
- Roman pottery, Milton (CHER: 05273A)
- Medieval pottery, Milton (CHER: 05273B)
- Post-medieval pottery, Milton (CHER: 05273C)
- Mesolithic flint blade, Milton (CHER: 05273)
- Roman pottery, Milton (CHER: 05538)

5.1.6.4 Treated effluent corridor option B

There are nine non-designated assets were located within the treated effluent corridor option B for site area 2, these are;

- Site of Rectory Farm, Milton (CHER: MCB27069)
- Milestone, Ely Road, Milton (CHER: MCB18343)
- Cropmark complex, Milton (CHER: 08471)
- Roman pottery, Milton (CHER: 05538)
- Roman site, Penfold Farm (CHER: 08873)
- Roman site, Penfold Farm (CHER: 08313)
- Romano-British features, Cambridge Rowing Lake site (CHER: MCB16009)
- Destroyed pillbox, N of Milton (CHER: MCB27485)
- Destroyed pillbox, N of Milton (CHER: MCB27483)

Within 100m of the treated effluent corridor are the following;

- Possible rectilinear feature, Milton (CHER: 08315)
- Dubious linear features, Milton (CHER: 08316)
- Roman urns, Horningsea (CHER: 05547)
- Prehistoric remains, Cambridge Rowing Lake site (CHER: MCB16002)
- Flint implement, Horningsea (CHER: 05404)
- Roman pottery scatter, Milton (CHER: MCB17094)
- Destroyed pillbox, N of Milton (CHER: MCB16401)
- Earthwork remains Ridge and furrow, N and NW of Horningsea village (CHER: 05615)

5.1.6.5 Waste water Transfer Corridor

Within the waste water transfer corridor for site area 2 seven assets were identified, which all relate to assets already discussed above. These are:

- WWII vehicle depot, Trinity Farm, Milton (CHER: MCB17527)
- Cropmark enclosure, Milton (CHER: 08320)
- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)
- Medieval windmill, Milton Park and Ride (CHER: MCB18210)
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)
- Section through Akeman Street Roman road, Milton (CHER: 07610)
- Impington Hall park and garden, Impington (CHER: MCB14254)

An additional six assets were identified within 100m of this corridor, mostly already discussed above, with the addition of two post-medieval agricultural features at St Johns Innovation Park. These assets are:

- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Cropmark enclosure, Milton (CHER: 08320)
- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)
- Post-Medieval and undated features, St. John's Innovation Park, Cowley (CHER: 08330)

- Post-medieval boundary ditch, St John's Innovation Park, Cambridge (CHER: MCB15916)
- Furrows and Undated Ditch at St Johns Innovation Park, Cowley Road, Cambridge (CHER: MCB20105)

5.1.6.6 Access Road

Within the access area for site area 2, the following non-designated assets identified in the CHER:

- Former Ridge and furrow, Milton (CHER: MCB20022)
- Impington Hall park and garden, Impington (CHER: MCB14254)
- Section through Akeman Street Roman road, Milton (CHER: 07610)
- Roman finds concentration, Butt Lane, Milton (CHER: MCB17609)
- Iron Age - Romano-British settlement, Milton Park and Ride (CHER: MCB18209)
- Medieval windmill, Milton Park and Ride (CHER: MCB18210)

The following non-designated assets are identified in the CHER within 100m of the access for site area 2:

- Ridge and furrow, S of Butt Lane, Milton (CHER: MCB17518)
- Cropmark enclosure, Milton (CHER: 08320)
- Neolithic and Bronze Age remains (Area D), Milton Landfill Site (CHER: CB15698)
- Iron Age remains (Area D), Milton Landfill Site (CHER: CB15709)
- Iron Age and Roman activity at Milton Landfill (CHER: MCB19987)
- Iron Age remains (Area C), Milton Landfill Site (CHER: MCB15708)
- Features at Milton Landfill Site (CHER: MCB19563)

5.1.6.7 Diversions for the Existing Waste Water Transfer Network

There are two non-designated assets within the corridors for the diversions for the existing waste water transfer network as follows:

- Former Impington Hall Park and Gardens (HER: 12129)
- Tile finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 22 (HER: 11209)

5.1.7 Archaeological Potential

5.1.7.1 Site area 2

There is low-moderate archaeological potential for remains relating to the Palaeolithic, Mesolithic and Neolithic and Bronze Age periods. There is limited precedent for remains for this period within the site boundary and the context of site area 2. Amounting to a single Mesolithic findspot (CHER: 05273) and limited Neolithic/ Bronze Age evidence at Milton landfill.

There is very high potential for Iron Age and Roman remains at site area 2. The Roman road bisects the site, and there is evidence within the immediate surroundings (at Milton Landfill) of roadside settlement relating to it. In addition, numerous findspots within the study area for site area 2 relate to the Roman period.

There is a low potential for early medieval remains, as there is no specific evidence for early medieval activity within site area 2 or its immediate surroundings.

There is moderate potential for remains relating to the medieval period, although the use of the area for Impington Park makes evidence of settlement in this period unlikely. Additionally, it is likely that there was agricultural land use for site area 2 during the medieval period, and this reduces the likelihood of recovering archaeological monuments or finds, as the land use would not have been intense.

There is a high potential for remains relating to the post medieval period, due to the presence of post medieval farmsteads and trackways in the area, and also due to the presence of a post medieval or modern building on historic maps within the boundary of site area 2.

5.1.7.2 Waterbeach transfer pipeline

The Waterbeach transfer pipeline for site area 2 follows the same route as for site area 1 up to a point south of Landbeach, and therefore has the same potential as described 4.1.7.2. It then extends further into an area of high potential relating to extensive Late Iron Age and Roman activity in the landscape surrounding site area 2.

5.1.7.3 Treated Effluent and Waste water Transfer Corridor

Due to the depth of the tunnels for the Treated Effluent and Waste water Transfer Corridors there is low potential for archaeological remains relating to all periods to be present within these routes. At the access to these tunnels from the site the archaeological potential is the same as discussed above in section 5.1.7.1. The output for the waste water transfer corridor has low potential due to prior development in this area. The outputs for options A and B for the treated effluent corridor has low potential for in situ remains due to the presence of the river, and the negative impact of moving water on the survival of archaeological remains. This is much the same as for site area 1.

Options A and B for the treated effluent corridor all have high potential for late prehistoric and roman archaeology north of the A10. The archaeological potential for all of these corridors is much as for the routes for site area 1, as described in section 4.1.7.3, due to the similarity between the routes. Both options cover a greater area within the butt lane area, resulting in greater area with high potential to contain roman and late prehistoric remains, than for the same option for site area 1.

5.1.7.4 Access Road

The access area for site area 2 has high potential for archaeological remains relating to the Late Iron Age and Roman periods, associated with Mere may / Akeman Street Roman Road and the prevalent late prehistoric and Early Roman activity in the immediate area.

5.1.7.5 Diversions for the Existing Waste Water Transfer Network

The diversion corridors have moderate potential archaeological remains relating to the Late Iron Age and Roman periods, associated with Mere way / Akeman Street Roman Road and the prevalent late prehistoric and early roman activity in the immediate area. This potential is slightly greater north of Butt Lane, where there has been less post-medieval disturbance of the ground. The corridor has moderate potential for archaeological remains relating to the former post-medieval Impington hall park, as it covers only a small amount of its former extent, and high potential for remains relating to post-medieval agriculture.

5.2 Site Walkover Survey

A site walkover survey was undertaken on Tuesday 18th August 2020. A complex of farm buildings not previously identified (located 200m east of site area 2), which is dated to 1905,

and now comprise the Wendy House Nursery, was observed and can be understood as a non-designated heritage asset.

Figure 5.1: 1905 Farm buildings (Wendy House Nursery)

Source: Mott MacDonald (2020)

The fields which comprise site area 2 were observed as lined with mature trees; this is likely a remnant of the former historic parkland. Further evidence of the former parkland was identified on New Road, where the park (brick) wall and former gatehouse survives (now developed).

In views towards Impington from site area 2, modern housing contained on the eastern edge of the Impington Conservation Area was partially visible through gaps in the tree line in the north area of the scheme. No historic assets were visible.

Figure 5.2: View west from site 2 towards Impington

Source: Mott MacDonald (2020)

To the south, the A14 is visible from within site area 2. The embankment is raised within the flat landscape and traffic on the A14 may be observed from within the site area. This embankment travels over the route of Mere Way to the south of the site area, via a bridge. Mere Way itself

was observed as a wide footpath lined by trees and scrub. The A14 was noted as a source of noise within the site area.

Figure 5.3: View of Mere Way going under A14 embankment

Source: Mott MacDonald (2020)

The fields had been recently ploughed at time of survey. Only recent material was observed in the plough soil and no archaeological remains were identified.

5.3 Impact Appraisal

This section describes the potential for impact on the historic environment if the proposed scheme is developed at site area 2.

5.3.1 Site area 2

There is potential for all assets identified within the ZTV to experience a negligible to minor impact to their significance as a result of change within their setting. As there are no designated assets within 500m of the site area, it is anticipated that most impacts on assets identified would be minor or negligible. The extent of this impact will depend on the design of the final scheme. As the ZTV has been produced using the maximum tallest height of the new WWTP (26m relating to an indicative height for the digesters), assets identified at this stage may not be impacted by the final proposed scheme if this site is selected; similarly additional assets may be identified at a later date. Assets of high value in the settlements beyond this radius are largely not within the ZTV due to screening from other buildings. Where they are within the boundaries of the ZTV, this is largely within a small isolated area of visibility, rather than an area where the WWTP would be dominant in views throughout. Therefore, the anticipated impact on most designated heritage assets is negligible to minor, as a result of change within long views and their setting.

External views from the Impington – St Andrew's Conservation Area may be altered by the construction of the WWTP at site area 2. However, the farmland setting of the conservation area is also retained to the north, there are established hedgerows and tree lines which would disrupt intervisibility and the indicative footprint is adjacent to Milton Landfill. These factors reduce the potential for impact. Despite this, due the proximity of the site area, and height of some elements, the construction of an unmitigated WWTP at site area 2 may result in minor to moderate impact to the significance of the conservation area, a moderate value asset. Most

assets within the conservation area are shielded by planting and buildings, however their setting is tied to the conservation area.

There is high archaeological potential for Iron Age and Roman remains within site area 2 related to the presence of a Roman Road (Mere Way/Akeman Street) and the known archaeology of the surrounding area. Therefore, the construction of the proposed scheme at site area 2 represents the potential for truncation or removal of these remains, if present. This could result in a moderate to major impact on a non-designated asset of moderate value.

Change in setting is likely for the non-designated complex of farm buildings comprising the Wendy House nursery which dated to 1905. This is likely to result in moderate impact to a non-designated asset of low value.

5.3.2 Waterbeach transfer pipeline

As much of the pipeline route to Waterbeach is the same as for site area 1, most of the potential impacts on the historic environment are the same as described in section 4.3.2. In addition, the extension from the route for site area 1 to the site area 2 area has potential for archaeological remains of moderate value, which could experience a moderate to major impact.

5.3.3 Treated Effluent and Waste water Transfer Corridors

There is no anticipated impact on designated assets from the Waste water Transfer Corridor for site area 2, or the Treated Effluent Corridor, if this is a tunnel. As for site areas 1 and 3, there is unlikely to be an impact on archaeology from below ground works to create the tunnels for these routes, due to their depth and low potential at their outputs. Treated effluent corridor option A has no designated assets within its study area, whereas there are two designated assets within the study area for option B. However, both are located to the edge of the study area and any impact from vibration from tunnelling is likely to amount to negligible or minor impact to these assets.

If pipelines are excavated from the top down this presents the risk of moderate to major impact to unknown and known archaeological remains of moderate value, due to recorded and potential late prehistoric and Roman archaeology on all routes. The impacts are likely to be the same as described for site area 1, as described in section 4.3.3, with additional likelihood of impact to archaeology due to the corridors for site area 2 covering a greater area.

A tunnel is preferable to a pipeline as it would result in a lesser impact to buried archaeology, there is no strong preference between the corridor options, however option A is anticipated to result in slightly lesser impact to the historic environment due to previous development within this corridor. These impacts do not affect the overall RAG rating of the site.

5.3.4 Access Road

The access route for site area 2 has the potential to impact unknown archaeology relating to the Iron Age and Roman periods. Therefore, there is potential for moderate to major impact, due to removal or truncation, of unknown archaeological remains of low or moderate value.

5.3.5 Diversions for the Existing Waste Water Transfer Network

The diversions for the existing waste water transfer network have the potential to remove or truncate archaeology relating to the Iron Age and Roman periods, as well as the post-medieval period. Therefore, there is potential for moderate to major impact of unknown archaeological remains of potentially moderate value, and likely low value.

5.4 RAG Outcome

Based on the criteria described in section 2 and the above impact appraisal, the RAG outcome for the development of the proposed scheme at **site area 2** is **AMBER.**

5.4.1 Reason for RAG outcome

The outcome of the RAG assessment on site area 2 relates to the archaeological potential for Roman and prehistoric remains. The relocation of WWTP to site area 2 would result in moderate to major impact to archaeological remains of potentially moderate value. The pipeline to Waterbeach encounters remains identified in the HER with potentially moderate value and would result in moderate to major harm to these. In both instances this amounts to substantial harm to assets of low and moderate value, in accordance with the NPS.

5.5 Mitigation

5.5.1 Proposed mitigation

Archaeological investigation would be required if site area 2 is selected. The extent of this investigation would be dependent on the results of initial surveys but is likely to include geophysical survey and archaeological trial trenching as a minimum. This does not amount to mitigation, as discussed for site area 1.

Geophysical survey, trial trenching and/or other survey may identify areas of greater archaeological potential or specific remains of moderate value within the site area. This may allow for the targeting of building and service locations to reduce impact on buried archaeology. However, as the landscape contains a high density of remains and the historic environment is not the only factor of consideration in the scheme design this is unlikely to materially reduce the potential for impact, as for site area 1.

Strategic planting and other landscaping may reduce the impact of the proposed development on heritage assets, by reducing the change within their setting. However, as the impact on built heritage does not make substantial contribution to the amber outcome for site area 2 this would not reduce its mitigated RAG rating.

5.5.2 Mitigated RAG Outcome

The proposed mitigation would reduce harm to the historic environment and comply with the requirements of planning policy, however this would not alter the elements of the design which result in the RAG rating for the site area. Therefore, even with mitigation in place, site area 2 would still receive an **AMBER** rating.

6 Site area 3

6.1 Baseline

6.1.1 Site Location

Site area 3 is located south of Horningsea, north of the A14 and east of Stow cum Quy in an area of open farmland. The proposed Waterbeach transfer pipeline corridor runs north, to the east of Horningsea, before joining the Cam. The proposed treated effluent and waste water transfer corridors run west from the south of the site, towards north Cambridge. There are two options for vehicle access to the site; via Horningsea Road and via High Ditch Road.

The route via Horningsea Road is considered in the unmitigated scenario whereas the route via High Ditch Road is considered in the mitigation scenario as it is preferable from a transport perspective. Heritage considerations for both routes are discussed in this report.

6.1.2 Previous Assessment

Site area 3 was referred to as Site L in prior stages of screening for the relocation of the WWTP. Site area 3 underwent Stage 2: Coarse Screening and in Stage 3: Fine screening underwent an initial archaeology and built heritage appraisal. Site area 3 was assessed as Amber during Stage 2, due to high potential for significant archaeological remains of low, moderate and high value. Site area 3 was again assessed as Amber during Stage 3 due to potential for impact on the setting of designated heritage assets and high archaeological potential related to a significant expanse of Roman cropmarks.

6.1.3 Topography and Geology

The bedrock geology of site area 3 is West Melbury Chalk Formation formed approximately 94 to 101 million years ago in the Cretaceous Period. There is no record of superficial deposits at the site.

Site area 3 is located on area of slightly raised flat land (10m AOD) 800m to the North West of the River Cam and north-east the A14). The area is currently farmland and is comprised of several large plots divided by hedges and small trackways.

6.1.4 Historical Development

Site area 3 sits between two historic settlements situated along the east bank of the River Cam. Horningsea, 900m to the north, and Fen Ditton, 900m to the south, both sit on the road from Cambridge to Clayhithe and have historic precedent dating back to the prehistoric period. There is evidence of Iron Age habitation in Horningsea and Neolithic activity in Fen Ditton. The name of Fen Ditton was first recorded in around 950AD as Dittone, meaning "the village by the ditch". This is due to the Fleam Dyke which is a prehistoric ditch that passed through the village, showing at least early activity in this area. It is likely therefore that this area experienced prehistoric activity as evidenced by finds of Bronze Age Worked Flints (CHER: 07812) and other Multiperiod finds (CHER: 11194) dating from the Early Neolithic. Furthermore, the cropmarks (CHER: 11555) within site area 3, located near the road linking Fen Ditton to Horningsea, indicate a potential settlement.

There is significant evidence of Roman commercial activity in this area. The River Cam is known to have been navigated since at least Roman times therefore encouraging development

in this area. The nearest Roman villa has been found just to the west of Quy Hall. The scheduled monument of Car Dyke (NHLE: 1006930) is located 1km to the west. Car Dyke is an 85-mile (137 km) long ditch dating from the Roman period. The scheduled area (1km to the west) is the location where a Roman-era boat and cargo of pottery was discovered in the 1990s leading to assertations that Car Dyke functioned as a canal transporting goods from Horningsea to Lincoln. There have also been finds Roman finds, including a Roman copper coin (CHER: 05344) and other Multiperiod finds (CHER: 11194; CHER: 11193) within the site area. Extensive cropmarks are identified within the south of site area 3, possibly representing a villa and being highly indicative of settlement (CHER: 11555).

The extensive commercial use of the River Cam leant the use of raised platforms either side for industry. Horningsea, the nearest settlement to site area 3, to its north, was used between the 2nd and 4th centuries for the manufacture of pottery. A scheduled monument relating to this is recognised in the NHLE, Horningsea Kilns (NHLE; 1006895). Evidence for settlement at Horningsea in the early medieval period is scarce, however the village was either re-established or still thriving by the medieval period. The grade I listed village church, the Church of St Peter (NHLE: 1331295), was constructed in the A bridge is recognised at Horningsea in the 13th century and this key location as a crossing of the River Cam likely led to the expansion of settlement here. Farmhouses and residential properties were constructed through the latter medieval and the post-medieval periods, with several of these properties listed and extant today, along the major north-south road through the settlement.[18] Today, Horningsea has historic, rural village character and is surrounded by open farmland on all sides except the west, which is bordered by the Cam.

The other two nearest settlements are Fen Ditton to the south and Stow cum Quy to the east. The road linking Fen Ditton to Horningsea (adjacent to the site) was first recorded in the 15th century but its raised position suggests it would have had earlier foundations. Fen Ditton was also likely occupied throughout the medieval and post-medieval periods, remaining a small settlement. The construction of the A14 c.1990 separated it from the land at site area 3. Stow cum Quy is a larger settlement, inhabited from at least the early medieval period. But remaining a small village (17 households at the Domesday Survey) until expansion in the late post-medieval period.[19]

Since its use in the Roman period, the land which comprises site area 3 appears to have been used primarily as agricultural land. It may have served Biggin Abbey, or one of the three mains settlements, being located almost centrally between these. Biggin Abbey is a grade II* listed building (NHLE: 1178408) with associated grounds and earlier earthworks of the lost reminder of the residence (CHER: 01095). The 14th and 17th century farmhouse, never used as an abbey, provided residence for the Bishops of Ely.

To the east, beyond Stow Cum Quy and towards Lode (which contains a conservation area), lies Anglesey Abbey (grade I listed, NHLE: 1331433). The abbey started as a hospital c.1135, but by the early 13th Century had been converted into an Augustinian priory. A community of monks lived here until the dissolution of the monasteries by King Henry VIII. In the early 17th century, the ruins of the former priory were converted into a stately home. The gardens and pleasure grounds were developed from the early 19th century, they survive today and are grade II* listed (NHLE: 1000611).

[18] A F Wareham and A P M Wright (2002) 'Horningsea', in *A History of the County of Cambridge and the Isle of Ely: Volume 10, Cheveley, Flendish, Staine and Staploe Hundred*s pp. 160-163. Via: British History Online www.british-history.ac.uk/vch/cambs/vol10/pp160-163 (accessed August 2020)

[19] A F Wareham and A P M Wright (2002) 'Stow Cum Quy', in A History of the County of Cambridge and the Isle of Ely: Volume 10, Cheveley, Flendish, Staine and Staploe Hundreds pp. 230-233. Via: British History Online www.british-history.ac.uk/vch/cambs/vol10/pp230-233 (accessed August 2020)

The Barnwell Junction to Mildenhall railway (disused) (CHER: 07633) was part of the Cambridge to Mildenhall line built by the Great Eastern Railway and opened in 1894. It was abandoned in the 20th century and is disused.

The land at site area 3 has continued under agricultural use to the present day.

6.1.5 Designated Assets

This section outlines the designated assets within the study area for site area 3. All designated assets within this study area are provided in Appendix A.3.

6.1.5.1 Site area 3

There are no designated assets located within the indicative boundary for site area 3. There are no designated assets located within 500m of this boundary. The nearest designated asset (c.910m north-west) is:

- Biggin Abbey (NHLE: 1178408), grade II* listed

The study area for designated assets can be viewed in map 409071-MMD-00-XX-GIS-Y-0480 in Appendix C.3.

6.1.5.2 ZTV for site area 3

In the given criteria (see methodology) within the ZTV for site area 3 there are:

- 31 grade I listed buildings;
- 27 grade II* listed buildings;
- 42 scheduled monuments;
- 1 grade I registered park and garden;
- 6 grade II* registered parks and gardens;
- 10 grade II registered parks and gardens; and
- 22 Conservation Areas.

In addition, the non-designated parkland of Quy Hall (NHLE: 1331325), falls within the ZTV and is located 1.2km east of site area 3.

Heritage Assets within the ZTV for site area 3 are shown in map 409071-MMD-00-XX-GIS-Y-0481 in Appendix C.3.

6.1.5.3 Waterbeach transfer pipeline

Heritage assets within the study area for all pipeline corridors for site area 3 are shown in map 409071-MMD-00-XX-GIS-Y-0482 in Appendix C.3.

Within the study area of the proposed corridor for the Waterbeach transfer pipeline for site area 3 are the following;

- 1 scheduled monument;
  - Horningsea Kilns, site of (NHLE: 1006895)
- 16 grade II listed buildings;
  - The Priory (NHLE: 1127374)
  - Village Pump to North of Shelter, (NHLE: 1331292)
  - 86 and 88, High Street (NHLE: 1331293)

- The Square (NHLE: 1178724)
- 52 and 54, High Street (NHLE: 1127375)
- Kings Hatch (NHLE: 1331294)
- K6 Telephone Kiosk (NHLE: 1223639)
- The Thatch (NHLE: 1302271)
- Kings Acre (NHLE: 1331291)
- Crown and Punch Bowl (NHLE: 1127376)
- The Old Rectory (NHLE: 1127377)
- Manor Farmhouse (NHLE: 1178774)
- Barn to North of Lock Farm (NHLE: 1179436)
- Granary to East of Eye Hall (NHLE: 1127368)
- Barn to East South East of Eye Hall (NHLE: 1127369)
- Eye Hall (NHLE: 1127411)

6.1.5.4 Treated Effluent Corridor

Within the study area for the treated effluent pipeline corridor are the following:

- Biggin Abbey, grade II* listed (NHLE: 1178408)
- Poplar Hall, grade II listed (NHLE: 1127400)
- Fen Ditton Conservation Area

6.1.5.5 Waste water Transfer Corridor

There are three designated assets located within the proposed waste water transfer pipeline corridor, as follows:

- Poplar Hall, grade II listed (NHLE: 1127400)
- Lode Cottage, grade II listed (NHLE: 1331301)
- 4, Green End, grade II listed (NHLE: 1127393)
- Fen Ditton Conservation Area

There is 1 additional designated asset within the 200m study area for the proposed waste water transfer pipeline corridor:

- Grassey Cottage, grade II listed (NHLE: 1127392)

6.1.5.6 Access Road

There are no designated heritage assets within the corridor proposed for access from Horningsea Road, or within 200m of this.

One designated asset is located within the proposed access for site area 3 from High Ditch Road:

- Milestone South West of Quy Mill at NGR 505 594 (NHLE: 1331307)

There are no other designated heritage assets within the corridor proposed for from High Ditch Road or within 200m of this.

6.1.6 Non-Designated Assets

The below outlines all non-designated assets within the study area for site area 3. These assets are detailed in the gazetteer in Appendix B.3.

6.1.6.1 Site area 3

Four non-designated assets were identified within the HER as being within the indicative site boundary for site area 3:

- Prehistoric pottery, A45 Quy fieldwalking survey field 8, Horningsea (CHER: 11195)
- Roman pottery, A45 Quy fieldwalking survey field 8, Horningsea (CHER: 11195A)
- Medieval pottery, A45 Quy fieldwalking survey field 8, Horningsea (CHER: 11195B)
- Post-medieval pottery, A45 Quy fieldwalking survey field 8, Horningsea (CHER: 11195C)

The following non-designated assets were identified as being within 100m of this boundary:

- Multiperiod finds, A45 Quy fieldwalking survey field 8, Horningsea (CHER: 11194)
- Ridge and furrow, Horningsea (CHER: 05611)
- Ridge and furrow, Horningsea (CHER: 05798)

Non-designated heritage assets within the study area for site area 3 are shown in map 409071-MMD-00-XX-GIS-Y-0483 in Appendix C.3.

6.1.6.2 Waterbeach transfer pipeline

Heritage assets within the study area for all pipeline corridors for site area 3 are shown in map 409071-MMD-00-XX-GIS-Y-0482 in Appendix C.3.

Three assets were identified within the pipeline corridor to Waterbeach: the site of a former tramway (CHER: MCB28303), the former Eye Hall Park and Garden (CHER: 12122) and Bronze Age rapiers and dirks (MCB27482). The latter is potentially of moderate value.

Five additional assets were identified in the HER within 100m of the pipeline corridor to Waterbeach, relating to Roman archaeology and sites associated with Eye Hall. These are:

- Roman settlement, Horningsea (CHER: 05402)
- Earthwork remains Ridge and furrow, N and NW of Horningsea village (CHER: 05615)
- Roman kiln dump, Horningsea (CHER: 05549)
- Deserted settlement and building remains, Eye Hall (CHER: MCB6772)
- Roman pottery, Eye Hall Farm, Horningsea (CHER: MCB7736)

6.1.6.3 Treated Effluent Corridor

Within the treated effluent corridor three assets are identified in the CHER, two findspots and one monument. The monument relates to cropmarks of unknown date (CHER: 08327). These are as follows:

- Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6 (CHER: 11193)
- Late Saxon - early medieval pottery, Fen Ditton (CHER: 11765)
- Cropmark site, Fen Ditton (CHER: 08327)

Within 100m of this corridor are a further four assets, the most notable of which is the earthworks associated with Biggin Abbey. These are;

- Former clay pit, Fen Ditton (CHER: MCB27455)
- Biggin Abbey (CHER: 01095)
- Roman cropmark system, Horningsea (CHER: 11555)
- Roman pottery and cropmarks, Horningsea (CHER: 11557)

6.1.6.4 Waste water Transfer Corridor

Within the waste water transfer corridor for site area 3 are fifteen assets, dating from the Roman to period to the Second World War.

- Former clay pit, Fen Ditton (CHER: MCB27455)
- Mounds, Fen Ditton (CHER: 10515)
- Mound, Fen Ditton (CHER: 11206)
- Poplar Hall, Fen Ditton (CHER: 05489)
- Roman cropmark system, Horningsea (CHER: 11555)
- Roman artefact scatter, Horningsea (CHER: 05324)
- Ridge and furrow, Horningsea (CHER: 05612)
- Windmill Hill, Fen Ditton (CHER: 05310)
- Former coprolite pit, Horningsea (CHER: MCB27456)
- Public air raid shelters, Fen Ditton (CHER: MCB25356)
- Public air raid shelters, Fen Ditton (CHER: MCB25357)
- Public air raid shelters, Fen Ditton (CHER: MCB25355)
- Roman copper coin, Fen Ditton (CHER: 05344)
- Site of Former Gravel Pit, Sandy Park Road, Milton (CHER: MCB20561)
- Roman settlement, Milton (CHER: MCB6439)

Within 100m of this corridor are an additional eight assets of the same periods.

- Furrows and Undated Ditch at St Johns Innovation Park, Cowley Road, Cambridge MCB20105
- WWII vehicle depot, Trinity Farm, Milton MCB17527
- Roman pottery and ditches, Milton 05308
- Cropmark site, Fen Ditton 08327
- Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6 11193
- Public air raid shelters, Fen Ditton MCB25354
- Medieval settlement remains, Fen Ditton 05535
- Extractive Pit, Off Green End MCB20562

6.1.6.5 Access Road

Within the identified access area for site area 3 from Horningsea Road are the following;

- Roman cropmark system, Horningsea (CHER: 11555);
- Medieval earthworks, Horningsea (CHER: 05324a);
- Roman artefact scatter (CHER: 05324);
- Ridge and furrow, Horningsea (CHER: 05612)

The following additional non-designated assets are identified within 100m of the access area from Horningsea Road;

- Roman pottery, A45 Quy fieldwalking survey field 16, Horningsea (CHER: 11203)
- Medieval pottery, A45 Quy fieldwalking survey field 16, Horningsea (CHER: 11203A)
- Post-medieval pottery, A45 Quy fieldwalking survey field 16, Horningsea (CHER: 11203B)

Within the identified access area for site area 3 from High Ditch Road are the following;

- Roman cropmark system, Horningsea (CHER: 11555)
- Medieval earthworks, Horningsea (CHER: 05324a)
- Ridge and furrow, Horningsea (CHER: 05612)
- Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 5 (CHER: 11192)
- High Dyke/ northern section of Fleam Dyke (CHER: MCB12150)
- Anglo-Saxon inhumation, Fleam Dyke at junction of Fen Ditton and Newmarket Roads (CHER: 06303)
- Milestone, Newmarket Road (CHER: MCB18062)

The following additional non-designated assets are identified within 100m of the access area from High Ditch Road;

- Medieval pottery, A45 fieldwalking project field 10, Fen Ditton (CHER: 11197)
- Ridge and furrow, High Ditch Field, Fen Ditton (CHER: 05471)
- Enclosures, Fen Ditton (CHER: 09037)

6.1.7 Archaeological Potential

6.1.7.1 Site area 3

There is a moderate potential for archaeological remains relating to the prehistoric period within site area 3. There is precedent for Neolithic and Bronze Age activity within the CHER, however this is based on findspots only and there is limited occupation for settlement in the site within this period.

There is a very high potential for archaeological remains relating to the Romano-British period. Cropmark evidence (CHER: 11555) suggests settlement in this area. Romano-British settlement associated with commercial pottery industry in this location is anticipated, due to the extensive activity at Horningsea and associated with the River Cam. In addition, numerous findspots and artefact scatters within the site area indicate the presence of Roman settlement or other archaeological activity within the site boundaries.

There is low to moderate potential for early medieval remains, these would likely be to the north, if present, and associated to the settlement at Horningsea.

There is moderate to high potential for remains relating to medieval and post-medieval agriculture. There is low potential for medieval remains relating to other activity. There is high potential for post-medieval remains relating to the defunct railway.

There is low potential for archaeological remains relating to the modern period, there is no recorded non-agricultural use of site area 3 within this period.

6.1.7.2 Waterbeach transfer pipeline

East of Horningsea, the Waterbeach transfer pipeline for site area 3 has high potential for medieval and post-medieval remains relating to the settlement. To the north of this, there is very high potential for archaeological remains due to the activity surrounding the scheduled kilns at Horningsea.

6.1.7.3 Treated Effluent and Waste water Transfer Corridors

Due to the depth of the tunnels for the Treated Effluent and Waste water Transfer Corridors there is low potential for archaeological remains relating to all periods to be present within these routes. At the access to these tunnels from the site the archaeological potential is the same as discussed above in section 6.1.7.1 until at sufficient depth to be below the archaeological horizon. Similar to site areas 1 and 2, the output locations have low archaeological potential for in situ remains but may contain some remains associate with the historic uses of the River Cam.

If pipelines are used instead there is greater archaeological potential along the entirety of both routes, especially relating to Bronze Age, Roman, medieval and post-medieval activity.

6.1.7.4 Access Road

The access area from High Ditch Road has high potential for early medieval remains, relating to the presence of Fleam Dyke and other assets of this period recorded in the HER. Other sections of the length of Fleam Dyke are scheduled, however desk-based research and initial findings of this report indicate that the section adjacent to High Ditch Road may not be of schedulable quality.

The access area from Horningsea Road has high potential for Roman archaeology, relating to the remains identified in the HER within this access route and its surroundings. There is also moderate potential for medieval and post-medieval archaeology, which is likely to relate to agricultural practices.

6.2 Site walkover survey

Site area 3 was surveyed on Tuesday 18th August 2020. From site area three, open and largely treeless views to the north and west were observed. Views to the south are interrupted by the A14 and by associated planting, this also screens Polar Hall (grade II listed) and other assets to the south from the site area. The A14 provides considerable background noise. Beyond the A14 cranes located in Cambridge are visible from the area but there is no other view of the city. Views to the east are screened with thicker hedge/tree lines. Anglesey Abbey and the parkland around Quy Hall was not visible at ground level from Low Fen Drove Way.

From Horningsea Road the main hall at Biggin Abbey is visible, near to the treelined entrance of the abbey. Some of the of the other buildings are also discernible. Also visible from this location is the Grade II listed Wildfowl Cottage, which is located further to the west on the River Cam. Both of these assets are visible at various points as you move up Honey Hill along Low Fen Drove Way. There is some screening from the occasional tree on the eastern side of Horningsea Road (south of Low Fen Drove Way). Planting around the abbey screens most of the buildings except the main hall.

Figure 6.1: Biggin Abbey and Wildfowl Cottage (in far distance) looking west from Horningsea Road

Source: Mott MacDonald (2020)

6.3 Impact Appraisal

This section describes the potential for impact on the historic environment if the proposed scheme is developed at site area 3.

6.3.1 Site area 3

There is potential for moderate to major impact on non-designated archaeological remains of moderate value within site area 3. There is very high potential for archaeology relating to the Roman period within site area 3. Known cropmarks within site area 3 (although not within the indicative boundary) which likely relate to Roman settlement and the known archaeology within the area suggests a likely Roman settlement. Construction of the WWTP at site area 3 could result in truncation or complete removal of these remains.

There is potential for moderate impact on the significance of Biggin Abbey from the development of site area 3 for WWTP. Biggin Abbey is a grade II* listed building located west of site area 3. The ZTV shows that the WWTP may be visible from parts of Biggin Abbey. Biggin Abbey is currently set within an expanse of agricultural land, which is accurate to its historic setting and contributes to its significance. The setting to its west, north and east is more significant than that to the south, which has been compromised by the construction of the A14. Site area 3 has a historic connection to the abbey, as well as a visual one, and was likely included in the farmland which serviced the abbey. This is evidenced by ridge and furrow across site area 3 and the surrounding fields, which is indicative of medieval and post medieval farming. In addition, the avenue lining the driveway to Biggin Abbey aligns towards site area 3 and creates directed views towards the farmland. The indicative footprint falls to the south of this directed area, however elements in the north-east of the indicative footprint may be features when looking down the avenue. Whilst there is some planting within the immediate surroundings of Biggin Abbey, most of the surrounding landscape is characteristically open. This would have provided the abbey with far-reaching views over its related land and continues to create expansive views in gaps between the foliage. Therefore, the setting of the Abbey to the north and east contributes to its significance. The relocation of WWTP to site area 3 could alter this context, both due to visual change and the change in land use, even where the scheme is not

visible from the abbey. As the agricultural land would be removed, this part of the historic context of the abbey would be lost and could no longer be interpreted. In addition, tall and large elements of the scheme have the potential to draw attention from the abbey, minimising its intended dominance in its immediate setting. These elements may also interrupt views to and from the abbey in the wider landscape, including agricultural land beyond the indicative footprint which is also part of the setting of the abbey. The extent of this impact would depend on detailed design, the location of the scheme within the site area and especially the location of tall towers, however due to its proximity and the importance of its setting, it is anticipated that the impact on Biggin Abbey could be moderate.

There is potential for all assets identified within the ZTV to experience a negligible to minor impact to their significance as a result of change within their setting. The extent of this impact will depend on the design of the final scheme. As the ZTV has been produced using assuming the tallest height of the new WWTP (26m relating to the full height of digesters in an indicative location), assets identified at this stage may not be impacted by the final proposed scheme if this site is selected similarly additional assets may be identified at a later date The assets identified within the ZTV which are of greatest relevance to this assessment, due to their value and/or the anticipated magnitude of impact, of those identified in section 6.1.54.1.55.1.5, are as follows:

- Biggin Abbey (NHLE:1178408), as discussed above.
- Anglesey Abbey (NHLE: 1331433), grade I listed building, and its associated registered park and garden (NHLE: 1000611), grade II* listed. These are of concern due to their proximity to site area 3 (2.3km to the south west of the asset). There is potential for views from the end of the main tree lined avenue, south westerly towards site area 3 to be altered, by the presence of the digesters. There potential for a minor impact on the parkland from change to its setting. However, the extent of this impact is dependent on the final design and detailed assessment of the significance of the south-westerly views.
- Quy Hall's (NHLE 1331325) non-designated parkland. The parkland is contemporary and forms part of the setting of the Grade II* house. The house is screened from site area 3 by existing tree cover but the associated parkland falls within the ZTV and there is potential for there to be a minor impact on the views and character of the parkland, which has the potential to cause a minor impact on the setting of the house. However, the extent of this impact is dependent on the final design and detailed assessment of the significance of westward views, from and within the parkland.
- Horningsea Conservation Area captures the village of Horningsea to the north-west of site area 3. Views out of the conservation area to the south are directed to the south-south-east along Horningsea Road, and due to buildings framing the streets within the conservation area, there are few external views outside of roadways. Therefore, there are no directed views from the conservation area to the indicative footprint within site area 3. Despite this, due to the potential height of some elements of the proposed CWWTP and the positive contribution made by the existing rural farmland to the conservation area, the construction of the WWTP at site area 3 is anticipated to have minor to moderate impact on Horningsea Conservation Area, a moderate value asset.
- Fen Ditton Conservation Area captures the village of Fen Ditton to the west of site area 3. However, the anticipated impact is minimal due to the presence of the A14 and associated manmade screening, which separates the conservation area from the site area.

6.3.2 Waterbeach transfer pipeline

Where the Waterbeach transfer pipeline nears the settlement of Horningsea, the route is in proximity to listed buildings within the centre of the settlement, clustered on Horningsea Road and around St Peter's Church (not itself within 200m, NHLE: 1331295, grade II* listed). These assets are all to the western periphery of the study area, therefore any potential for direct impact is negligible. Their setting is concentrated to the village centre and the church, therefore any temporary change in setting from installing this pipeline would have no negative impact on the significance of these assets. The pipeline corridor is closer to, c.60m west of, the grade II listed Barn to North of Lock Farm (NHLE: 1179436). The asset is not located within the corridor, and the 60m distance is likely to reduce the potential for impact from vibration or other direct impact to minor, however a vibration assessment may be required, dependent on construction methodology. The barn is set in relation to the farmhouse, to its south, and the open farmland in its wider soundings. It is separated from the pipeline corridor by Long Drove. Therefore, any temporary change in setting from above ground works associated with this pipeline corridor, if required, would result in a minor impact to significance.

This route also passes through the former Eye Hall Park and Garden (CHER: 12122). There is potential for impact to remains associated with this asset. Any associated remains would likely be low value; however, the impact could be minor-moderate. Additionally, this pipeline may impact Bronze Age rapiers and dirks (MCB27482) which are of potentially moderate value due to their age. This impact may amount to removal or truncation, which could result in major impact to an asset of moderate value.

There is high potential for unknown Roman archaeological remains relating to the scheduled kiln site north of Horningsea. These remains may be of moderate value, if present, and would experience moderate to major harm from their truncation or removal from construction of the Waterbeach transfer pipeline.

6.3.3 Waste water Transfer and Treated Effluent Corridors

There is no anticipated impact on archaeology from the Waste water Transfer Corridors for site area 3, or the Treated Effluent Corridor, if this is a tunnels. As for site areas 1 and 2, there is unlikely to be impact on archaeology from below ground works to create the tunnels for these routes, due to their depth and low potential at their outputs.

If pipelines are excavated from the top down this presents the risk of moderate to major impact to unknown and known archaeological remains of low and moderate value, based on the archaeological potential of the area. This is likely to impact remains relating to the prehistoric or roman periods, which are likely to be moderate value, in addition to low and moderate value archaeological remains relating to the medieval and post-medieval periods may be impacted. A tunnel is preferable to a pipeline, as this reduces potential impact on buried archaeology.

Designated built heritage assets are located within or adjacent to both of these routes study areas, there is potential for their construction to have a small impact on these assets through vibration or temporary change in setting. The extent of this impact would be dependent on the construction methodology. Impact on Fen Ditton Conservation Area is likely to be temporary and minor, although this is dependent on the use of tunnels or pipelines. Tunnels are preferable with regard to this potential for impact, as they will not temporarily alter the character of the conservation area and will have lesser impact on archaeological remains associated with it.

6.3.4 Access Road

The proposed access route from Horningsea Road utilises an entrance opposite the avenue toward Biggin Abbey and would result in large construction, and later operational, vehicles using the Horningsea Road with greater frequency. The current farm track which runs to the indicative footprint form Horningsea Road is located immediately opposite this entrance, however it is used by agricultural vehicles which are in keeping with the historic land use in the setting of Biggin Abbey; whereas the vehicles which would require access for the construction and operation of the WWTP are not in keeping with this setting. Therefore, there would be a change within the setting of Biggin Abbey, resulting in a minor impact to the significance of the grade II* listed asset. In addition, this route has high archaeological potential associated with a Roman cropmark system, Horningsea (CHER: 11555) and roman activity in the surrounding landscape. This non-designated asset relates to archaeological remains of potentially moderate value.

The proposed access route from High Ditch Road contains a listed Milestone (NHLE: 1331307), located in the centre of the junction at the terminus of Fen Drove. There is potential for this asset to experience damage from heavy construction vehicles or to be required to be moved to open the road, as it is located on the junction between Newmarket Road and High Ditch Road. However, it is on the far side of this junction and therefore further from the potential turning area. In addition, if required it may be removed and replaced back into its original setting. This would result in a small negative impact to a designated asset of moderate value.

Immediately south of High Ditch Road, within the access area, is a section of Fleam Dyke (CHER: MCB12150), a potentially moderate value asset. If any widening of the road to the south was required, this would result in moderate to major impact to an asset of moderate value. Currently the road widening is proposed for the northern side of High Ditch Road, therefore it is assumed that based on the current information there is no anticipated impact on Fleam Dyke. Human inhumations have been identified near Fleam Dyke (CHER: 0603), and there is therefore the potential for human archaeological remains within this access area.

6.4 RAG Outcome

Based on the criteria described in section 2 and the above impact appraisal, the RAG outcome for the development of the proposed scheme at **site area 3** is **RED.**

6.4.1 Reason for RAG outcome

The reason for the RAG outcome is the potential for impact to Biggin Abbey as a result of change within its setting. Without mitigation this may amount to moderate harm to the significance of the asset, this amounts to less than substantial harm in accordance with the NPS but constitutes a red rating within the RAG criteria for this report.

Without this element the site would receive an amber rating due to the potential for impact on buried archaeological remains and lesser impact on Anglesey Abbey. The pipeline to Waterbeach would also likely result in moderate to major impact to archaeological remains of moderate value, if present. This may amount to substantial harm in accordance with the NPS.

There is also potential for impact to the grade II listed Wildfowl Cottage from change within its setting. The access route from Horningsea Road contains Roman archaeological remains of potentially moderate value and has high potential for associated archaeology. The access road from High Ditch Road presents risk to Fleam Dyke, the grade II listed milestone and archaeological human remains that have been recovered in proximity to it. These impacts amount to less than substantial harm.

6.5 Mitigation

6.5.1 Proposed mitigation

The potential for impact on Biggin Abbey, grade II* listed, and its associated grounds and archaeology can be reduced through mitigation. Some strategic planting close to the asset may be achievable to reduce impact, however the landscape is open and excessive planting may have adverse effect on its character. Bunds may help reduce the visual impact on the landscape and landscaping design proposed may contribute to reducing this impact. The visual impact should be softened as much as possible by introducing landscaping features. However, the mitigation factor which will have the greatest effect on reducing potential for impact is the design, height and massing of the WWTP. Reducing the massing and using materials which aid in fading the digester into the skyline, for example gradated painting, would also contribute to reducing impact. The location of the digesters within the footprint will also influence the extent of impact, they should be placed on the far side of the area from the abbey. The height of the digesters should be reduced by the greatest feasible amount. A reduction in potential impact to height is likely to directly correlate to reducing the impact to Biggin Abbey. Other buildings over 10m should also be reduced in height and mass wherever possible.

The use of the access route from Horningsea Road is slightly preferable when considering potential impact to the historic environment; both routes contain archaeological remains of potentially moderate value and Horningsea Road has potential impact to the setting of Biggin Abbey, however only the High Ditch Road access route contains a designated heritage asset. If Horningsea Road is used, the entrance should be offset so that line of sight down the avenue from Biggin Abbey is not directed into site area 3. Landscaping should be used to soften elements in the north-east corner, so they do not dominate views outwards down the avenue entrance. This would reduce the impact from change in setting for the designated asset. Archaeological investigation is also likely to be required for this route.

If High Ditch Road is used for access to site area 3, the listed milestone should only be removed if absolutely necessary for the proposed scheme or necessary to protect the asset from harm. Following construction, it should be returned to its original setting, reducing negative impact to the asset from moderate to minor. Fleam dyke is located north and south of the road for which widening may be required for use by construction vehicles if site area 3 is selected, crossing the road along its length. The road should not be widened unless absolutely necessary. If the road must be widened this should aim to avoid Fleam Dyke rather than focus on widening on only one side of the road. Archaeological investigation is also likely to be required for this route and may be required to determine the route of Fleam Dyke to aid in avoiding the asset. Archaeological investigation would be required if site area 3 is selected. The extent of this investigation would be dependent on the results of initial surveys but is likely to include geophysical survey and some excavation at a minimum. This does not amount to mitigation, as discussed for site areas 1 and 2.

Geophysical survey, trial trenching and/or other survey may identify areas of greater archaeological potential or specific remains of moderate value within the site area. This may allow for the targeting of building and service locations to reduce impact on buried archaeology. However, as the landscape contains a high density of remains and the historic environment is not the only factor of consideration in the scheme design this is unlikely to materially reduce the potential for impact, as for areas 1 and 2.

6.5.2 Mitigated RAG Outcome

With the above mitigation imposed there is potential that the impact may be reduced. This will largely be dependent on the design of the buildings and structures on the site, including the digesters. If all the above mitigation is followed there is potential that the outcome may be reduced to **AMBER**.

7 Conclusions

This stage 4 screening report for the three shortlisted sites (site area 1, site area 2 and site area 3) for the relocation of Cambridge Waste water Treatment Plant, focusses on the potential for impact on the historic environment. This report has provided a baseline for each of the three sites and completed an initial Impact Appraisal which identifies the potential for impact on the built historic environment and on archaeology for each of the three sites. Based on this Impact Appraisal and the criteria laid out in the methodology of this report (section 2) each site has been assigned a Green, Amber or Red (RAG) outcome.

Based on the criteria described in section 2 and the Impact Appraisal in section 4, the RAG outcome for the development of the proposed scheme at **Site area 1** is **AMBER**. This is due to the potential for moderate or major impact on archaeological remains of moderate value associated with Iron Age and Roman activity and potential impact on the grade I listed church from change within its setting. With mitigation this rating would remain amber.

Based on the criteria described in section 2 and the above Impact Appraisal, the RAG outcome for the development of the proposed scheme at **Site area 2** is **AMBER.** This is due to the high potential for Iron Age and Roman archaeological remains. With mitigation this rating would remain amber.

Based on the criteria described in section 2 the Impact Appraisal in section 6, the RAG outcome for the development of the proposed scheme at **Site area 3** is **RED.** This is due to the potential impact on Biggin Abbey, with extensive mitigation there is potential for this impact to be reduced to an amber outcome.

8 References

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A P M Wright and C P Lewis (198) 'Histon: Manors and other estates', in A History of the County of Cambridge and the Isle of Ely: Volume 9. Via: British History Online /www.british-history.ac.uk/vch/cambs/vol9/pp94-97 (accessed August 2020)

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Palmer, R. and Connor, A. (2000) An Iron Age ditched enclosure system at Limes farm, Landbeach, Cambridgeshire. Antiquity 74; 284 (p281-282).

Parks and Gardens (2020) Impington Hall, Cambridgeshire. Via: https://www.parksandgardens.org/places/impington-hall-cambridge (accessed August 2020)

Appendices

A. Designated Assets within Study Areas for shortlisted sites

A.1 Designated assets within the study area for Site area 1

Name	NHLE	Designation
BAPTIST CHAPEL	1179106	Grade II listed
CHURCH OF ST MARY AND ST MICHAEL	1081526	Grade I listed
SIDNEY SUSSEX COLLEGE, THE BUILDINGS SURROUNDING HALL COURT AND CHAPEL COURT	1106237	Grade I listed
Trinity College, The Buildings surrounding Great Court, Nevile's Court and New Court, and including King's Hostel	1106371	Grade I listed
CHURCH OF ST ANDREW	1112541	Grade I listed
THE COCKERELL BUILDING (SQUIRE LAW LIBRARY)	1121518	Grade I listed
GONVILLE AND CAIUS COLLEGE, THE GATE OF HONOUR AND FLANKING WALLS	1125526	Grade I listed
GONVILLE AND CAIUS COLLEGE, THE GATE OF HUMILITY	1125527	Grade I listed
JESUS COLLEGE, THE BUILDINGS SURROUNDING CLOISTER AND OUTER COURTS, AND THE EAST RANGE OF PUMP COURT (EXCLUDING THE NORTH RANGE OF OUTER COURT)	1125529	Grade I listed
KING'S COLLEGE, SCREENS AND ENTRANCE GATEWAY ON KING'S PARADE	1125532	Grade I listed
CHRIST'S COLLEGE, BATHING POOL AND SUMMER HOUSE, INCLUDING THE BUSTS OF CUDWORTH, MILTON AND SAUNDERSON AND STONE VASE IN MEMORY OF JOSEPH MEDE	1125548	Grade I listed
CLARE COLLEGE, GATEWAY ON WEST SIDE OF CLARE BRIDGE WITH FLANKING RAILINGS AND GATES TO COLLEGE GARDEN	1125551	Grade I listed
CHURCH OF ST MARY THE GREAT	1126084	Grade I listed

Name	NHLE	Designation
"CHAPEL OF ST MARY MAGDALENE	1126144	Grade I listed
STOURBRIDGE CHAPEL"	1126204	Grade I listed
ALL SAINTS CHURCH	1126252	Grade I listed
CHURCH OF ST BENE'T	1126260	Grade I listed
CHURCH OF THE HOLY SEPULCHRE	1126266	Grade I listed
TRINITY COLLEGE, FIELD GATES TO QUEEN'S ROAD	1126279	Grade I listed
THE LAW SCHOOL AND UNIVERSITY OFFICES	1127040	Grade I listed
CHURCH OF ST MARY	1127052	Grade I listed
CHURCH OF ST MARY THE VIRGIN	1127115	Grade I listed
CHURCH OF HOLY TRINITY	1127283	Grade I listed
CHURCH OF ST MARY AND ALL THE SAINTS	1127295	Grade I listed
CHURCH OF ALL SAINTS	1127360	Grade I listed
DENNY ABBEY	1127385	Grade I listed
PARISH CHURCH OF ALL SAINTS	1127404	Grade I listed
PARISH CHURCH OF ST ANDREW	1127774	Grade I listed
CHURCH OF ST PETER	1139003	Grade I listed
KING'S COLLEGE, CHAPEL	1139049	Grade I listed
JESUS COLLEGE, NORTH RANGE OF OUTER COURT	1139452	Grade I listed
KING'S COLLEGE, SOUTH RANGE OF FIRST COURT, INCLUDING THE LIBRARY AND THE FORMER PROVOST'S LODGE	1163528	Grade I listed
MADINGLEY HALL AND STABLE COURTYARD	1165597	Grade I listed
THE ABBEY	1115408	Grade I listed
GONVILLE AND CAIUS COLLEGE, THE NORTH AND EAST RANGES OF TREE COURT AND SOUTH WALL	1115639	Grade II* listed
CLARE COLLEGE MEMORIAL COURT	1125496	Grade II* listed
SIDNEY SUSSEX COLLEGE, CLOISTER COURT	1125506	Grade II* listed
NEWNHAM COLLEGE, PFEIFFER BUILDING	1126068	Grade II* listed

Name	NHLE	Designation
30 AND 31, TRINITY STREET	1126076	Grade II* listed
CHURCH OF ST EDWARD, KING AND MARTYR	1126103	Grade II* listed
"BARNWELL PRIORY	1126148	Grade II* listed
BARNWELL PRIORY (THE CELLARER'S CHECKER)"	1126262	Grade II* listed
ARTS THEATRE WORKSHOP AND STORE	1127041	Grade II* listed
CHURCH OF ST CLEMENT	1127071	Grade II* listed
CHURCH OF ST CYRIAC AND JULITTA	1127241	Grade II* listed
THE HALL	1127273	Grade II* listed
PARISH CHURCH OF ALL SAINTS	1127298	Grade II* listed
CHURCH OF ALL SAINTS	1127349	Grade II* listed
CHURCH OF ST MICHAEL	1127351	Grade II* listed
PARISH CHURCH OF ALL SAINTS	1127366	Grade II* listed
MILTON HOUSE	1127378	Grade II* listed
CHURCH OF ST JOHN	1127399	Grade II* listed
IMPINGTON MILL	1127408	Grade II* listed
DITTON HALL	1127430	Grade II* listed
THE OLDE HOUSE	1127431	Grade II* listed
PARISH CHURCH OF ST MARY VIRGIN	1127740	Grade II* listed
THE OLD RECTORY	1127741	Grade II* listed
CHURCH OF ST MARY MAGDALENE	1127744	Grade II* listed
GATEWAY TO STABLE COURTYARD AT MADINGLEY HALL	1162717	Grade II* listed
THE MANOR HOUSE	1163652	Grade II* listed
CHURCH OF ST PETER AND ST PAUL	1164101	Grade II* listed
MADINGLEY MILL, AT MILL FARM, MADINGLEY HILL	1164356	Grade II* listed
CHURCH OF ST ANDREW	1164972	Grade II* listed
CHURCH OF ST ANDREW	1165918	Grade II* listed
CATTELL'S MILL	1167060	Grade II* listed

Name	NHLE	Designation
BURGH HALL	1178408	Grade II* listed
CHURCH OF ST JOHN THE EVANGELIST	1081526	Grade II* listed
BIGGIN ABBEY	1106237	Grade II* listed
Multi-phased settlement east of Milton	1457437	Scheduled Monument
Iron Age ritual enclosure containing a Bronze Age barrow, and Roman cemetery	1465057	Scheduled Monument
Denny Abbey	1012770	Scheduled Monument
Giant's Hill: a motte castle with part of an earlier medieval settlement and associated field system	1011778	Scheduled Monument
Causewayed enclosure 900m west of Great Wilbraham parish church	1009103	Scheduled Monument
Belsar's Hill ringwork	1010368	Scheduled Monument
Swaffham Bulbeck moated site.	1012622	Scheduled Monument
Moated site area 140m south west of Histon Manor	1019181	Scheduled Monument
Moated site 90m south of Bendyshe Farm	1019175	Scheduled Monument
Long barrow 650m NNW of Lythel's Farm	1020843	Scheduled Monument
Moated site at Manor Farm	1019180	Scheduled Monument
Devil's Ditch, Reach to Woodditton	1003262	Scheduled Monument
Worstead Street (Via Devana) near Cambridge	1003263	Scheduled Monument
Romano-British Settlement at Chittering, Cambs	1012359	Scheduled Monument
Roman settlement	1006793	Scheduled Monument
Length of Car Dyke between Green End and Top Moor	1006813	Scheduled Monument
Shrunken medieval village of Landbeach	1006870	Scheduled Monument
Moated site at Manor Farm	1020440	Scheduled Monument
Horningsea kilns, site of	1006895	Scheduled Monument
Deserted medieval village in Bottisham Park	1006900	Scheduled Monument
Roman villa and Iron Age settlement N of Reach Bridge	1006875	Scheduled Monument
Civil War earthworks at the Castle	1006886	Scheduled Monument

Name	NHLE	Designation
Car Dyke	1006930	Scheduled Monument
Old Cheddar's Lane pumping station	1006896	Scheduled Monument
Waterbeach Abbey (site of)	1006888	Scheduled Monument
Cambridge Castle mound	1006905	Scheduled Monument
Settlement site by Caudle Corner Farm	1006878	Scheduled Monument
Romano-British settlement on Bullocks Haste Common	1006897	Scheduled Monument
AMERICAN MILITARY CEMETERY	1001573	Grade I Registered Park and Garden
HISTON ROAD CEMETERY	1001569	Grade II* Registered Park and Garden
BOTANIC GARDEN, CAMBRIDGE	1000612	Grade II* Registered Park and Garden
ANGLESEY ABBEY	1000611	Grade II* Registered Park and Garden
KING'S COLLEGE	1000624	Grade II* Registered Park and Garden
ST JOHN'S COLLEGE	1000632	Grade II* Registered Park and Garden
EMMANUEL COLLEGE	1000619	Grade II* Registered Park and Garden
MILL ROAD CEMETERY	1001561	Grade II Registered Park and Garden
TRINITY HALL	1000634	Grade II Registered Park and Garden
MADINGLEY HALL	1000627	Grade II Registered Park and Garden
WILBRAHAM TEMPLE	1000397	Grade II Registered Park and Garden
SWAFFHAM PRIOR HOUSE	1000396	Grade II Registered Park and Garden
CLARE COLLEGE	1000617	Grade II Registered Park and Garden
CHRIST'S COLLEGE	1000616	Grade II Registered Park and Garden
TRINITY COLLEGE	1000633	Grade II Registered Park and Garden
QUEENS' COLLEGE	1000630	Grade II Registered Park and Garden
Garden of 48 Storey's Way	1422759	Grade II Registered Park and Garden
Reach	N/A	Conservation Area
Swaffham Prior	N/A	Conservation Area
Swaffham Bulbeck	N/A	Conservation Area
Lode	N/A	Conservation Area
Bottisham	N/A	Conservation Area

Name	NHLE	Designation
Trumpington	N/A	Conservation Area
Ferry Lane	N/A	Conservation Area
Chesterton	N/A	Conservation Area
De Freville	N/A	Conservation Area
Storey's Way	N/A	Conservation Area
Conduit Head Road	N/A	Conservation Area
Southacre	N/A	Conservation Area
Brooklands Avenue	N/A	Conservation Area
Barrow Road	N/A	Conservation Area
Central	N/A	Conservation Area
Castle and Victoria Road	N/A	Conservation Area
Kite	N/A	Conservation Area
Mill Road	N/A	Conservation Area
New Town and Glisson Road	N/A	Conservation Area
Newnham Croft	N/A	Conservation Area
Riverside and Stourbridge Common	N/A	Conservation Area
West Cambridge	N/A	Conservation Area
BAPTIST CHAPEL	1179106	Grade II listed
THE LIMES	1127389	Grade II listed
Multi-phased settlement east of Milton	1457437	Scheduled Monument
LODGE TO MILTON HALL	1331320	Grade II listed

Source: Historic England (2020) National Heritage List for England

A.2 Designated assets within the study area for Site area 2

Name	NHLE	Designation
There are no designated assets within Site area 2		
There are no designated heritage assets within 500m of Site area 2		
Designated heritage assets within 10km ZTV for Site area 2		
CHURCH OF ST MARY AND ST MICHAEL	1081526	Grade I listed
SIDNEY SUSSEX COLLEGE, THE BUILDINGS SURROUNDING HALL COURT AND CHAPEL COURT	1106237	Grade I listed
Trinity College, The Buildings surrounding Great Court, Nevile's Court and New Court, and including King's Hostel	1106371	Grade I listed
CHURCH OF ST ANDREW	1112541	Grade I listed
ST JOHN'S COLLEGE, GATEWAY TO KITCHEN YARD TO EAST OF OLD BRIDGE	1125488	Grade I listed
GONVILLE AND CAIUS COLLEGE, THE GATE OF HONOUR AND FLANKING WALLS	1125526	Grade I listed
JESUS COLLEGE, THE BUILDINGS SURROUNDING CLOISTER AND OUTER COURTS, AND THE EAST RANGE OF PUMP COURT (EXCLUDING THE NORTH RANGE OF OUTER COURT)	1125529	Grade I listed
KING'S COLLEGE, SCREENS AND ENTRANCE GATEWAY ON KING'S PARADE	1125532	Grade I listed
KING'S COLLEGE, KING'S BRIDGE	1125535	Grade I listed
CHRIST'S COLLEGE, BATHING POOL AND SUMMER HOUSE, INCLUDING THE BUSTS OF CUDWORTH, MILTON AND SAUNDERSON AND STONE VASE IN MEMORY OF JOSEPH MEDE	1125548	Grade I listed
CLARE COLLEGE, GATEWAY ON WEST SIDE OF CLARE BRIDGE WITH FLANKING RAILINGS AND GATES TO COLLEGE GARDEN	1125551	Grade I listed
CORPUS CHRISTI COLLEGE, THE BUILDINGS SURROUNDING THE OLD AND NEW COURTS INCLUDING THE MASTER'S LODGE	1125553	Grade I listed
CHURCH OF ST MICHAEL	1126061	Grade I listed
CHURCH OF ST MARY THE GREAT	1126084	Grade I listed
CHURCH OF ST ANDREW	1126191	Grade I listed
ALL SAINTS CHURCH	1126204	Grade I listed
CHURCH OF ST BENE'T	1126252	Grade I listed
CHURCH OF THE HOLY SEPULCHRE	1126260	Grade I listed
CHURCH OF ST MARY THE VIRGIN	1127052	Grade I listed
CHURCH OF HOLY TRINITY	1127115	Grade I listed

Name	NHLE	Designation
CHURCH OF ST MARY AND ALL THE SAINTS	1127283	Grade I listed
CHURCH OF ALL SAINTS	1127295	Grade I listed
DENNY ABBEY	1127360	Grade I listed
PARISH CHURCH OF ALL SAINTS	1127385	Grade I listed
PARISH CHURCH OF ST ANDREW	1127404	Grade I listed
CHURCH OF ST PETER	1127774	Grade I listed
KING'S COLLEGE, CHAPEL	1139003	Grade I listed
JESUS COLLEGE, NORTH RANGE OF OUTER COURT	1139049	Grade I listed
MADINGLEY HALL AND STABLE COURTYARD	1163528	Grade I listed
WANSTEAD HOUSE	1099114	Grade II* listed
GONVILLE AND CAIUS COLLEGE, THE NORTH AND EAST RANGES OF TREE COURT AND SOUTH WALL	1115408	Grade II* listed
SIDNEY SUSSEX COLLEGE, CLOISTER COURT	1125496	Grade II* listed
13, TRINITY STREET	1126063	Grade II* listed
30 AND 31, TRINITY STREET	1126068	Grade II* listed
CHURCH OF ST EDWARD, KING AND MARTYR	1126076	Grade II* listed
"BARNWELL PRIORY	1126103	Grade II* listed
BARNWELL PRIORY (THE CELLARER'S CHECKER)"	1126148	Grade II* listed
ARTS THEATRE WORKSHOP AND STORE	1126262	Grade II* listed
CHURCH OF ST CLEMENT	1127241	Grade II* listed
PARISH CHURCH OF ALL SAINTS	1127273	Grade II* listed
CHURCH OF ALL SAINTS	1127298	Grade II* listed
CHURCH OF ST MICHAEL	1127349	Grade II* listed
PARISH CHURCH OF ALL SAINTS	1127351	Grade II* listed
MILTON HOUSE	1127366	Grade II* listed
CHURCH OF ST JOHN	1127378	Grade II* listed
IMPINGTON MILL	1127399	Grade II* listed
DITTON HALL	1127408	Grade II* listed
THE OLDE HOUSE	1127430	Grade II* listed

Name	NHLE	Designation
PARISH CHURCH OF ST MARY VIRGIN	1127431	Grade II* listed
THE OLD RECTORY	1127740	Grade II* listed
CHURCH OF ST MARY MAGDALENE	1127741	Grade II* listed
GATEWAY TO STABLE COURTYARD AT MADINGLEY HALL	1127744	Grade II* listed
THE MANOR HOUSE	1162717	Grade II* listed
CHURCH OF ST PETER AND ST PAUL	1163557	Grade II* listed
PARISH CHURCH OF ST MARY	1163652	Grade II* listed
MADINGLEY MILL, AT MILL FARM, MADINGLEY HILL	1164101	Grade II* listed
CHURCH OF ST ANDREW	1164356	Grade II* listed
CHURCH OF ST ANDREW	1164972	Grade II* listed
CATTELL'S MILL	1165918	Grade II* listed
BURGH HALL	1167060	Grade II* listed
CHURCH OF ST JOHN THE EVANGELIST	1178408	Grade II* listed
BIGGIN ABBEY	1099114	Grade II* listed
Multi-phased settlement east of Milton	1457437	Scheduled Monument
Iron Age ritual enclosure containing a Bronze Age barrow, and Roman cemetery	1465057	Scheduled Monument
Wandlebury Camp: a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains	1009395	Scheduled Monument
Denny Abbey	1012770	Scheduled Monument
Giant's Hill: a motte castle with part of an earlier medieval settlement and associated field system	1011778	Scheduled Monument
Causewayed enclosure 900m west of Great Wilbraham parish church	1009103	Scheduled Monument
Belsar's Hill ringwork	1010368	Scheduled Monument
Swaffham Bulbeck moated site.	1012622	Scheduled Monument
Moated site area 140m south west of Histon Manor	1019181	Scheduled Monument
Moated site 90m south of Bendyshe Farm	1019175	Scheduled Monument
Long barrow 650m NNW of Lythel's Farm	1020843	Scheduled Monument
Henge 220m ESE of Herring's House	1011716	Scheduled Monument
Moated site at Manor Farm	1019180	Scheduled Monument

Name	NHLE	Designation
Worstead Street (Via Devana) near Cambridge	1003263	Scheduled Monument
Romano-British Settlement at Chittering, Cambs	1012359	Scheduled Monument
Roman settlement	1006793	Scheduled Monument
Length of Car Dyke between Green End and Top Moor	1006813	Scheduled Monument
Shrunken medieval village of Landbeach	1006870	Scheduled Monument
Horningsea kilns, site of	1006895	Scheduled Monument
Over Windmill	1006869	Scheduled Monument
Deserted medieval village in Bottisham Park	1006900	Scheduled Monument
Chesterton Abbey	1006907	Scheduled Monument
Civil War earthworks at the Castle	1006886	Scheduled Monument
Site revealed by aerial photography W of White Hill Farm	1006891	Scheduled Monument
Car Dyke	1006930	Scheduled Monument
Old Cheddar's Lane pumping station	1006896	Scheduled Monument
Waterbeach Abbey (site of)	1006888	Scheduled Monument
Cambridge Castle mound	1006905	Scheduled Monument
Settlement site by Caudle Corner Farm	1006878	Scheduled Monument
Romano-British settlement on Bullocks Haste Common	1006897	Scheduled Monument
AMERICAN MILITARY CEMETERY	1001573	Grade I registered park and garden
HISTON ROAD CEMETERY	1001569	Grade II* registered park and garden
BOTANIC GARDEN, CAMBRIDGE	1000612	Grade II* registered park and garden
ANGLESEY ABBEY	1000611	Grade II* registered park and garden
KING'S COLLEGE	1000624	Grade II* registered park and garden
ST JOHN'S COLLEGE	1000632	Grade II* registered park and garden
EMMANUEL COLLEGE	1000619	Grade II* registered park and garden
CHILDERLEY HALL	1000614	Grade II* registered park and garden
MILL ROAD CEMETERY	1001561	Grade II registered park and garden
TRINITY HALL	1000634	Grade II registered park and garden
MADINGLEY HALL	1000627	Grade II registered park and garden

Name	NHLE	Designation
SWAFFHAM PRIOR HOUSE	1000396	Grade II registered park and garden
CLARE COLLEGE	1000617	Grade II registered park and garden
CHRIST'S COLLEGE	1000616	Grade II registered park and garden
TRINITY COLLEGE	1000633	Grade II registered park and garden
QUEENS' COLLEGE	1000630	Grade II registered park and garden
Garden of 48 Storey's Way	1422759	Grade II registered park and garden
Swaffham Bulbeck	N/A	Conservation Area
Lode	N/A	Conservation Area
Bottisham	N/A	Conservation Area
Trumpington	N/A	Conservation Area
Ferry Lane	N/A	Conservation Area
Chesterton	N/A	Conservation Area
De Freville	N/A	Conservation Area
Storey's Way	N/A	Conservation Area
Conduit Head Road	N/A	Conservation Area
Southacre	N/A	Conservation Area
Brooklands Avenue	N/A	Conservation Area
Barrow Road	N/A	Conservation Area
Central	N/A	Conservation Area
Castle and Victoria Road	N/A	Conservation Area
Kite	N/A	Conservation Area
Mill Road	N/A	Conservation Area
New Town and Glisson Road	N/A	Conservation Area
Newnham Croft	N/A	Conservation Area
Riverside and Stourbridge Common	N/A	Conservation Area
West Cambridge	N/A	Conservation Area
Within 200m of the Waterbeach transfer pipeline corridor		
BAPTIST CHAPEL	1179106	Grade II listed

Name	NHLE	Designation
THE LIMES	1127389	Grade II listed
There are no designated heritage assets within 200m of treated effluent pipeline corridor option A for site area 2		
Within 200m of treated effluent pipeline corridor option B for site area 2		
Multi-phased settlement east of Milton	1457437	Scheduled Monument
LODGE TO MILTON HALL	1331320	Grade II listed
There are no designated assets within 200m of the waste water transfer pipeline corridor for Site area 2		

Source: Historic England (2020) National Heritage List for England

A.3 Designated assets within the study area for Site area 3

Name	NHLE	Designation
There are no designated assets within Site area 3		
Within 500m of Site area 3		
BIGGIN ABBEY	1178408	Grade II* listed
THE PLOUGH AND FLEECE	1127373	Grade II listed
VILLAGE PUMP TO NORTH OF SHELTER	1331292	Grade II listed
Within ZTV for Site area 3		
SIDNEY SUSSEX COLLEGE, THE BUILDINGS SURROUNDING HALL COURT AND CHAPEL COURT	1106237	Grade I listed
Trinity College, The Buildings surrounding Great Court, Nevile's Court and New Court, and including King's Hostel	1106371	Grade I listed
CHURCH OF ST ANDREW	1112541	Grade I listed
THE COCKERELL BUILDING (SQUIRE LAW LIBRARY)	1121518	Grade I listed
MAGDALENE COLLEGE, THE BUILDINGS SURROUNDING FIRST COURT	1125500	Grade I listed
GONVILLE AND CAIUS COLLEGE, THE GATE OF HONOUR AND FLANKING WALLS	1125526	Grade I listed
JESUS COLLEGE, THE BUILDINGS SURROUNDING CLOISTER AND OUTER COURTS, AND THE EAST RANGE OF PUMP COURT (EXCLUDING THE NORTH RANGE OF OUTER COURT)	1125529	Grade I listed
KING'S COLLEGE, SCREENS AND ENTRANCE GATEWAY ON KING'S PARADE	1125532	Grade I listed
KING'S COLLEGE, FELLOWS' BUILDING	1125533	Grade I listed

Name	NHLE	Designation
KING'S COLLEGE, KING'S BRIDGE	1125535	Grade I listed
CHRIST'S COLLEGE, BATHING POOL AND SUMMER HOUSE, INCLUDING THE BUSTS OF CUDWORTH, MILTON AND SAUNDERSON AND STONE VASE IN MEMORY OF JOSEPH MEDE	1125548	Grade I listed
CLARE COLLEGE, GATES AND RAILINGS TO TRINITY HALL LANE	1125550	Grade I listed
CLARE COLLEGE, GATEWAY ON WEST SIDE OF CLARE BRIDGE WITH FLANKING RAILINGS AND GATES TO COLLEGE GARDEN	1125551	Grade I listed
CHURCH OF ST MICHAEL	1126061	Grade I listed
CHURCH OF ST MARY THE GREAT	1126084	Grade I listed
SCHOOL OF PYTHAGORAS	1126114	Grade I listed
CHURCH OF ST ANDREW	1126191	Grade I listed
ALL SAINTS CHURCH	1126204	Grade I listed
CHURCH OF ST BENE'T	1126252	Grade I listed
CHURCH OF THE HOLY SEPULCHRE	1126260	Grade I listed
THE LAW SCHOOL AND UNIVERSITY OFFICES	1126279	Grade I listed
CHURCH OF ST MARY	1127040	Grade I listed
CHURCH OF ST MARY THE VIRGIN	1127052	Grade I listed
CHURCH OF HOLY TRINITY	1127115	Grade I listed
DENNY ABBEY	1127360	Grade I listed
PARISH CHURCH OF ALL SAINTS	1127385	Grade I listed
PARISH CHURCH OF ST ANDREW	1127404	Grade I listed
CHURCH OF ST PETER	1127774	Grade I listed
KING'S COLLEGE, CHAPEL	1139003	Grade I listed
JESUS COLLEGE, NORTH RANGE OF OUTER COURT	1139049	Grade I listed
KING'S COLLEGE, SOUTH RANGE OF FIRST COURT, INCLUDING THE LIBRARY AND THE FORMER PROVOST'S LODGE	1139452	Grade I listed
THE ABBEY	1165597	Grade I listed
WANSTEAD HOUSE	1099114	Grade II* listed
GONVILLE AND CAIUS COLLEGE, THE NORTH AND EAST RANGES OF TREE COURT AND SOUTH WALL	1115408	Grade II* listed
CLARE COLLEGE MEMORIAL COURT	1115639	Grade II* listed
SIDNEY SUSSEX COLLEGE, CLOISTER COURT	1125496	Grade II* listed

Name	NHLE	Designation
13, TRINITY STREET	1126063	Grade II* listed
30 AND 31, TRINITY STREET	1126068	Grade II* listed
CHURCH OF ST EDWARD, KING AND MARTYR	1126076	Grade II* listed
"BARNWELL PRIORY	1126103	Grade II* listed
BARNWELL PRIORY (THE CELLARER'S CHECKER)"	1126148	Grade II* listed
ARTS THEATRE WORKSHOP AND STORE	1126262	Grade II* listed
CHURCH OF ST CLEMENT	1126339	Grade II* listed
SIX MILE BOTTOM WINDMILL	1127041	Grade II* listed
CHURCH OF ST CYRIAC AND JULITTA	1127071	Grade II* listed
THE HALL	1127273	Grade II* listed
CHURCH OF ALL SAINTS	1127349	Grade II* listed
PARISH CHURCH OF ALL SAINTS	1127351	Grade II* listed
MILTON HOUSE	1127366	Grade II* listed
CHURCH OF ST JOHN	1127378	Grade II* listed
IMPINGTON MILL	1127399	Grade II* listed
DITTON HALL	1127430	Grade II* listed
PARISH CHURCH OF ST MARY VIRGIN	1127431	Grade II* listed
THE OLD RECTORY	1127875	Grade II* listed
WILBRAHAM TEMPLE	1163652	Grade II* listed
MADINGLEY MILL, AT MILL FARM, MADINGLEY HILL	1164101	Grade II* listed
CHURCH OF ST ANDREW	1167060	Grade II* listed
CHURCH OF ST JOHN THE EVANGELIST	1178408	Grade II* listed
BIGGIN ABBEY	1099114	Grade II* listed
Multi-phased settlement east of Milton	1457437	Scheduled Monument
Iron Age ritual enclosure containing a Bronze Age barrow, and Roman cemetery	1465057	Scheduled Monument
Wandlebury Camp: a multivallate hillfort, earlier univallate hillfort, Iron Age cemetery and 17th century formal garden remains	1009395	Scheduled Monument
Burwell Castle	1015596	Scheduled Monument
Denny Abbey	1012770	Scheduled Monument

Name	NHLE	Designation
Giant's Hill: a motte castle with part of an earlier medieval settlement and associated field system	1011778	Scheduled Monument
Three bowl barrows 640m north west of Hare Park Stud	1016819	Scheduled Monument
Causewayed enclosure 900m west of Great Wilbraham parish church	1009103	Scheduled Monument
Three bowl barrows 640m north west of Hare Park Stud	1016819	Scheduled Monument
Swaffham Bulbeck moated site.	1012622	Scheduled Monument
Moated site area 140m south west of Histon Manor	1019181	Scheduled Monument
Moated site 90m south of Bendyshe Farm	1019175	Scheduled Monument
Long barrow 650m NNW of Lythel's Farm	1020843	Scheduled Monument
Bowl barrow on Copley Hill	1017327	Scheduled Monument
Henge 220m ESE of Herring's House	1011716	Scheduled Monument
Moated site at Manor Farm	1019180	Scheduled Monument
Four bowl barrows at Allington Hill, 420m south west of Allington Hill Farm	1016820	Scheduled Monument
Devil's Ditch, Reach to Woodditton	1003262	Scheduled Monument
Worstead Street (Via Devana) near Cambridge	1003263	Scheduled Monument
Five bowl barrows 270m north of Hare Park Stud	1016818	Scheduled Monument
Bowl barrow 1080m north east of Worsted Lodge Farm, part of a dispersed round barrow cemetery in Charterhouse Plantation	1019989	Scheduled Monument
Romano-British Settlement at Chittering, Cambs	1012359	Scheduled Monument
Four bowl barrows 920m and 950m south east of Heath Farm, part of a dispersed round barrow cemetery in Charterhouse Plantation	1017326	Scheduled Monument
Roman settlement	1006793	Scheduled Monument
Length of Car Dyke between Green End and Top Moor	1006813	Scheduled Monument
Shrunken medieval village of Landbeach	1006870	Scheduled Monument
Mutlow Hill tumulus	1006932	Scheduled Monument
Moated site at Manor Farm	1020440	Scheduled Monument
Horningsea kilns, site of	1006895	Scheduled Monument
Causewayed enclosure and bowl barrow at Little Trees Hill	1011717	Scheduled Monument
Romano-British settlement 200m west of Allington Hill	1006901	Scheduled Monument
Deserted medieval village in Bottisham Park	1006900	Scheduled Monument

Name	NHLE	Designation
Roman villa and Iron Age settlement N of Reach Bridge	1006875	Scheduled Monument
Chesterton Abbey	1006907	Scheduled Monument
Civil War earthworks at the Castle	1006886	Scheduled Monument
Old Cheddar's Lane pumping station	1006896	Scheduled Monument
Car Dyke	1006930	Scheduled Monument
Waterbeach Abbey (site of)	1006888	Scheduled Monument
Cambridge Castle mound	1006905	Scheduled Monument
Settlement site by Caudle Corner Farm	1006878	Scheduled Monument
Romano-British settlement on Bullocks Haste Common	1006897	Scheduled Monument
Fleam Dyke	1006931	Scheduled Monument
AMERICAN MILITARY CEMETERY	1001573	Grade I registered park and garden
HISTON ROAD CEMETERY	1001569	Grade II* registered park and garden
BOTANIC GARDEN, CAMBRIDGE	1000612	Grade II* registered park and garden
ANGLESEY ABBEY	1000611	Grade II* registered park and garden
KING'S COLLEGE	1000624	Grade II* registered park and garden
ST JOHN'S COLLEGE	1000632	Grade II* registered park and garden
EMMANUEL COLLEGE	1000619	Grade II* registered park and garden
MILL ROAD CEMETERY	1001561	Grade II registered park and garden
TRINITY HALL	1000634	Grade II registered park and garden
MADINGLEY HALL	1000627	Grade II registered park and garden

Name	NHLE	Designation
WILBRAHAM TEMPLE	1000397	Grade II registered park and garden
SWAFFHAM PRIOR HOUSE	1000396	Grade II registered park and garden
CLARE COLLEGE	1000617	Grade II registered park and garden
CHRIST'S COLLEGE	1000616	Grade II registered park and garden
TRINITY COLLEGE	1000633	Grade II registered park and garden
QUEENS' COLLEGE	1000630	Grade II registered park and garden
Garden of 48 Storey's Way	1422759	Grade II registered park and garden
Burwell High Town	N/A	Conservation Area
Reach	N/A	Conservation Area
Swaffham Prior	N/A	Conservation Area
Swaffham Bulbeck	N/A	Conservation Area
Lode	N/A	Conservation Area
Bottisham	N/A	Conservation Area
Trumpington	N/A	Conservation Area
Ferry Lane	N/A	Conservation Area
Chesterton	N/A	Conservation Area
De Freville	N/A	Conservation Area
Storey's Way	N/A	Conservation Area
Conduit Head Road	N/A	Conservation Area
Southacre	N/A	Conservation Area
Brooklands Avenue	N/A	Conservation Area
Central	N/A	Conservation Area
Castle and Victoria Road	N/A	Conservation Area

Name	NHLE	Designation
Kite	N/A	Conservation Area
Mill Road	N/A	Conservation Area
New Town and Glisson Road	N/A	Conservation Area
Newnham Croft	N/A	Conservation Area
Riverside and Stourbridge Common	N/A	Conservation Area
West Cambridge	N/A	Conservation Area
Within 200m of Waterbeach transfer pipeline Corridor		
Horningsea kilns, site of	1006895	Scheduled Monument
THE PRIORY	1127374	
VILLAGE PUMP TO NORTH OF SHELTER	1331292	
86 AND 88, HIGH STREET	1331293	
THE SQUARE	1178724	
52 AND 54, HIGH STREET	1127375	
KINGS HATCH	1331294	
K6 TELEPHONE KIOSK	1223639	
THE THATCH	1302271	
KINGS ACRE	1331291	
CROWN AND PUNCH BOWL	1127376	
THE OLD RECTORY	1127377	
MANOR FARMHOUSE	1178774	
BARN TO NORTH OF LOCK FARM	1179436	Grade II listed
GRANARY TO EAST OF EYE HALL	1127368	Grade II listed
BARN TO EAST SOUTH EAST OF EYE HALL	1127369	Grade II listed
EYE HALL	1127411	Grade II listed
Within the study area for the treated effluent pipeline corridor		
BIGGIN ABBEY	1178408	Grade II* listed
POPLAR HALL	1127400	Grade II listed
Within the waste water transfer corridor		

Name	NHLE	Designation
POPLAR HALL	1127400	Grade II listed
LODE COTTAGE	1331301	
4, GREEN END	1127393	
Within 200m of the waste water transfer corridor		
GRASSEY COTTAGE	1127392	

Source: Historic England (2020) *National Heritage List for England*

B. Non-Designated Heritage Assets within the study areas

B.1 Non-designated assets in the study area for Site area 1

Name	CHER	Period and description
Within Site area 1 study area		
Coin finds, Mere Way	MCB16262	Iron Age/ Roman
Roman and medieval finds, Milton	MCB16263	Roman Medieval
Roman bronze coins, Milton	08779	Roman
Metal disc, Milton	08799A	Undated Modern
Roman bronze jug handle, Milton	08778	Roman
Bronze artefacts, Milton	08778A	Undated
Mesolithic flint blade, Milton	05273	Mesolithic
Mere Way/ Akeman Street Roman Road	N/A	Roman
Within Waterbeach transfer pipeline study area for site area 1		
Cropmarks near Landbeach	08317	Roman (?)
Roman pottery and coin, Landbeach	08314	Roman
Cropmark ditches, Lime Farm	11175	Roman
Cropmark complex, Lime Farm, Landbeach	08312a	Undated
Roman cropmark evidence, Landbeach	08844	Roman
Roman ditch, Landbeach	05343	Roman Prehistoric
Roman cropmark site, Landbeach	08847	Roman
RAF Waterbeach	CB15155	WWII
Roman settlement and cemetery, Area 6, Waterbeach Barracks	MCB24602	Medieval Roman

Name	CHER	Period and description
Roman finds, Waterbeach	11331	Roman
Within treated effluent pipeline corridor for site area 1 Option A		
Roman finds concentration, Butt Lane, Milton	MCB17609	Roman
Iron Age - Romano-British settlement, Milton Park and Ride	MCB18209	Iron Age Roman
Medieval windmill, Milton Park and Ride	MCB18210	Medieval
Ridge and furrow, S of Butt Lane, Milton	MCB17518	Medieval or Post-medieval
? Cropmark enclosure, Milton	08320	Undated
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
Within 100m of treated effluent pipeline study area for site area 1 Option A		
Post-Medieval and undated features, St. John's Innovation Park, Cowley	08330	Post-medieval
Roman settlement, Milton	05281	Roman
Roman pottery and ditches, Milton	05308	Roman
Within treated effluent pipeline study area for site area 1 Option B		
Site of Rectory Farm, Milton	MCB27069	Post-medieval
Milestone, Ely Road, Milton	MCB18343	Post-medieval
Cropmark complex, Milton	08471	Undated
Roman pottery, Milton	05538	Roman
Roman site, Penfold Farm	08873	Roman
Roman site, Penfold Farm	08313	Roman
Romano-British features, Cambridge Rowing Lake site	MCB16009	Roman
Destroyed pillbox, N of Milton	MCB27485	WWII
Destroyed pillbox, N of Milton	MCB27483	WWII
Within 100m of the treated effluent pipeline study area for site area 1 Option B		
Possible rectilinear feature, Milton	08315	Undated
Dubious linear features, Milton	08316	Undated
Roman urns, Horningsea	05547	Roman
Prehistoric remains, Cambridge Rowing Lake site	MCB16002	Late Prehistoric

Name	CHER	Period and description
Flint implement, Horningsea	05404	Prehistoric
Roman pottery scatter, Milton	MCB17094	Roman
Destroyed pillbox, N of Milton	MCB16401	WWII
Earthwork remains Ridge and furrow, N and NW of Horningsea village	05615	Medieval
Within waste water transfer corridor study area for site area 1		
Roman finds concentration, Butt Lane, Milton	MCB17609	Roman
Iron Age - Romano-British settlement, Milton Park and Ride	MCB18209	Iron Age Roman
Medieval windmill, Milton Park and Ride	MCB18210	Medieval
Ridge and furrow, S of Butt Lane, Milton	MCB17518	Medieval or Post-medieval
? Cropmark enclosure, Milton	08320	Undated
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
Post-Medieval and undated features, St. John's Innovation Park, Cowley	08330	Post Medieval Undated
Post-medieval boundary ditch, St John's Innovation Park, Cambridge	MCB15916	Post Medieval
Cropmark site, Fen Ditton	08327	Undated
Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6	11193	Roman Post-medieval
Medieval settlement remains, Fen Ditton	05535	Medieval
Extractive Pit, Off Green End	MCB20562	Post-medieval
Public air raid shelters, Fen Ditton	MCB25354	WWII
Roman cropmark system, Horningsea	11555	Roman (?)
Roman pottery, A45 Quy fieldwalking survey field 16	11203	Roman
Ridge and Furrow, Abbots Ditch Field	MCB6677	Post-medieval (?)
Medieval pottery, A45 fieldwalking project field 10	11197	Medieval
Within the study area for the diversions for the existing waste water transfer network		
Former Impington Hall and Gardens	12129	Post-medieval
Tile finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 22	**11209**	**Undated**

B.2 Non-Designated Assets within the study area for site area 2

Name	CHER	Period and Description
Within Site area 2		
Impington Hall park and garden, Impington	12129	Post-medieval
Medieval and post-medieval boundary banks east of Impington	MCB25715	Medieval to post-medieval
Former Ridge and furrow, Milton	MCB20022	Medieval
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
Within 100m of site area 2		
Iron Age remains (Area C), Milton Landfill Site	CB15708	Iron Age
Features at Milton Landfill Site	MCB19563	Early Neolithic to Modern
Post medieval finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 23	MCB13191	Post-medieval
Within 100m of Waterbeach transfer pipeline corridor		
Medieval and post-medieval boundary banks east of Impington	MCB25715	Medieval to post-medieval
Cropmarks near Landbeach	08317	Roman (?)
Roman pottery and coin, Landbeach	08314	Roman
Cropmark ditches, Lime Farm	11175	Roman
Cropmark complex, Lime Farm, Landbeach	08312a	Undated
Roman cropmark evidence, Landbeach	08844	Roman
Roman ditch, Landbeach	05343	Roman Prehistoric
Roman cropmark site, Landbeach	08847	Roman
RAF Waterbeach	CB15155	WWII
Roman settlement and cemetery, Area 6, Waterbeach Barracks	MCB24602	Medieval Roman
Roman finds, Waterbeach	11331	Roman
Cropmarks near Landbeach	08317	Roman (?)

Name	CHER	Period and Description
Roman pottery and coin, Landbeach	08314	Roman
Cropmark ditches, Lime Farm	11175	Roman
Cropmark complex, Lime Farm, Landbeach	08312a	Undated
Roman cropmark evidence, Landbeach	08844	Roman
Roman ditch, Landbeach	05343	Roman Prehistoric
Roman cropmark site, Landbeach	08847	Roman
RAF Waterbeach	CB15155	WWII
Roman settlement and cemetery, Area 6, Waterbeach Barracks	MCB24602	Medieval Roman
Roman finds, Waterbeach	11331	Roman
Within the treated effluent corridor option A		
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
Iron Age - Romano-British settlement, Milton Park and Ride	MCB18209	Iron Age and Roman
Medieval windmill, Milton Park and Ride	MCB18210	Medieval
Ridge and furrow, S of Butt Lane, Milton	MCB17518	Medieval
Section through Akeman Street Roman road, Milton	07610	Roman
? Cropmark enclosure, Milton	08320	Undated
Roman finds concentration, Butt Lane, Milton	MCB17609	Palaeolithic to post-medieval
Within 100m of the treated effluent corridor option A		
Post-Medieval and undated features, St. John's Innovation Park, Cowley	08330	Post-medieval
Roman settlement, Milton	05281	Roman
Roman pottery and ditches, Milton	05308	Roman
Mesolithic flint blade, Milton	05273	Mesolithic
Roman pottery, Milton	05273A	Roman
Medieval pottery, Milton	05273B	Medieval
Post-medieval pottery, Milton	05273C	Post-medieval
Mesolithic flint blade, Milton	05273	

Name	CHER	Period and Description
Roman pottery, Milton	05538	Roman
Within treated effluent pipeline study area for site area 1 Option B		
Site of Rectory Farm, Milton	MCB27069	Post-medieval
Milestone, Ely Road, Milton	MCB18343	Post-medieval
Cropmark complex, Milton	08471	Undated
Roman pottery, Milton	05538	Roman
Roman site, Penfold Farm	08873	Roman
Roman site, Penfold Farm	08313	Roman
Romano-British features, Cambridge Rowing Lake site	MCB16009	Roman
Destroyed pillbox, N of Milton	MCB27485	WWII
Destroyed pillbox, N of Milton	MCB27483	WWII
Within 100m of the treated effluent pipeline study area for site area 1 Option B		
Possible rectilinear feature, Milton		
Dubious linear features, Milton		
Roman urns, Horningsea		
Prehistoric remains, Cambridge Rowing Lake site		
Flint implement, Horningsea		
Roman pottery scatter, Milton		
Destroyed pillbox, N of Milton		
Earthwork remains Ridge and furrow, N and NW of Horningsea village		
Within treated effluent pipeline study area for site area 1 Option B		
Site of Rectory Farm, Milton		
Milestone, Ely Road, Milton		
Cropmark complex, Milton		
Roman pottery, Milton		
Within the waste water transfer corridor		
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
? Cropmark enclosure, Milton	08320	Undated

Name	CHER	Period and Description
Ridge and furrow, S of Butt Lane, Milton	MCB17518	Medieval
Medieval windmill, Milton Park and Ride	MCB18210	Medieval
Iron Age - Romano-British settlement, Milton Park and Ride	MCB18209	Iron Age, Roman
Roman finds concentration, Butt Lane, Milton	MCB17609	Palaeolithic to post-medieval
Section through Akeman Street Roman road, Milton	07610	Roman
Impington Hall park and garden, Impington	MCB14254	Post-medieval
Within 100m of waste water transfer corridor		
Iron Age - Romano-British settlement, Milton Park and Ride	MCB18209	Iron Age, Roman
? Cropmark enclosure, Milton	08320	Undated
Roman finds concentration, Butt Lane, Milton	MCB17609	Palaeolithic to post-medieval
Post-Medieval and undated features, St. John's Innovation Park, Cowley	08330	Post-medieval
Post-medieval boundary ditch, St John's Innovation Park, Cambridge	MCB15916	Post-medieval
Furrows and Undated Ditch at St Johns Innovation Park, Cowley Road, Cambridge	MCB20105	Undated
Within the study area for diversions for the existing waste water transfer network		
Former Impington Hall and Gardens	12129	Post-medieval
Tile finds, A45 Girton to Stow cum Quy fieldwalking survey, Field 22	**11209**	**Undated**

Non-designated assets listed above are identified in the CHER. Assessment of value is in accordance with the methodology in section 2.

B.3 Non-designated Assets within the study area for site area 3

Name	CHER	Period and description
Within Site area 3		
Roman cropmark system, Horningsea	11555	Roman
Bronze Age worked flints, Horningsea	07812	Bronze Age
Multiperiod finds, A45 Quy fieldwalking survey field 8, Horningsea	11194	Neolithic to Medieval
Prehistoric pottery, A45 Quy fieldwalking survey field 8, Horningsea	11195	Prehistoric
Roman pottery, A45 Quy fieldwalking survey field 8, Horningsea	11195A	Roman
Medieval pottery, A45 Quy fieldwalking survey field 8, Horningsea	11195B	Medieval
Post-medieval pottery, A45 Quy fieldwalking survey field 8, Horningsea	11195C	Post-medieval
Roman pottery, A45 Quy fieldwalking survey field 16, Horningsea	11203	Roman
Medieval pottery, A45 Quy fieldwalking survey field 16, Horningsea	11203A	Medieval
Post-medieval pottery, A45 Quy fieldwalking survey field 16, Horningsea	11203B	Post-medieval
Soilmarks and earthworks, A45 Quy fieldwalking survey field 20, Horningsea	11207	Unknown
Post-medieval pottery, A45 Quy fieldwalking survey field 21, Horningsea	11208	Post-medieval
Ridge and furrow, Horningsea	05611	Post-medieval
Within 100m of site area 3		
Roman pottery, Horningsea	11558	Roman
Ridge and furrow, Horningsea	05798	Medieval
Medieval pottery, A45 fieldwalking project field 10, Fen Ditton	11197	Medieval
Medieval earthworks, Horningsea	05324a	Medieval
Roman artefact scatter, Horningsea	05324	Roman
Ridge and furrow, Horningsea	05612	Medieval
Barnwell Junction to Mildenhall railway	MCB9234	Post-medieval
Within the Waterbeach transfer pipeline Corridor		
Site of former tramway, Horningsea	MCB28303	Post-medieval
Bronze Age rapiers & dirks, Horningsea	MCB27482	Bronze Age
Park and gardens of Eye Hall Farm, Horningsea	12122	Post-medieval and Modern

Name	CHER	Period and description
Within 100m of the Waterbeach transfer pipeline Corridor		
Roman settlement, Horningsea	05402	Roman
Earthwork remains Ridge and furrow, N and NW of Horningsea village	05615	Medieval
Roman kiln dump, Horningsea	05549	Roman
Deserted settlement and building remains, Eye Hall	MCB6772	Post-medieval
Roman pottery, Eye Hall Farm, Horningsea	MCB7736	Roman
Within the treated effluent corridor		
Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6	11193	Roman – modern
Late Saxon - early medieval pottery, Fen Ditton	11765	Early medieval
Cropmark site, Fen Ditton	08327	Unknown
Within 100m of the treated effluent corridor		
Former clay pit, Fen Ditton	MCB27455	Post-medieval
Biggin Abbey	01095	Medieval to post-medieval
Roman cropmark system, Horningsea	11555	Roman
Roman pottery and cropmarks, Horningsea	11557	Roman
Within the waste water transfer corridor		
Former clay pit, Fen Ditton	MCB27455	Post-medieval
Mounds, Fen Ditton	10515	Undated
Mound, Fen Ditton	11206	Undated
Poplar Hall, Fen Ditton	05489	Post-medieval
Roman cropmark system, Horningsea	11555	Roman
Roman artefact scatter, Horningsea	05324	Roman
Ridge and furrow, Horningsea	05612	Medieval
Windmill Hill, Fen Ditton	05310	Medieval to post-medieval
Former coprolite pit, Horningsea	MCB27456	Post-medieval
Public air raid shelters, Fen Ditton	MCB25356	WWII
Public air raid shelters, Fen Ditton	MCB25357	WWII
Public air raid shelters, Fen Ditton	MCB25355	WWII

Name	CHER	Period and description
Roman copper coin, Fen Ditton	05344	Roman
Site of Former Gravel Pit, Sandy Park Road, Milton	MCB20561	Post-medieval to modern
Roman settlement, Milton	MCB6439	Roman
Within 100m of the waste water transfer corridor		
Furrows and Undated Ditch at St Johns Innovation Park, Cowley Road, Cambridge	MCB20105	Undated
WWII vehicle depot, Trinity Farm, Milton	MCB17527	WWII
Roman pottery and ditches, Milton	05308	Roman
Cropmark site, Fen Ditton	08327	Unknown
Multiperiod finds, A45 Girton to Stow cum Quy fieldwalking survey, field 6	11193	Roman – modern
Public air raid shelters, Fen Ditton	MCB25354	WWII
Medieval settlement remains, Fen Ditton	05535	Medieval
Extractive Pit, Off Green End	MCB20562	Post-medieval and modern

C. Maps

C.1 Site 1

Data Sources
Listed buildings: © Historic England 2019.
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Client: anglianwater

Rev	Date	Drawn	Description	Ch'k'd	App'd
G	01/21	AB	Final	MR	JN

Title
CWWTPR Project
Stage 4 Final Site Selection
Nearest Designated Assets to WWTP Footprint
Site area 1

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton

Scale at A3: 1:10,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0472

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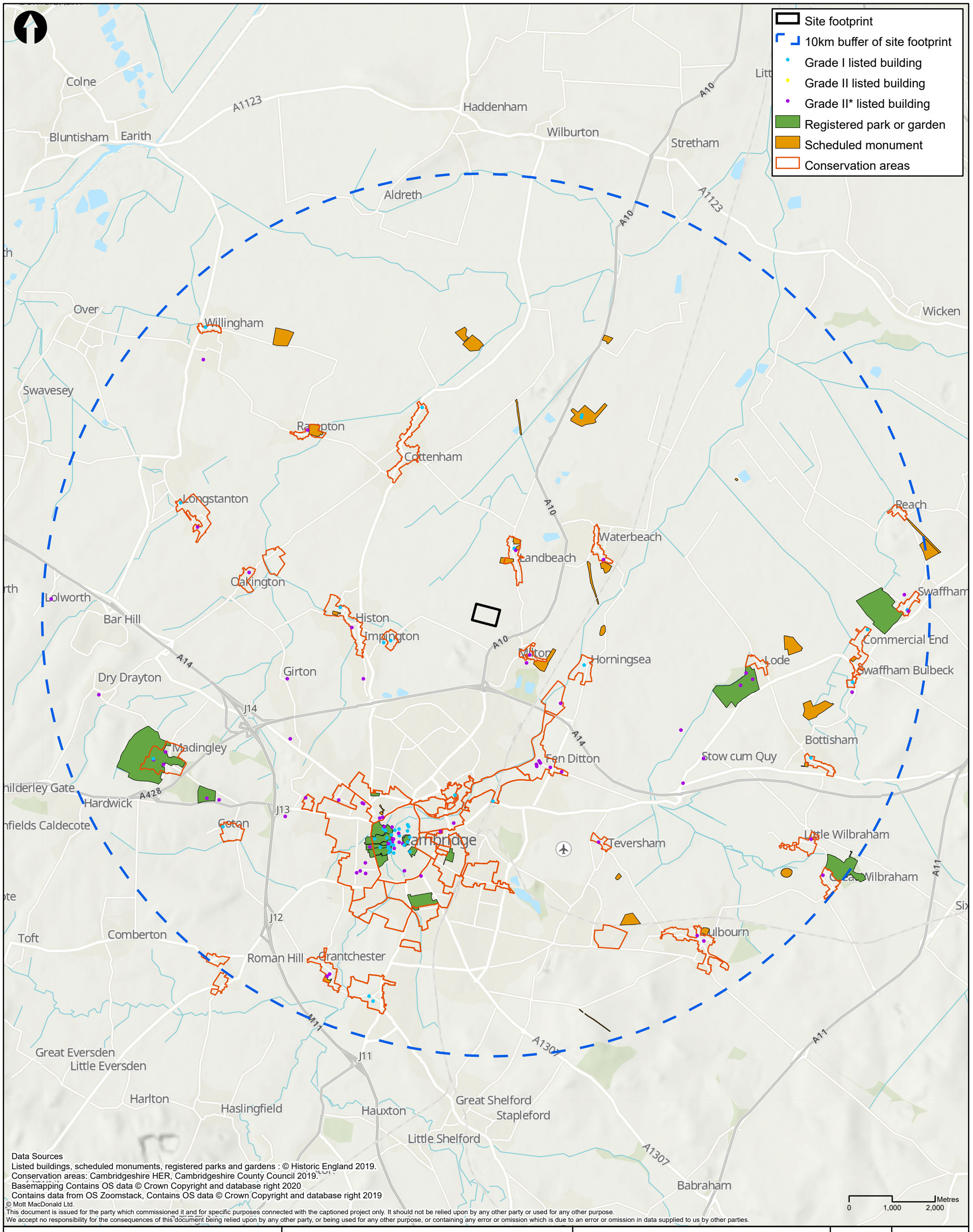

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G	01/21	AB	Final	MR	JN

Title
CWWTPR Project
Stage 4 Final Site Selection
Designated Assets within 10km ZTV
Site area 1

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:80,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0473

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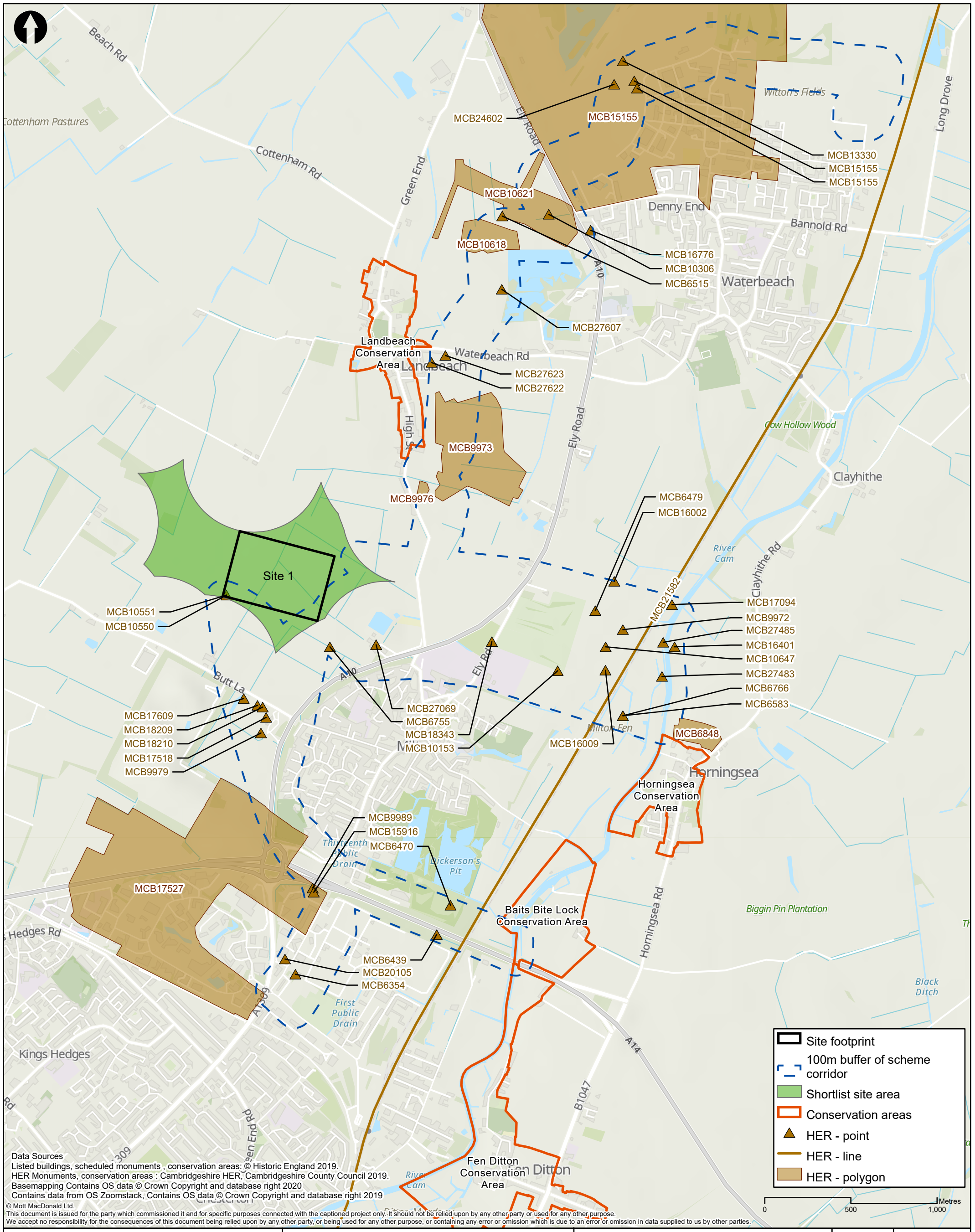

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Title
CWWTPR Project
Stage 4 Final Site Selection
Assets within 100m of Scheme Corridors
Site area 1

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:20,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0474

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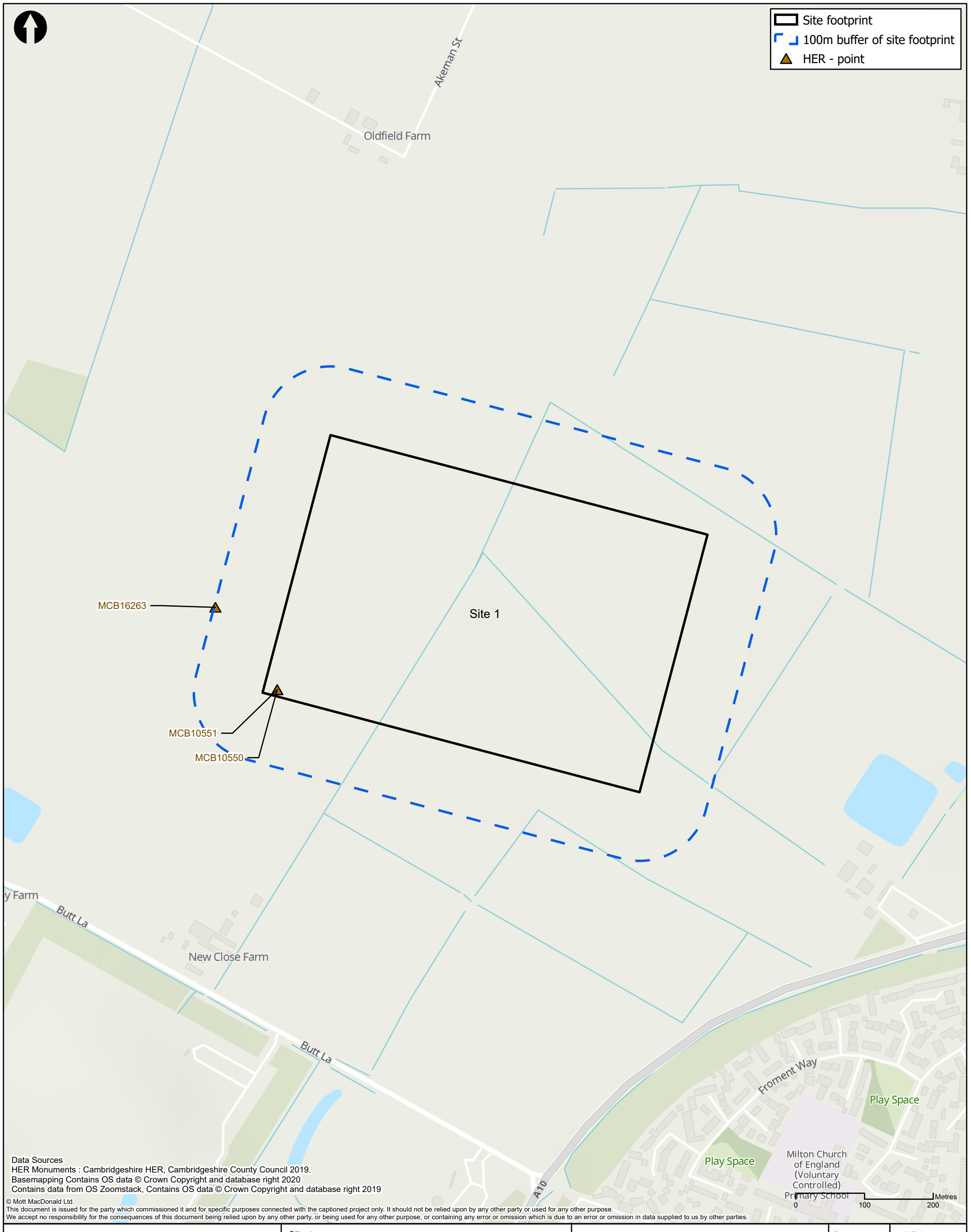

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Title
CWWTPR Project
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Nearest Non Designated Assets to WWTP Footprint
Site area 1

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:5,000

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C.2 Site 2

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Title
CWWTPR Project
Stage 4 Final Site Selection
Nearest Designated Assets to WWTP Footprint
Site area 2

Drawn	A Briggs
Checked	M Rickard
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Scale at A3	1:10,000

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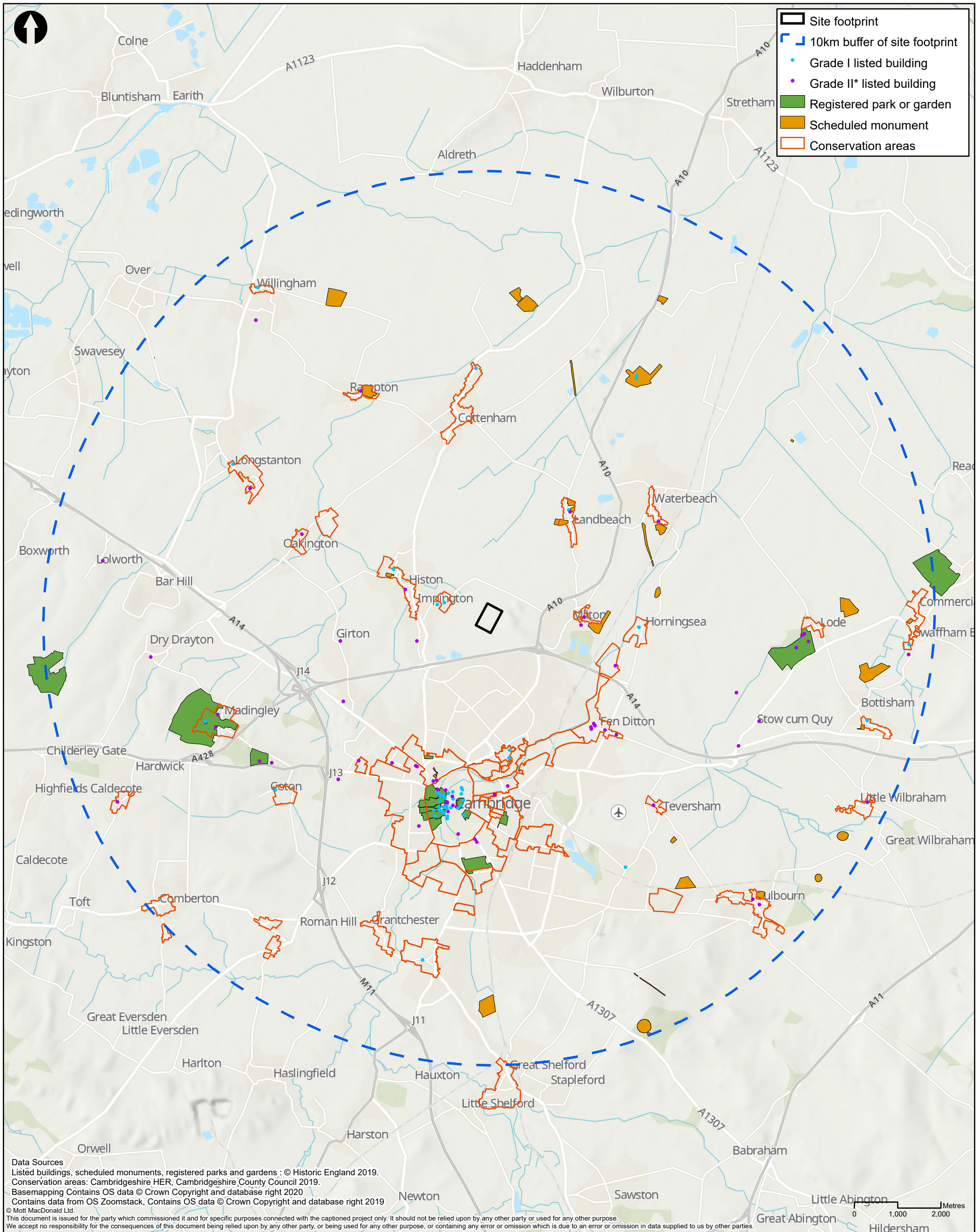

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Title
CWWTPR Project
Stage 4 Final Site Selection
Designated Assets within 10km ZTV
Site area 2

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
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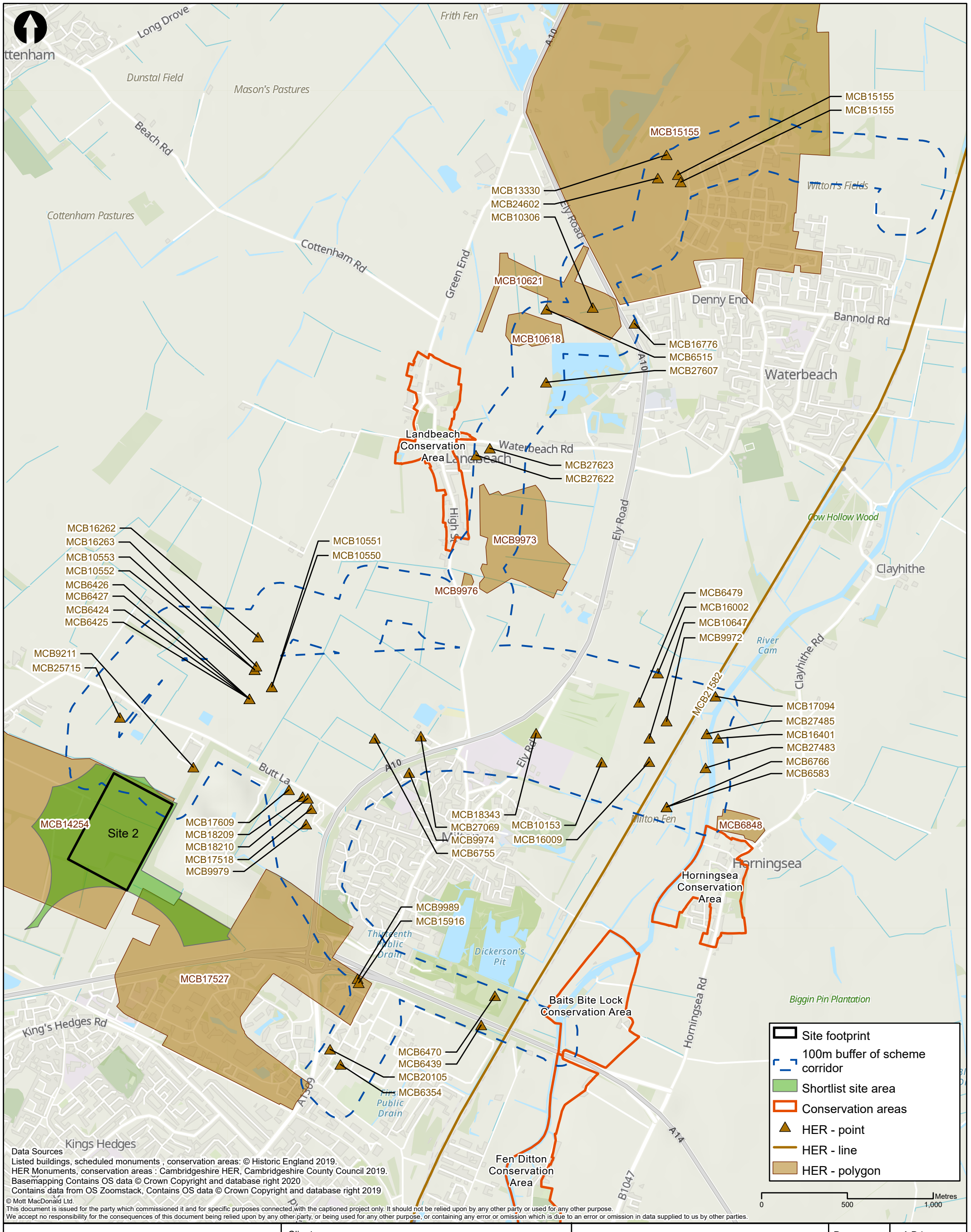

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Title
CWWTPR Project
Stage 4 Final Site Selection
Assets within 100m of Scheme Corridors
Site area 2

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:20,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0478

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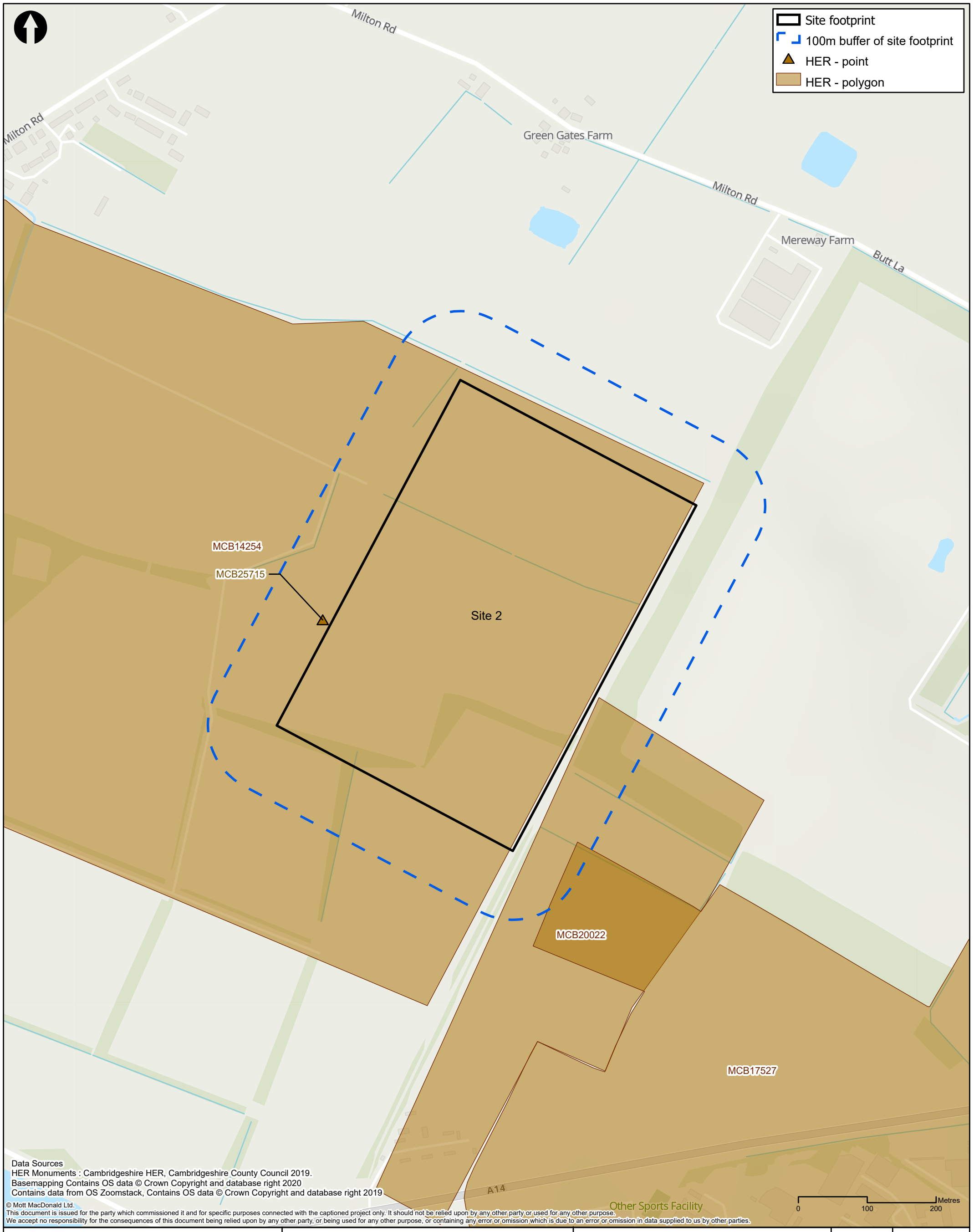

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Title
CWWTPR Project
Stage 4 Final Site Selection
Nearest Non Designated Assets to WWTP Footprint
Site area 2

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:5,000

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Security	Status	Rev
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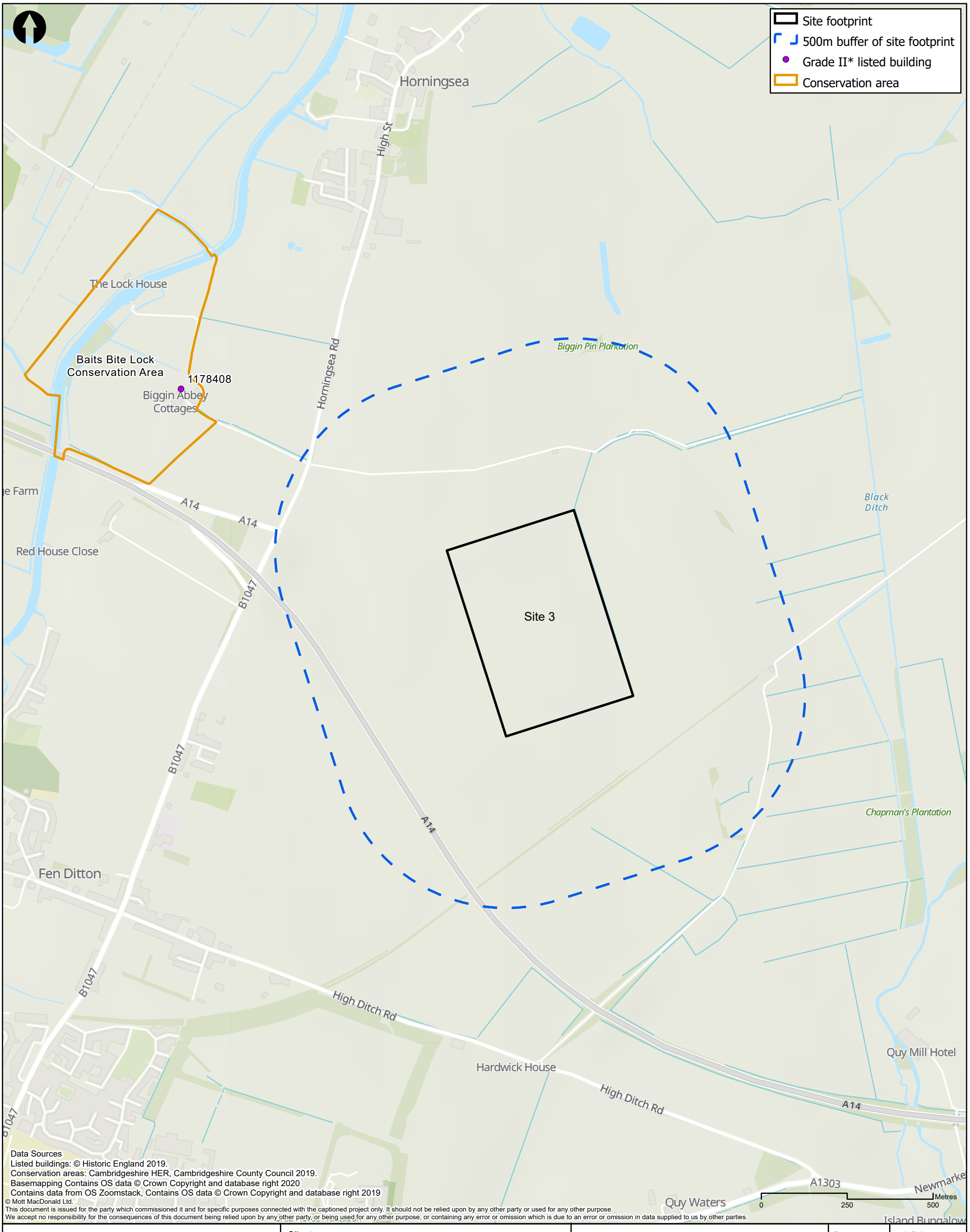
C.3 Site 3



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Nearest Designated Assets to WWTP Footprint
Site area 3

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton

Scale at A3: 1:10,000

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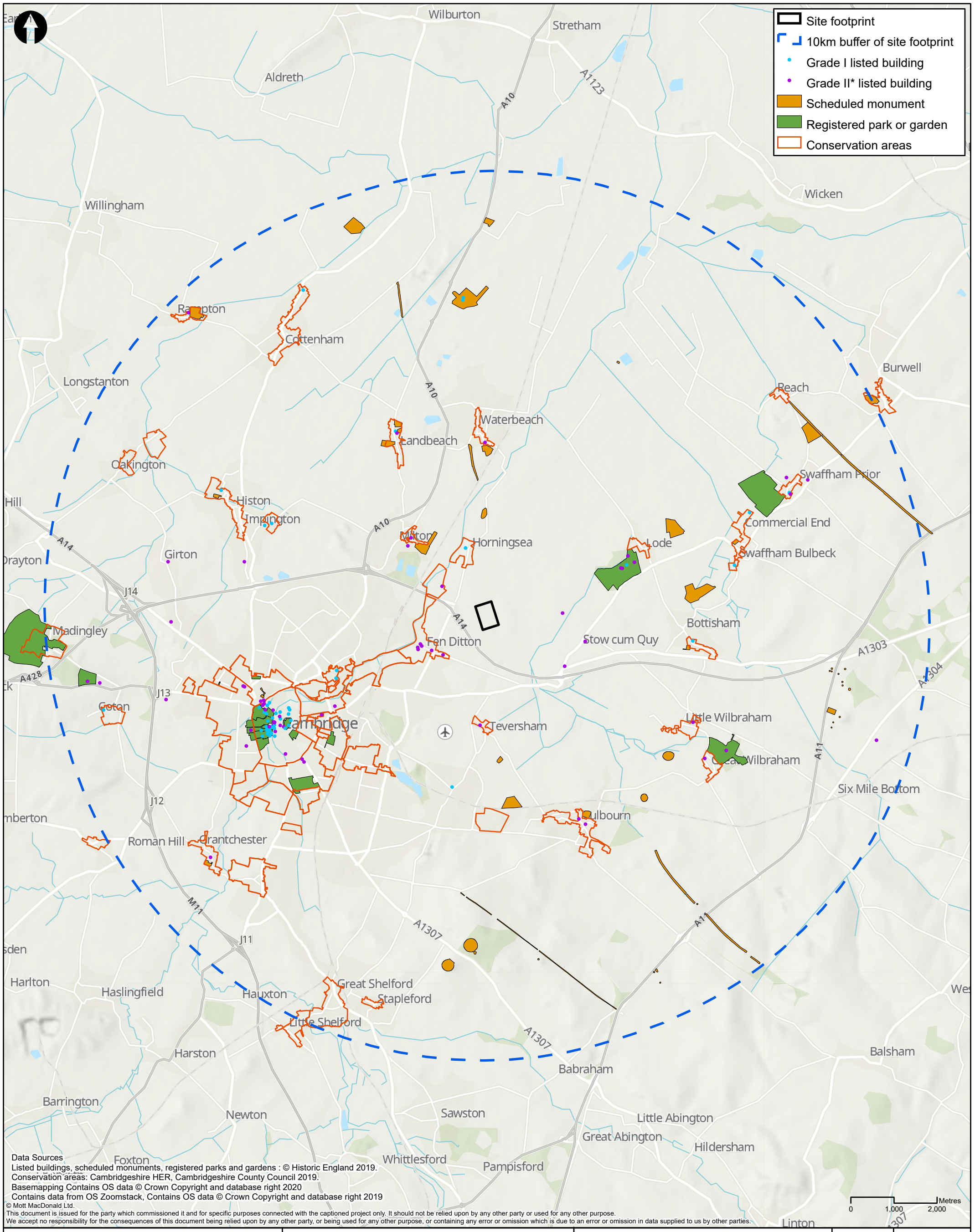

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Site area 3

Drawn	A Briggs
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Approved	J Newton
Scale at A3	1:80,000

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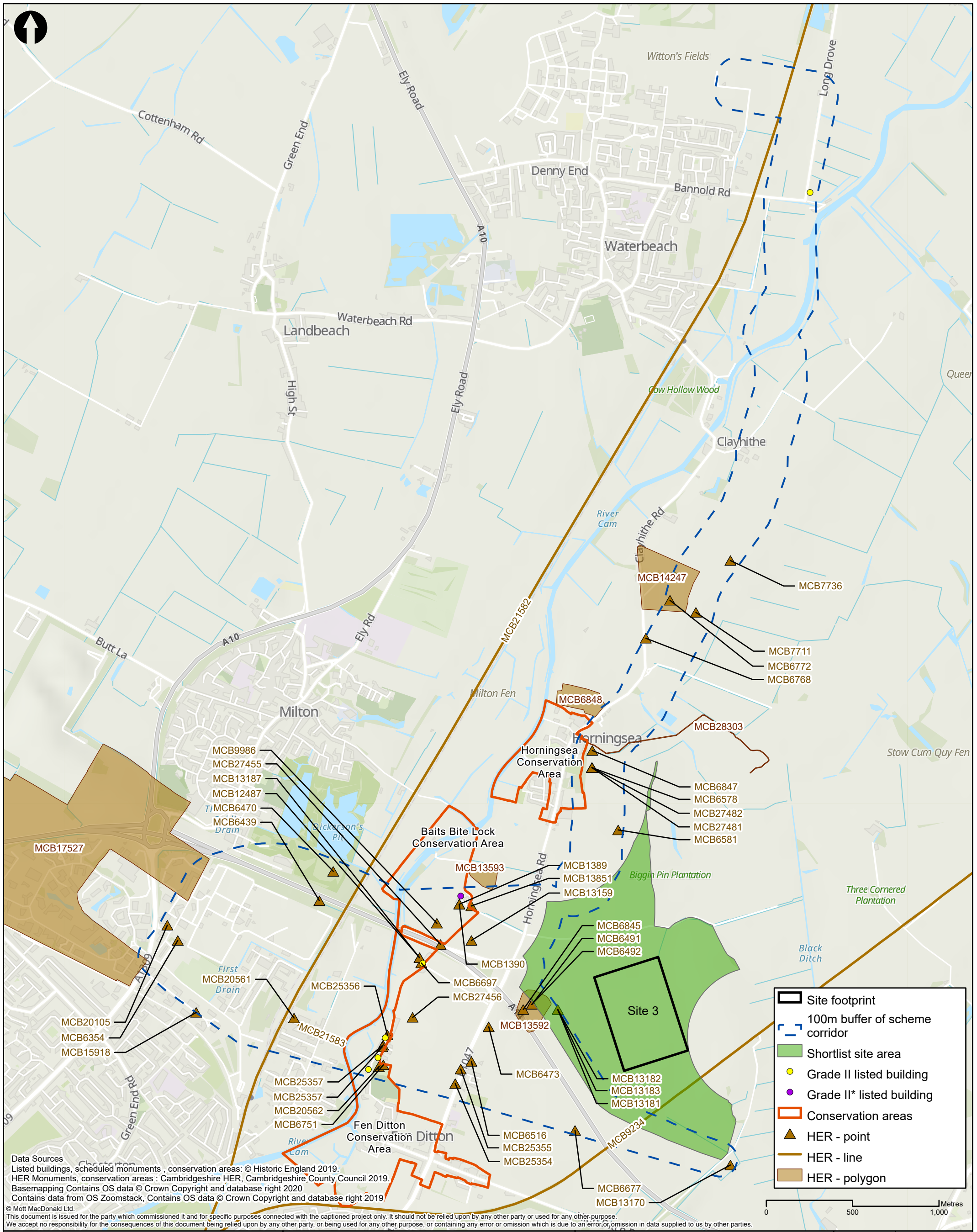

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Assets within 100m of Scheme Corridors
Site area 3

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:20,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0482

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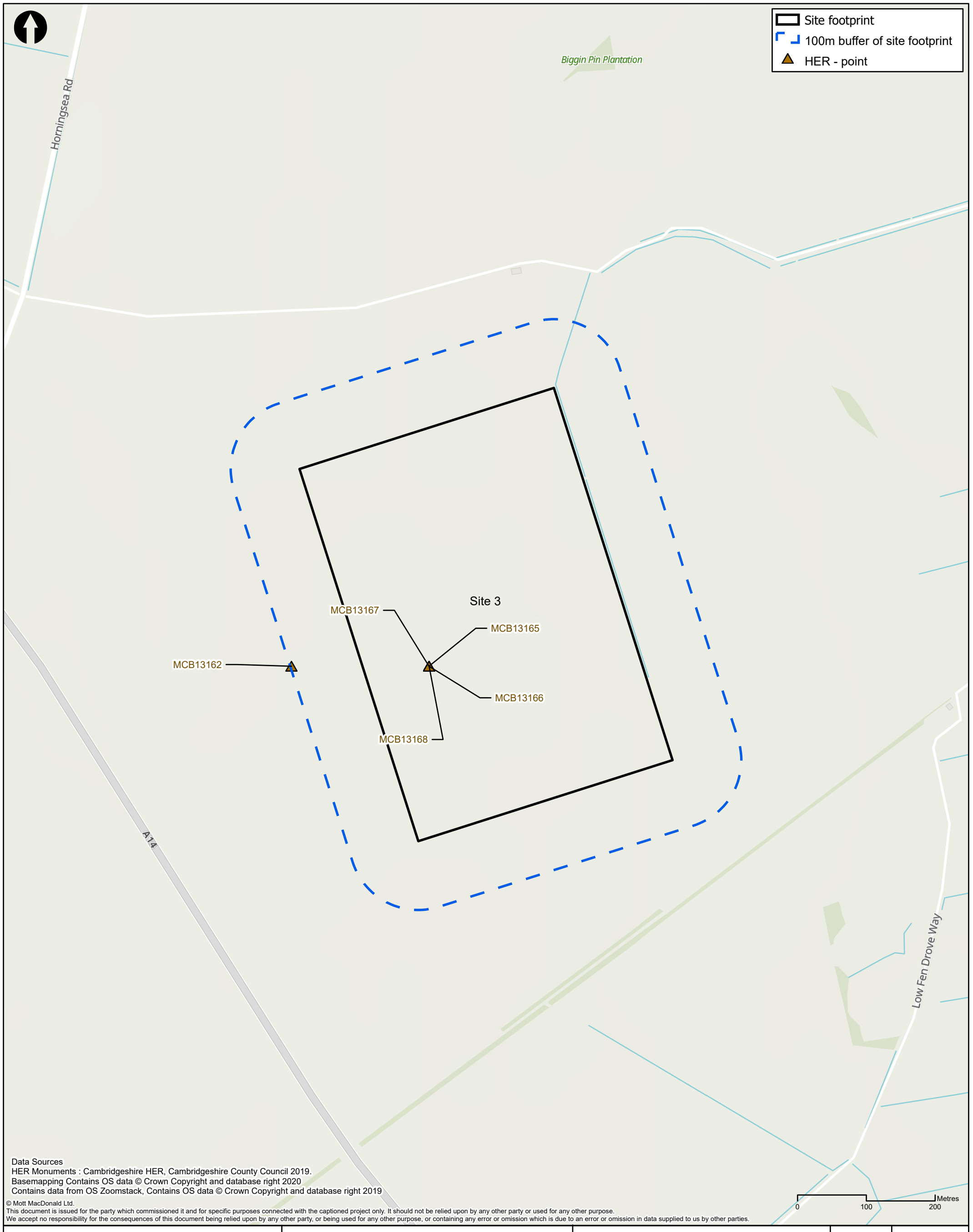

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G	01/21	AB	Final	MR	JN

Title
CWWTPR Project
Stage 4 Final Site Selection
Nearest Non Designated Assets to WWTP Footprint
Site area 3

Drawing Number
409071-MMD-00-XX-GIS-Y-0483

Drawn	A Briggs
Checked	M Rickard
Approved	J Newton
Scale at A3	1:5,000

Security	Status	Rev
STD	PRE	G

M. Preliminary odour assessment

CONFIDENTIAL

CAMBRIDGE WWTW RELOCATION PROJECT

Predicted Odour Impacts – Site selection

RFP# 907014

Prepared for:

AWG Land Holdings Limited

12 January 2021

BLACK & VEATCH

Table of contents

Details of document:

File name: 122971-BVL-Z0-00-RP-P-00008.docx

1. Introduction

Black and Veatch have been instructed through Anglian Water Venture Holdings Limited (AVH) for the benefit of Anglian Water Services Limited in its role as Applicant of the Development Consent Order (DCO) for Cambridge wastewater treatment plant relocation (CWWTPR), to conduct preliminary odour modelling of the indicative layout of the proposed new (relocated) Cambridge wastewater treatment plant (WwTP). The potential site locations used for the relocated WwTP have been determined through a formal site location and selection process. As this process has not been concluded, the 3 most suitable sites were considered as part of the inception phase odour modelling and odour assessment study.

This report has been prepared to provide details of the predicted odour impacts at receptors.

2. Background

2.1 Understanding the Requirements

Good air quality considers dust, smoke, fumes or gases, steam, and smells or odour. The European Union (EU) Ambient Air Quality Directive is implemented and regulated in the UK through compliance with the National air quality objectives of the Air Quality Strategy. This sets the relevant limits and target values at a regional level based on local constraints.

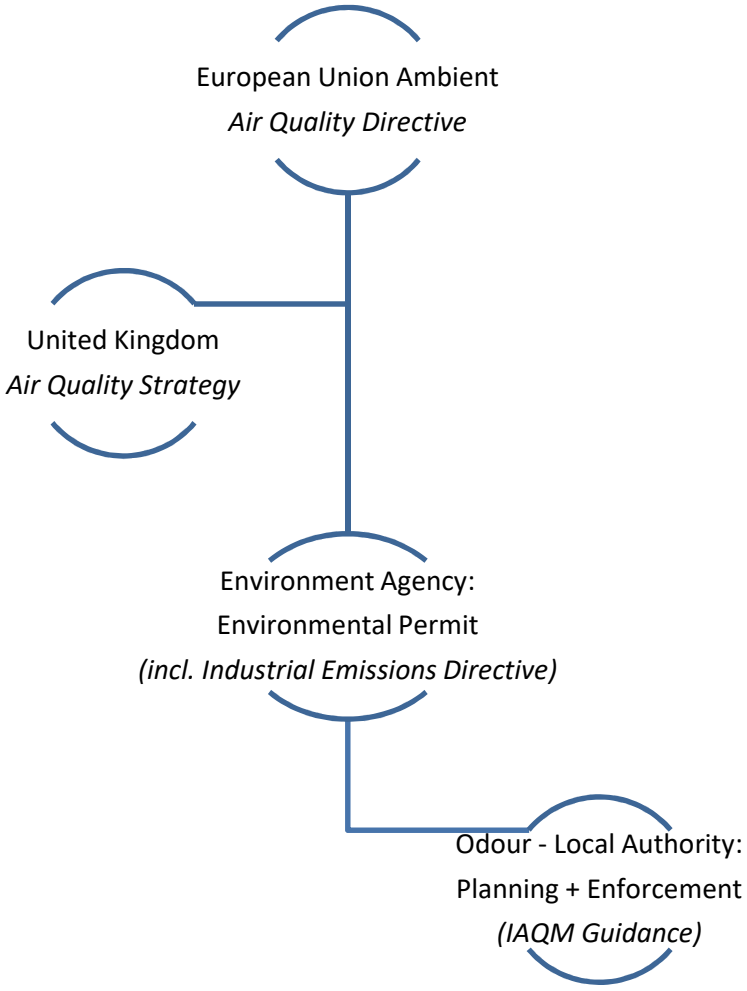


Figure 1: Delegated authority for odour requirements and enforcement

These requirements are delegated to the UK Environment Agency (EA), who issue and enforce Environmental Permits to ensure compliance with the Industrial Emissions Directive and other environmental protection directives (e.g. Water Framework Directive, Urban Wastewater Treatment Directive, etc.) and requirements associated with other EU, UK and local constraints. During the environmental permit application process, air quality modelling may be required, dependant on the site's activity (e.g. engines of certain size/type) and the local air quality (e.g. near Site of Special Scientific Interest).

Underpinned by these air quality and emission limits, local authorities enforce and (with the assistance of organisations such as the EA and the Institute of Air Quality Management (IAQM)) provide guidance towards planning for new developments to avoid creating odour pollution or nuisance. Included in the considerations of the National Planning Policy Framework is the effect of pollution on health, the natural environment and general amenity.

Additional to air quality, consideration for operator safety under the Health and Safety at Work Act will also be required. This will include investigations such as HAZOP (hazard and operability) studies, DSEAR (dangerous substances and explosive atmospheres regulations) reviews, and COSHH (Control of Substances Hazardous to Health Regulations) assessments. For the gasses predominantly associated with sewage and waste, odour is generally perceived at lower concentrations than those which would be considered hazardous.

For wastewater treatment plants, requirements for odour control and ventilation design are subject to British Standard European Standard (BS EN) 12255-9: 2002.

2.2 Further Guidance Available

The National Planning Policy requires: "*Considerations will include the proximity of sensitive receptors, including ecological as well as human receptors, and the extent to which adverse emissions can be controlled through the use of appropriate and well-maintained and managed equipment and vehicles.*". To assist in determining acceptable planning considerations several industry bodies have provided guidance documents relating to odour impact. The most relevant of these are:

a) EA's *Guidance for developments requiring planning permission and environmental permits*, provides guidance to clarify the interface between the EA and others as part of the planning and permitting process. It provides insights into what would typically be considered trigger/focus points (e.g. distance to receptor) and an indication of what would be deemed to be acceptable, e.g. "*New developments within 250m of an anaerobic digestion activity could mean people being exposed to odours. The severity of this will depend on a number of factors, including the size of the facility, the way it is operated and managed, the nature of the waste it takes and weather conditions. If the operator can demonstrate that they have taken all reasonable precautions to reduce odours, the development can go ahead, with minimal effect on those living nearby.*" For the site selection process, this buffer zone or separation distance guidance has already been considered.

EA H4 Odour Management Guidance benchmark targets at site boundary or nearest receptors:
- Most offensive odours (septic effluent or sludge) = 1.5 OU_E/m^3
- Moderately offensive odours (well aerated composting, fat frying) = 3 OU_E/m^3
- Less offensive (coffee, bread) = 6 OU_E/m^3

b) EA's *H4 Odour Management* Guidance document, provides guidance on 'How to comply with your environmental permit'. It also provides benchmark values – referred to in this document as EA's H4 guidance.

c) IAQM's *Guidance on the assessment of odour for planning* Version 1.1 – July 2018, is specifically aimed at the planning process – referred to in this document as the IAQM's guidance.

d) UK Water Industry Research (UKWIR) have produced an *Odour Control in Wastewater Treatment* set of technical reference documents describing typical odour emission rates and best available techniques (BAT) considerations for odour mitigation and management.

2.3 Site Boundary or Receptors?

Environmental permits with odour specific conditions will typically contain two types of clauses, with more or less detail as appropriate to the site:

- The odour boundary condition: "*Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in an approved odour management plan, to prevent or where that is not practicable to minimise the odour.*"

- The requirement to comply with an odour management plan (OMP).

The EA H4 odour management guidance clarifies that the odour boundary refers to the 'site boundary'. However, should there be no receptors close to the boundary, permitting will revert to the nearest receptor(s). A warning is included as part of this guidance that should circumstances change (e.g. new development established closer to the site after permitting), the operator may be required to take action to reduce impacts.

The definition of Statutory Nuisance in England and Wales covers seven areas, which relate to odour (s.79(1) Environment Protection Act 1990): "*any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;*". The 1990 act contains no technical definitions of nuisance, such as maximum concentrations, frequencies or durations of odour in air and only the Court can decide whether a legal Nuisance is being caused.

2.4 'Likely to Cause Pollution' and 'Appropriate Measures'

Odour is subjective. Even the units of measurement are subjective: *Odour, expressed in OU_E/m^3 or "odour units per cubic meter", is defined as the concentration of odour in one cubic meter of air at the panel detection threshold of the odour. 1 OU is the point at which 50% of the olfactometry panellists cannot smell the odour but 50% can.*

Whether an individual perceives odour as acceptable, objectionable or offensive would be partly based on their sensitivities but also partly determined through life experiences. Other annoyances such as dust, noise, traffic, etc. could amplify the perception of the acceptableness of odour. Not everyone will perceive pollution or nuisance at the same point, and yet not everyone that experiences the nuisance will complain.

Van Harrevelt[1] described the diminishing process from odour formation to complaint. The steps of his process have been listed, along with a brief commentary, in Table 1.

Table 1: Commentary on Van Harrevelt odour formation process applicable to WwTW

Van Harrevelt odour formation process	Commentary
Odour formed	The sewage and sludge received at a wastewater treatment works (WwTW) is associated with a variety of odorous gasses. Hydrogen Sulphide (H_2S) is probably the most easily recognised - smells like rotten eggs or flatulence – but Ammonia and Mercaptans have also been associated with odour complaints.
Transferred to air	The gasses are transferred to the air at the liquid-air surface, up to a saturation concentration if equilibrium can be established.
Released to atmosphere	Turbulent flow locations such as weirs, flumes and pumped pipe discharges, along with aeration of the liquid are some of the methods that amplify release of the gasses to the air and atmosphere.
Atmospheric dispersion	Sheltering/shielding/covering, air temperature, elevation (e.g. stack or ground level), and wind are some factors that may impact dispersion.
Exposure of receptor	Frequency, intensity, duration, character of the odour and location of the site in relation to its environment (similar or different) are some of the factors that will influence likelihood to proceed towards complaint.
Detection and perception	Differentiation between natures of smells are only possible if >1 OU_E/m^3 difference is detected, meaning that if a background odour exists in an area, the detection of other/different odours in the area will be harder. However, confusion between similar odours can also be perceived. Visual screening is used internationally to minimize odour perception associated with visual detection. Time of the day and activity context, relation to source, association with the odour are some of the factors that could influence detection and perception of the odour as a problem or not.
Appraisal by receptor	Perception of potential health impacts is an example of a trigger that will spur action.
Annoyance	Receptor factors such as attitude to status quo, economic relation to source, personal coping strategies, etc. are some factors that influence level of annoyance.
Nuisance	Cumulative impact of annoyance
Complaint	People with access to a complaint channel and legal instruments are more likely to complain. People will complain if they expect to see a result emanating from their complaint.

For the assessment of the level of odour 'likely to cause pollution' and to determine 'appropriate measures' for mitigation, the EA's H4 guidance recommends, with reference to Table 2 below, consideration of the following two steps:

Step 1: Is there serious pollution?

Step 2: Is the operator taking appropriate measures?

[1] Van Harreveld A.P., From Odorant Formation to Odour Nuisance: New Definitions for Discussing a Complex Process, Water Science and Technology, Vol.44, No.9, pp9-15 (2001)

Table 2 - Three levels of odour (Figure 1 from the Environment Agency guidance document: H4 odour management)

Unreasonable odour amounting to serious pollution is being or is likely to be caused (regardless of whether appropriate measures are being used). You must take further action or you may have to reduce or cease operations. The Environment Agency would not issue a permit if it considered that you were likely to be operating at this level.
Odour pollution is or is likely to be caused beyond boundary. **Your duty** is to use appropriate measures to minimise odour. **You are not in breach** if you are using appropriate measures. If appropriate measures are being used, residual odour will have to be tolerated by the community. For some activities appropriate measures will achieve no smell beyond the boundary.
No odour beyond the boundary or likely to be = no pollution = no action needed

The H4 guidance describes factors to take into consideration for establishing if receptors could perceive a potential odour as pollution or nuisance, including FIDOL (frequency, intensity, duration, offensiveness and location). It provides some benchmark maximum targets at receptors, but lacks clear definition as to what could be considered a reasonable odour position.

The IAQM guidance (2018) is specifically for use during planning and this has been used to inform Step 1 of the H4 process for this project.

As such, the odour modelling and odour assessment work completed during the inception phase considered all factors required in the EA's H4 guidance to establish a baseline position.

3. Methodology for Assessing Odour Impact

To ensure that a robust methodology was developed for assessing the potential to cause odour impact arising from the proposed new Cambridge WWTW relocation project (CWWTWRP), the methodology was developed considering the EA H4 odour management guidance and the IAQM guidance for assessment of odour for planning, as follows:

1. Baseline Conditions:

   A baseline condition was defined for the use in the odour assessment. Although the design philosophy employed for the proposed new WwTP was to provide a "like for like" replacement for the existing Cambridge WwTP at a new site location, the following changes from the existing WwTP have been included in the baseline condition (Scenario 4A):

   (1) Covering and venting of air from the terminal pumping station (TPS) and inlet works through odour control units (OCUs). This will reduce the odour impact associated with potentially receiving sewage out of the network of unpredictable quality.

   (2) Improvements in the design configuration of the sludge treatment centre (STC) with all tanks in the STC being covered and either vented to OCU for treatment or, if the tanks remain under anaerobic conditions, connected to the biogas collection and utilisation system. This will reduce the odour impact of the STC.

(3) The proposed site will be more compact in nature than the existing WWTP site: approximately 24 hectares for the new, compared to approximately 48 hectares for the existing. The existing site includes several areas planted with trees around the site, which provides natural odour dispersion.

2. Receptors:

Receptors and their sensitivity were defined in line with the IAQM guidance. Table 3 below, (Table 7 from the IAQM guidance) indicates the requirements for determining a *Negligible* impact on receptors for a "normal operation" WwTW, as is expected as a worst-case position for the new CWWTWRP:

Table 3 – Proposed odour effect descriptors for impacts predicted by modelling for moderately offensive odours

Odour Exposure Level C_{98} OU_E/m^3	Receptor Sensitivity		
	Low	Medium	High
≥ 10	Moderate	Substantial	Substantial
5 to < 10	Slight	Moderate	Moderate
3 to < 5	Negligible	Slight	Moderate
1.5 to < 3	Negligible	Negligible	Slight
<1.5	Negligible	Negligible	Negligible

This should be read in association with the classification of Sensitivity of Receptors, as per Table 2 of the IAQM guidelines, included in Table 4 below:

Table 4 – Receptor sensitivity to odours

Sensitivity of Receptors	Surrounding Land Use
High	Surrounding land where: • users can reasonably expect enjoyment of a high level of amenity; and • people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium	Surrounding land where: • users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home; or • people wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Low	Surrounding land where: • the enjoyment of amenity would not reasonably be expected; or • there is transient exposure, where the people would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples may include industrial use, farms, footpaths and roads.

3. Odour Modelling:

In line with IAQM guidance, odour modelling was used to establish the predicted odour exposure levels. The following approach has been used for the construction of the odour dispersion model and odour modelling, undertaken by *H&M Environmental Ltd*.

- AERMOD Version 9.8.3 has been employed for the odour modelling exercise. Its use for odour modelling has been accepted by the UK Environment Agency and it is confirmed as a suitable predictive modelling odour assessment tool by the Institute of Air Quality Management (IAQM) for the assessment of odour for planning purposes.
- The meteorological data used in the models are based on that from Cambridge Airfield and RAF Mildenhall MET data, compiled by following the best available technology (BAT) practices.
- The surface roughness for each site was determined based upon the current topography and land use around each site respectively. The topography of the Fens landscape is mostly flat, but as the land use around each site differs these surface roughness values differ between the sites.
- The layout utilised for the odour modelling was prepared by Black and Veatch during the inception phase of the project as an indicative WwTP layout to allow the confirmation of land size requirement. The layout is based on a conventional activated sludge treatment process and a sludge treatment centre (STC) utilising Anglian Water's HpH process followed by anaerobic digestion to simulate a "like for like" replacement of the existing Cambridge WwTP.
- As the proposed new relocated WwTP does not currently exist, all emission rates utilised are **estimated values** of what they may be at the proposed WwTP based upon the **measured values** at the existing Cambridge WwTP. Odour emission rates measured during a July 2019 odour survey carried out by Silsoe Odours[2] have been used. The survey was carried out in the summer, and would thus be representative of the maximum odour potential expected. These summer values were used for the entire modelling exercise and therefore a conservative design assumption. These emission rates were also compared with Anglian Water Asset Standard Emission Rates and the UKWIR documents and they correlated well.
- Validation of the modelling against actual measurements is not possible as the WwTW has not been constructed. However, as part of the Cambridge North Odour Assessment[2] sniff testing was carried out at the existing Cambridge WwTW, which correlated with the modelling results of the existing Cambridge WwTW. As the same modelling configuration, emissions and software were used, a comparable level of accuracy is expected for the proposed new WwTW.
- Modelling outputs contours were chosen to be comparable to the categories used in the IAQM guidelines, namely: 1.5, 3, 5, 10 OU_E/m^3.
- Should any of the items change as more information becomes available, the odour model will require to be rerun, and the odour impact re-assessed.

[2] 'Cambridge North Odour Assessment' Draft 1 report prepared by ARUP on behalf of Brookgate Ltd, 12th August 2019

4. Consideration of mitigation measures:

   Mitigation measures are not specifically explored or discussed in this report, as it is expected that the outputs from this odour study will inform the further design development before the actual planning application.

   Mitigation measures considered will be in line with the National Policy Statement for Waste Water and may include:

   - selecting processes and process technologies with a lower "odour potential",
   - flow handling techniques to prevent odour dispersion (e.g. diffused aeration causes less turbulence than surface aerators and thus less emissions dispersion and odour impact),
   - the processes most likely to generate offensive odours will be contained or enclosed (extracting the odorous air to odour control units or the biogas system, as appropriate),
   - processes with treated effluent (and thus unoffensive odours) will be located near the boundary and processes with higher odour risk nearer to the centre of the site, taking account of the site-specific constraints, architectural and bio-diversity features,
   - enclosed/covered tanks connected to the odour control system (e.g. bio-scrubbers combined with activated carbon polishing units) designed to ensure high enough extraction rates are maintained to control fugitive leaks.
   - Different odour control systems and configurations provide different treatment. Units to address the specific odour components of the area treated, as well as novel technologies can be employed.
   - Odour control facilities are critical equipment and will be designed to operate continuously, day and night, in all conditions. Their power supply will be protected, and standby equipment will be brought on-line automatically should duty equipment fail.

4. Odour Modelling Results

4.1 Previously Reported

The sniff testing performed as part of the Cambridge North Odour Assessment[3] reported to detect odours above 3 OU_E/m^3 (and usually above 5 OU_E/m^3), but not below 3 OU_E/m^3. The EA's H4 guidance recommended ≤3 OU_E/m^3 as suitable criterion for moderately offensive odours (e.g. well operating WwTW) and ≤1.5 OU_E/m^3 as criterion for most offensive odours (e.g. septic effluent or sludge). As the STC will be covered and extracted air treated in OCUs, and the new WwTW is expected to be well operating, a reference position of ≤3 OU_E/m^3 for acceptable odour level could have been used. However, the more stringent IAQM guidelines were used and mitigation applied until all receptors were within the *negligible impact* classification for moderately offensive odours.

[3] Cambridge North Odour Assessment' Draft 1 report prepared by ARUP on behalf of Brookgate Ltd, 12th August 2019

4.2 Baseline Modelling Results

For the baseline scenario, a portion of Landbeach, as well as Punch and Oldfield Farms were slightly impacted for Site 1. The other Sites, 2 and 3, showed negligible impact on their closest receptors. Receptors further afield are not expected to be adversely impacted and thus not listed. *The baseline odour dispersion maps for each site is shown in Appendix A.*

The results of the impacts, assessed using the IAQM guidance, is shown for each site and its receptors in the tables below.

The resulting odour impact on the receptors associated with **Site 1**, based on the site-specific surface roughness of 0.25, are summarised in the following table.

Table 5 - Odour Impact on Receptors – Site 1

Receptor	Surrounding Land Use OR Character of Area	Nr of PE Affected	Sensitivity	Odour Exposure C_{98} OU_E/m^3	Impact
Landbeach area	Small Rural Village	c. 150-300	High	Mostly: >1.5, few dwellings: 1.5-3	Slight
Punch and Oldfield	Farms with homesteads	c. 10	High	1.5-3	Slight
Roman Road	Recreational (e.g. dog walking)	occasional	Low	3-5 (highest impacted section)	Negligible

The resulting odour impact on the receptors associated with **Site 2**, based on the site-specific surface roughness of 0.4, are summarised in the following table.

Table 6 - Odour Impact on Receptors – Site 2

Receptor	Surrounding Land Use OR Character of Area	Nr of PE affected	Sensitivity	Odour Exposure C_{98} OU_E/m^3	Impact
Evolution Business Park	Small industry	c.20-200	Medium	1.5-3	Negligible
Roman Road	Recreational (e.g. dog walking)	occasional	Low	1.5-3 (highest impacted section)	Negligible

The resulting odour impact on the receptors associated with **Site 3**, based on the site-specific surface roughness of 0.26, are summarised in the following table.

Table 7 - Odour Impact on Receptors – Site 3

Receptor	Surrounding Land Use OR Character of Area	Nr of PE affected	Sensitivity	Odour Exposure C_{98} OU_E/m^3	Impact
Snout Corner Fen Track	Recreational (e.g. dog walking)	occasional	Low	1.5-3	Negligible
Disused railway and Low Fen Drove Way	Recreational (e.g. dog walking)	occasional	Low	1.5-3	Negligible
A14	Major Road	1,000s	Low	1.5-3	Negligible

5. Conclusions

On an 'inception phase site design and layout used as common baseline' basis, using the IAQM guidance, Site 2 and 3 would cause negligible impact on its receptors, whereas Site 1 would require mitigation measures to reduce the baseline scenario from *slight impact* to *negligible impact* (<1.5 OU_E/m^3).

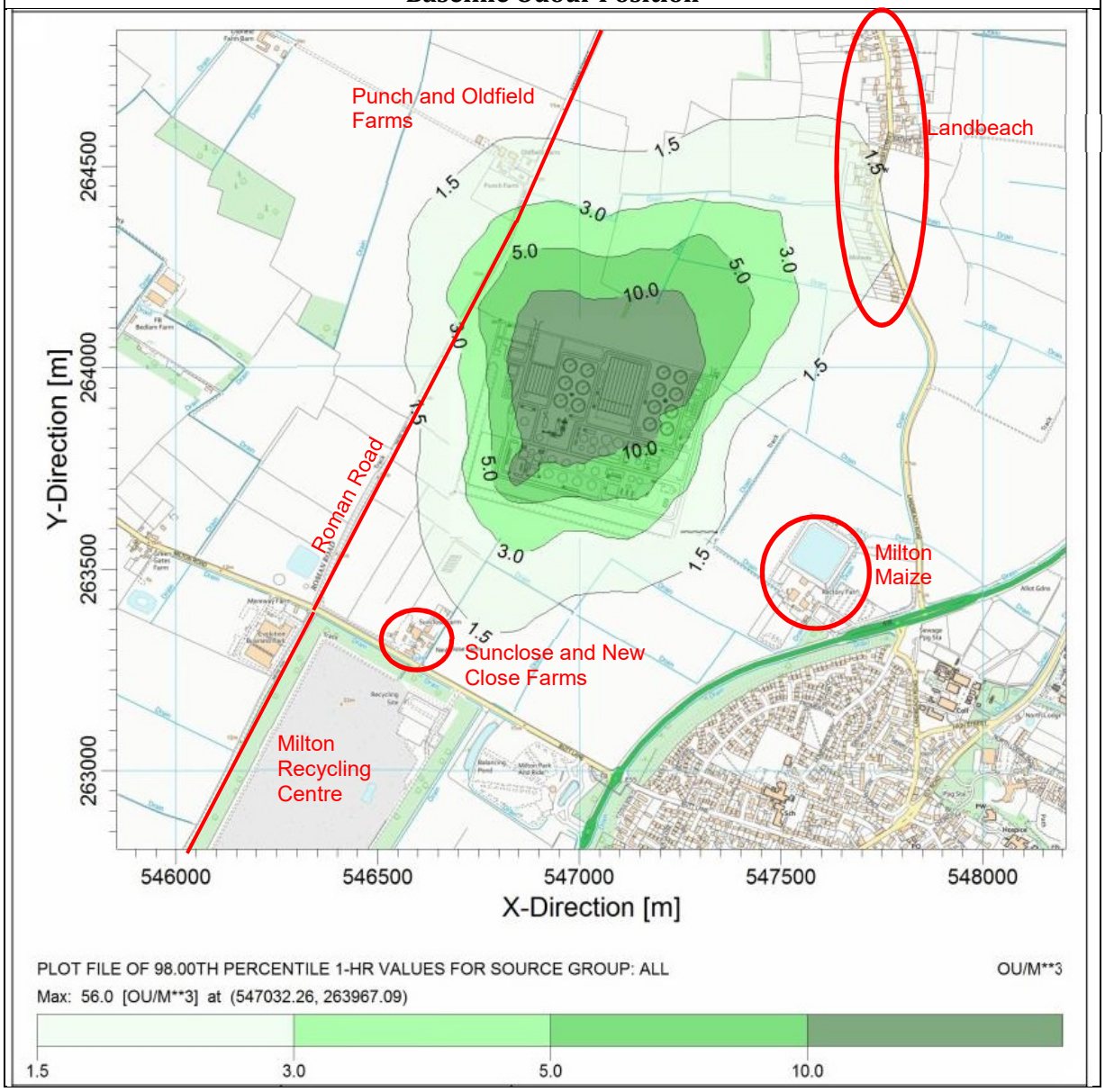
It is recommended that a further odour modelling and odour assessment study be conducted during the design phase following site selection, to ensure the layout and other assumptions are updated to match the specifics of the site.

APPENDICES

Appendix A: Modelling Results: Baseline

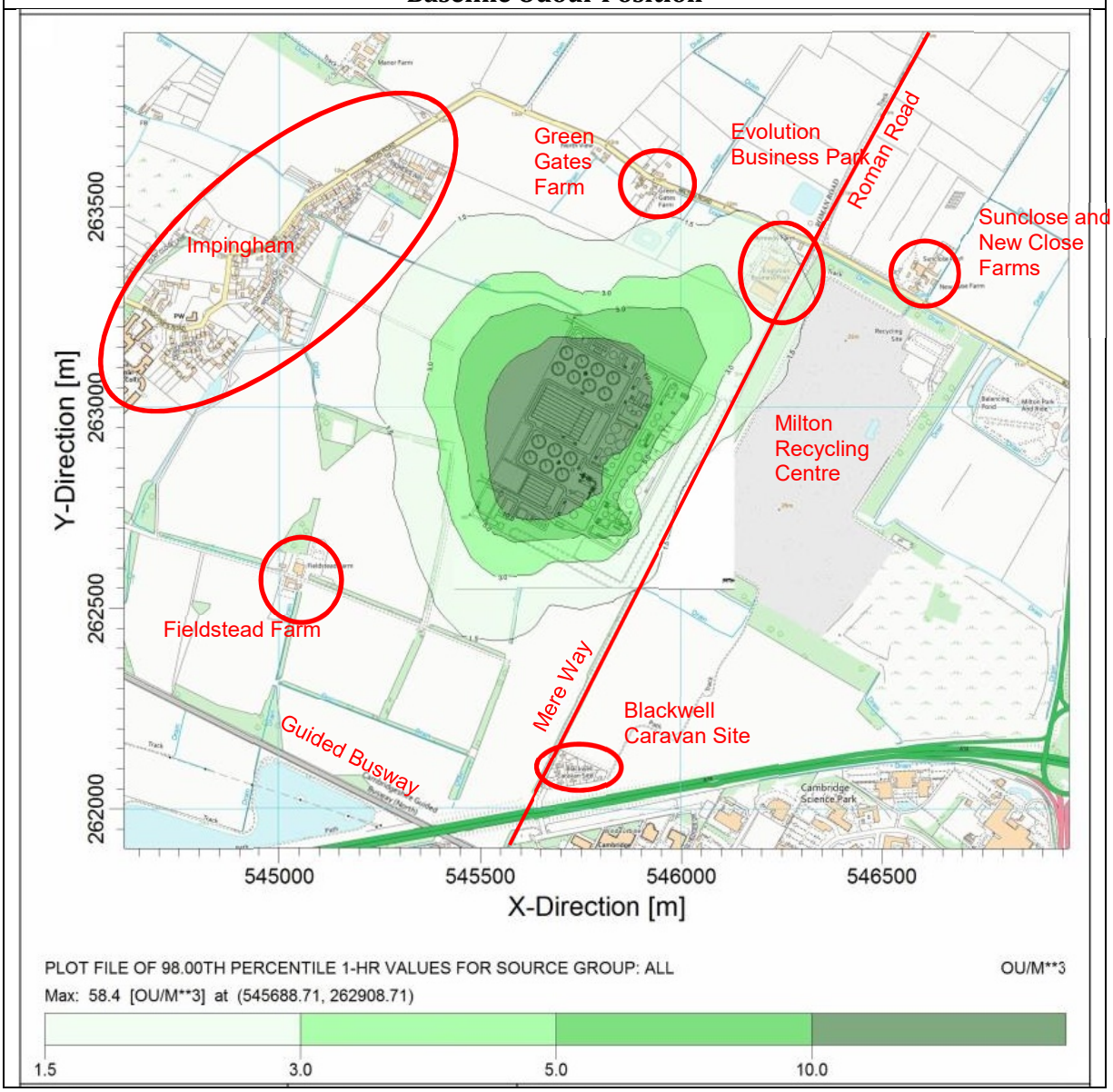
A.1 Site 1 - Scenario 4A - Proposed WwTW with the TPS, Inlet and STC covered and air treated in OCU – MET surface roughness 0.25

Baseline Odour Position



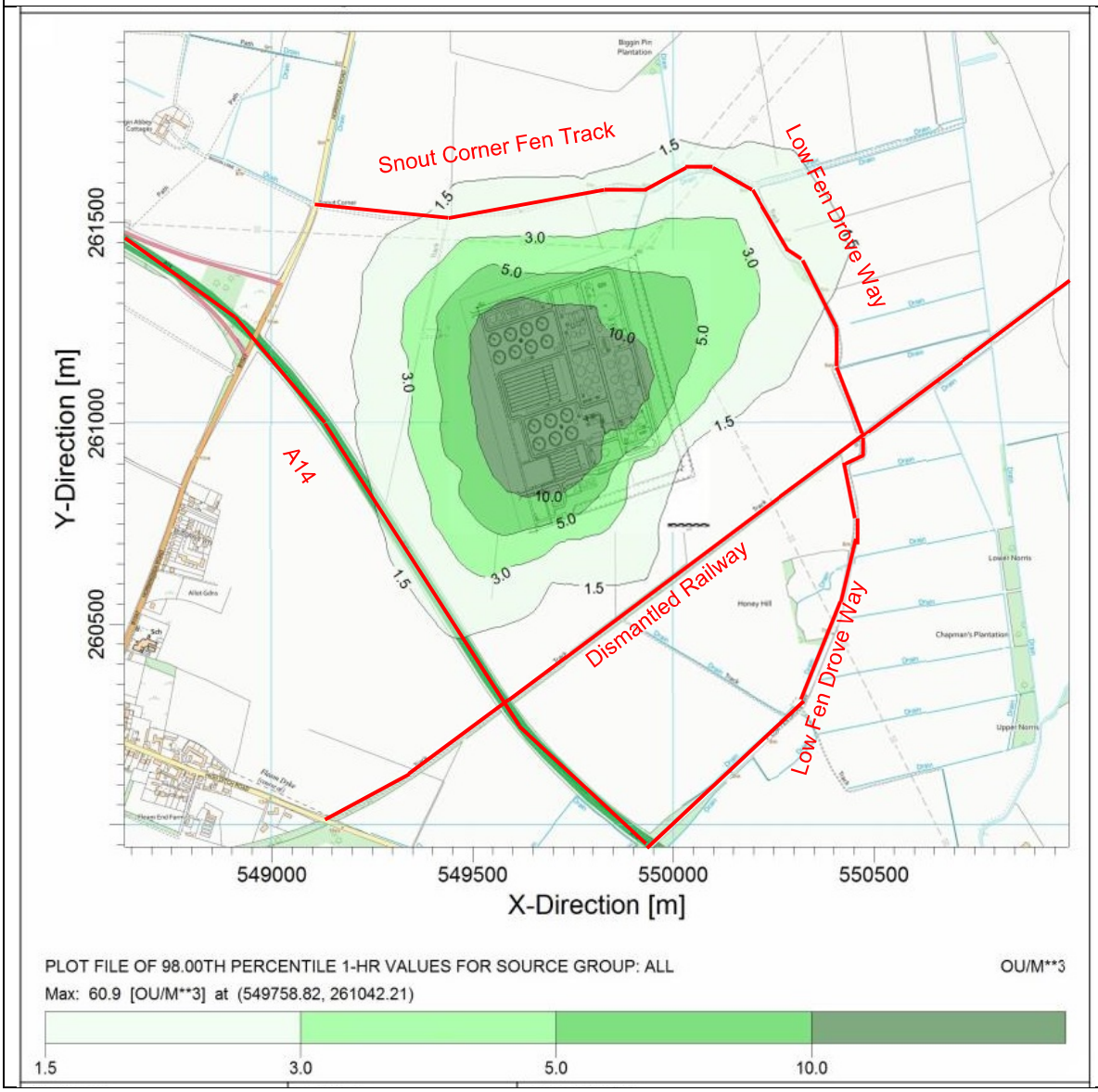
A.2 Site 2 - Scenario 4A - Proposed WwTW with the TPS, Inlet and STC covered and air treated in OCU – MET surface roughness 0.4

Baseline Odour Position



A.3 Site 3 - Scenario 4A - Proposed WwTW with the TPS, Inlet and STC covered and air treated in OCU, compared to Scenario 4B: Proposed WwTW with the TPS, Inlet, PSTs and STC covered and air treated in OCU – MET surface roughness 0.26

Baseline Odour Position



- End -

N. SSSI IRZ review addendum

MOTT MACDONALD

Cambridge Waste Water Treatment Plant Relocation

Nature Conservation and Biodiversity Stage 2 and Stage 3 SSSI Impact Risk Zone Addendum

December 2020

415458-08-A

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Contents

Executive summary

The report is a nature conservation and biodiversity appraisal addendum to the Stage 2 Course Screening (Mott Macdonald 2020a) and Stage 3 Fine Screening reports (Mott Macdonald 2020b). This addendum, undertaken as part of the back checking exercise for Stage 4 – Final Site Selection, incorporates an updated Red Amber Green (RAG) assessment for Sites of Special Scientific Interest (SSSIs) Impact Risk Zones (IRZs) that fall within the longlisted and shortlisted site boundaries assessed in the Stage 2 and 3 reports, respectively.

This addendum follows advice from Natural England's to factor IRZs into the appraisal to refine and verify the findings and conclusions of the assessment and to demonstrate that risks to statutorily designated sites have been appropriately and robustly considered.

The report assesses each of the 14 longlisted site areas within the Stage 2 report, in relation to the potential impact pathways for SSSIs, identified by the presence of the Natural England IRZ buffers around all SSSI's within a 10km Ecological Zone of Influence (Ezol). Each of the 14 longlisted site areas was evaluated against SSSI IRZ RAG criteria. The results for each site area were compared to the overall RAG assessment scores presented in the July 2020 Stage 2 report to identify changes to the Stage 2 overall RAG assessment scores.

The RAG assessment results for the Stage 2 July 2020 report were reviewed against the SSSI IRZ RAG assessments. Ten out of the 14 longlisted site area RAG assessment scores (A, B,C, D, E, F, G, J, K and M) were re-assessed to Red due to the presence of SSSI IRZs. Four site areas (H, I, L, N) RAG scores indicated no change and these previously scored a Red RAG score.

The results of the Stage 2 Course screening assessment in July 2020 identified shortlisted sites (A,B,C,H,I, J and L) to be considered for further assessment (progressed to Stage 3) and site areas (D, E, F, G, K, M and N) were removed from further assessment.

The RAG assessment scores for the seven sites in the Stage 3 report were reviewed against the presence of the SSSI IRZs. Two RAG assessment scores for site area A and C changed from Amber to Red due to the presence of SSSI IRZs. The four site areas (B, H, I, J and L) RAG scores did not change and remained as Red. This addendum does not change the conclusions of Stage 2 - Course Screening Report and the Stage 3 – Fine Screening Report decision on the best performing site areas I, J and L, which are referred to in Stage 4 – Final Site Selection as site areas 1, 2 and 3 respectively.

1 Introduction

1.1 Background

Natural England were consulted on 8 July 2020 on the Cambridge Waste Water Treatment Plant Relocation Project following an initial project briefing from Anglian Water on 30 June 2020. Natural England responded on 28 August 2020 and raised comments on the use of Sites of Special Scientific Interest (SSSIs) Impact Risk Zones (IRZs)[1].

As part of the Stage 1 Initial Screening Assessment a 500m buffer was used to identify SSSIs constraints. At the Stage 2 Course Screening Appraisal, a 5km buffer was applied to consider potential pathways. Natural England commented that the application of the IRZs would have provided a more appropriate and robust indication of potential risks to SSSIs and internationally designated sites through the appraisal process. Natural England advise that the IRZs should be used to screen all new development proposals and site options.

Natural England have advised that the Stage 2 and 3 reports are revisited to incorporate a Red Amber Green (RAG) assessment applicable to the SSSIs IRZs. This report serves as an addendum to these reports as part of the back checking exercise for Stage 4 – Final Site Selection. The Natural England comments are:

"Whilst we are not aware that application of the IRZs will significantly alter the screening appraisal or its general conclusions, we believe further consideration should be given to applying the IRZs to refine and confirm the findings of the assessment. Evidence should be provided to support the screening out of potential impacts to SSSIs flagged by the IRZs. In the absence of evidence, a precautionary approach should be applied to ensure that risks to SSSIs associated with short listed sites are highlighted; the appraisal should then explain how these risks will be addressed through the next stages of the assessment."

"Stage 2 Coarse Screening

Natural England generally agrees with the RAG assessment presented in table B.9 of Appendix B that there is unlikely to be any pathway for impact between any of the sites and the SSSIs listed. We agree that there is a potential pathway for impact to Stow-cum-Quy Fen SSSI, associated with Site L, due to possible hydrological connectivity with Black Ditch. Our advice is that this table, and the Stage 2 screening assessment, should include all of those SSSIs triggered by Natural England's IRZs for sewage treatment works and associated infrastructure. Evidence should be provided to support any conclusion that there is 'no pathway for impact".

"Stage 3 Fine Screening

…our advice is that Natural England's IRZs should be factored into the appraisal to refine and verify the findings and conclusions of the assessment and to demonstrate that risks to statutorily designated sites have been appropriately and robustly considered."

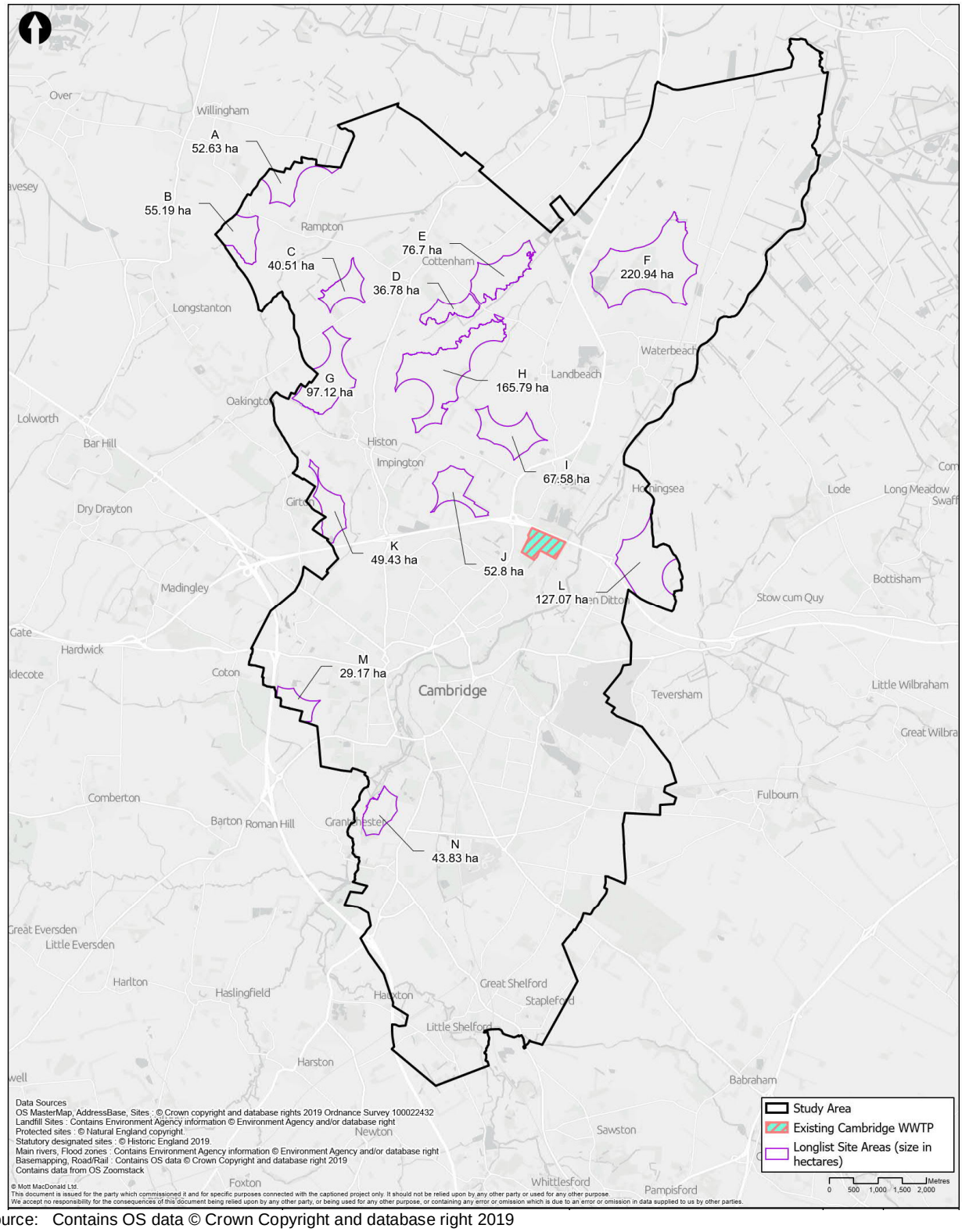
The report aims to review the Stage 2 Course Screening and Stage 3 Fine Screening reports by assessing each of the 14 longlisted site areas (shown in Figure 1 below) in relation to the

[1] SSSI IRZs are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts. The IRZs also cover the interest features and sensitivities of European sites, which are underpinned by the SSSI designation and "Compensation Sites", which have been secured as compensation for impacts on European/Ramsar sites. Available online at https://magic.defra.gov.uk/Metadata_for_magic/SSSI%20IRZ%20User%20Guidance%20MAGIC.pdf

potential impact pathways for SSSIs, identified by the presence of SSSI IRZ buffers (shown in Appendix A).

The results of the IRZs are then compared with the Stage 2 and 3 nature conservation and biodiversity assessments to identify if inclusion of the IRZs would have changed the overall RAG rating of any of the site areas.

Figure 1: Longlisted site areas



Source: Contains OS data © Crown Copyright and database right 2019

2 Methodology

2.1 Stage 2 course screening assessment methodology

The Stage 2 Course Screening assessment report assessed the impact of the Waste Water Treatment Plan (WWTP) development on any designated areas of nature conservation and biodiversity importance at each proposed longlisted site area. The assessment took the form of a desk-based study utilising GIS software and aerial imagery where available. No site visits were undertaken at this stage.

The assessment identified potential pathways for impact on any protected areas and statutory designations within 5km of each site area. The pathways identified comprised natural routes for wildlife migration, such as watercourses or woodland.

Each site area was evaluated against the criteria listed within Table 1 by means of a RAG assessment. The RAG assessment was used to highlight the potential significance of the criteria for each site area. It is important to note that none of the assessments were exclusionary i.e. a red result for a single criterion did not indicate that a site area should be excluded from further consideration.

The assessment criteria adopted at Stage 2 is listed in the Table 1.

Table 1: RAG assessment criteria

Green	Amber	Red
No national, regional or local designations likely to be adversely affected, or effect likely to be positive. i.e. no pathways from site area identified*.	Designation of regional or local importance likely to be adversely affected. i.e. a pathway from site area was identified*. e.g. County Wildlife Sites (CWS), Country Parks etc.	Designation of national and/or international importance and/or Ancient Woodland likely to be adversely affected. i.e. pathway from site area was identified*. e.g. National Nature Reserves (NNR), SSSI, SSSI IRZ, Ancient Woodland (AW), Special Protection Areas (SPA), Special Areas of Conservation (SAC), Local Nature Reserves (LNR), Ramsar sites.

* All protected areas and statutory designations within 5km of each site area have been considered regarding potential pathways for impact.

To ensure completeness of these assessments this report will combine aspects of RAG assessment criteria from the Stage 2 report with information from each SSSI IRZ around the longlisted site areas. The assessment identified potential impact pathways to SSSI sites, within a 10km Ecological Zone of Influence (EZol). The assessment used a combination of Ordnance Survey (OS) maps, aerial imagery, SSSI Impact Risk Zones, designated site citations and impact pathways from the construction and operation of each proposed site area areas on all SSSIs.

The assessment considered the following factors within the potential impact pathways during construction and these factors could lead to direct and indirect effects on habitats and species (i.e. potential for impact and effects due to proximity despite lack of physical pathway). The points below list development descriptions from the SSSI IRZs, which may be relevant to the WWTP (Natural England 2020):

- Natural routes used for wildlife migration, such as hedgerows, woodland or watercourses.
- Potential air quality connections from combustion processes and this pathway includes sewage treatment works by generating energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion. Emissions from combustion can cause air pollution affecting the habitats and species on SSSIs. More than 500m away from a SSSI, only combustion processes over a certain minimum size are likely to have an impact. A very large project and could cause air pollution on SSSIs up to 10km away.
- Potential discharge connections. Any discharge of water or liquid waste that is discharged to ground (i.e. to seep away) or to surface water, such as a beck or stream (NB This does not include discharges to mains sewer which are unlikely to pose a risk at this location). Description may vary to specify volume thresholds for discharges or to include discharges to main sewer. Most foul water is removed from a development site by a mains sewer. Where this is not the case, foul water is usually treated on site and then discharged either to ground to filter away from the site, or into a nearby watercourse. If the treated water flows towards a SSSI, it has the potential to impact on water quality sensitive features.
- Potential infrastructure connections from Pipeline and any transport proposal including road at site access areas (excluding routine maintenance). Pipelines, pylons and overhead cables can create a collision risk for birds and the footprint of the construction can affect local water supplies, which the SSSIs depend on. An increase in road traffic as a result of new or extended roads can cause local air pollution impacts and significant transport infrastructure projects can have impacts on water supply mechanisms, especially by introducing new drainage. New or extended aviation proposals can cause disturbance to birds, as well as collision with birds.
- Rural non-residential. Any non-residential development outside of existing urban areas where net additional gross internal floorspace following development is 30m2 or more. Description may vary to specify different area thresholds. Rural non-residential developments can impact on water quality, cause disturbance to birds and impact on functional land outside SSSIs, which they depend on for feeding.

The area of a proposed development may coincide with more than one SSSI IRZ, the IRZs will be listed where relevant to the development.

2.2 Stage 3 Fine screening assessment methodology

The results of Stage 2 were used in a Stage 3 assessment, to identify seven shortlisted sites (A, B, C, H, I, J and L) out of 14 longlisted sites by performing a RAG assessment score, based upon the following criteria for the nature conservation and biodiversity for site access roads and a treated effluent pipeline to a new outfall north-east of Milton.

- Identification of legally protected and notable species within a 5km Ecological Zone of Influence (EZoI) around each of the site areas.
- Review of historical European Protected Species (EPS) licence applications within a 5 km EZoI around each of the proposed sites.
- Use of Ordnance Survey maps, aerial imagery and the MAGIC website to assess broad habitat types and to identify the presence of Habitats of Principal Importance (HPI; listed under Section 41 of the Natural Environment & Rural Communities (NERC) Act 2006) within each of the indicative WWTP boundaries. Additional high-level assessment of the suitability of identified habitat types to support protected species.
- Assessment of the likelihood of great crested newts (GCN) being present within a 0.5km EZoI around each site area. Ordnance Survey maps and aerial imagery were used to assess

the extent of potential GCN habitats with 0.25km of the indicative WWTP boundaries. The protected species data provided by Anglian Water were also searched to identify all records of GCN within 0.5km of each of the proposed site areas.

- Use of ordinance survey maps and aerial imagery to identify potential pathways for impact during the construction of pipeline routes and access roads on all statutory within a 1.0km EZoI. Pathways identified were generally natural routes for wildlife migration, such as hedgerows, woodland or watercourses. However, where the designated site is within 0.5km of the proposed route, it was considered that increased levels of noise, vibration, light and vehicular movement during construction could lead to habitat disruption and species displacement (i.e. potential for impact due to proximity despite lack of physical pathway).
- The Stage 3 Fine Screening RAG scores were combined with the Stage 2 Course Screening RAG scores to provide an overall assessment of the potential ecological constraints at each of the proposed site areas. The overall RAG rating presented in Stage 3 corresponds to the highest level of risk across the components of the Stage 3 Fine Screening (as described above) and the Stage 2 Coarse Screening.

3 Results

Table 2 provides the combined results for the Stage 2 and Stage 3 assessments in relation to the presence of SSSI IRZs. There are 14 longlisted site areas as reviewed for Stage 2, with seven shortlisted sites (A, B, C, H, I, J and L) taken forward for Stage 3. The seven shortlisted site areas within Table 2 include a review of whether the site areas associated pipeline and access roads also fall within the SSSI IRZ.

Figures 2 and 3 in Appendix A show the location of the site areas, concept access roads and pipelines, the SSSIs and, the IRZs.

Table 2: Site areas and SSSI IRZ

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
Site area A	Ouse Washes	5.9	Yes-Discharge. Yes- Combustion.	Red
	Berry Fen	6.4	Yes-Discharge. Yes- Combustion.	
	Cam Washes	9.3	Yes-Discharge	
Site area A – Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	1.8	Yes -Discharge Yes- Infrastructure	
	Cam Washes	5.6	Yes -Discharge Yes- Infrastructure	
	Upware South Pit	8.6	Yes-Discharge.	
Site A access road	Ouse Washes	6.5	Yes- Combustion.	
	Berry Fen	6.8	Yes- Combustion.	
Site area B	Overhall Grove	6.6	No obvious SSSI IRZs present	Red
	Ouse Washes	6.7	Yes-Discharge. Yes- Combustion.	
	Berry Fen	6.8	Yes-Discharge.	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
			Yes- Combustion.	
Site area B – Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	1.8	Yes -Discharge Yes- Infrastructure	
	Cam Washes	5.6	Yes -Discharge Yes- Infrastructure	
	Upware South Pit	8.6	Yes-Discharge. Yes- Combustion.	
Site B Access road	Ouse Washes	6.7	Yes- Combustion.	
	Berry Fen	7.0	Yes- Combustion.	
	Overhall Grove	9.1	Yes- Combustion.	
Site area C	Histon Road	5.4	No obvious SSSI IRZs present	Red
	Traveller's Rest Pit	6.4	No obvious SSSI IRZs present	
	Madingley Wood	7.3	No obvious SSSI IRZs present	
	Stow-cum-Quy Fen	8.1	No obvious SSSI IRZs present	
	Ouse Washes	8.4	Yes-Discharge. Yes- Combustion.	
	Cam Washes	8.8	Yes -Discharge Yes- Infrastructure	
	Berry Fen	8.9	Yes-Discharge. Yes- Combustion.	
Site area C – Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	1.8	Yes -Discharge Yes- Infrastructure	
	Cam Washes	5.6	Yes -Discharge Yes- Infrastructure	
	Upware South Pit	8.6	Yes-Discharge. Yes- Combustion.	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
Site C access road	Histon Road	5.4	Yes-Combustion.	
	Traveller's Rest Pit	6.4	Yes- Combustion.	
	Madingley Wood	7.3	Yes-Combustion.	
	Stow-cum-Quy Fen	8.1	Yes- Combustion.	
	Ouse Washes	9.0	Yes- Combustion.	
	Berry Fen	9.4	Yes- Combustion.	
Site area D	Histon Road	5.1	No obvious SSSI IRZs present	Red
	Stow-cum-Quy Fen	6.0	No obvious SSSI IRZs present	
	Cam Washes	6.5	Yes-Discharge. Yes- Combustion.	
	Traveller's Rest Pit	6.6	No obvious SSSI IRZs present	
	Wicken Fen	8.5	No obvious SSSI IRZs present	
	Upware South Pit	8.7	Yes-Discharge. Yes- Combustion	
	Upware Bridge Pit North	9.8	Yes- Combustion	
Site area E	Cam Washes	5.2	Yes-Discharge. Yes- Combustion.	Red
	Histon Road	5.8	No obvious SSSI IRZs present	
	Stow-cum-Quy Fen	5.8	No obvious SSSI IRZs present	
	Wicken Fen	7.1	No obvious SSSI IRZs present	
	Upware South Pit	7.2	Yes-Discharge.	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
			Yes- Combustion.	
	Traveller's Rest Pit	7.5	No obvious SSSI IRZs present	
	Upware Bridge Pit North	8.2	Yes-Discharge. Yes- Combustion.	
	Upware North Pit	8.6	Yes-Discharge. Yes- Combustion.	
	Devil's Dyke	9.5	Yes-Discharge. Yes- Combustion.	
Site area F	Cam Washes	2.0	Yes-Discharge. Yes- Combustion.	Red
	Stow-cum-Quy Fen	3.4	Yes-Discharge. Yes- Combustion.	
	Wicken Fen	4.0	Yes-Discharge. Yes- Combustion.	
	Cam Washes	4.2	Yes-Discharge. Yes- Combustion.	
	Upware South Pit	4.2	Yes-Discharge. Yes- Combustion.	
	Upware Bridge Pit North	5.5	Yes-Discharge. Yes- Combustion.	
	Upware North Pit	5.9	Yes-Discharge. Yes- Combustion.	
	Devil's Dyke	6.2	Yes-Discharge. Yes- Combustion.	
Site area G	Histon Road	3.5	No obvious SSSI IRZs present	Red
	Traveller's Rest Pit	4.3	No obvious SSSI IRZs present	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
	Madingley Wood	5.3	No obvious SSSI IRZs present	
	Stow-cum-Quy Fen	7.6	No obvious SSSI IRZs present	
	Cam Washes	9.3	Yes-Discharge.	
	Ouse Washes	9.4	Yes-Discharge.	
	Berry Fen	9.8	Yes-Discharge.	
Site area H	Histon Road	2.8	Yes-Discharge.	Red
	Traveller's Rest Pit	4.5	Yes-Discharge.	
	Stow-cum-Quy Fen	5.3	No obvious SSSI IRZs present	
	Cam Washes	6.1	Yes-Discharge. Yes- Combustion.	
	Wicken Fen	8.2	No obvious SSSI IRZs present	
	Upware South Pit	8.4	Yes-Discharge. Yes- Combustion.	
	Upware Bridge Pit North	9.6	Yes -Combustion	
Site area H – Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	1.8	Yes -Discharge Yes- Infrastructure	
	Cam Washes	5.6	Yes -Discharge Yes- Infrastructure	
	Upware South Pit	8.6	Yes-Discharge. Yes- Combustion.	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
Site H access road	Histon Road	4.0	Potentially -Discharge.	
	Traveller's Rest Pit	5.6	Potentially -Discharge.	
	Stow-cum-Quy Fen	6.4	Yes- Combustion.	
	Cam Washes	8.1	Yes- Combustion.	
Site area I	Stow-cum-Quy-Fen	3.5	Yes – Combustion	Red
	Wilbraham Fens	5.7	Potentially – Combustion.	
	Cam Washes	6.6	Yes – combustion Yes - discharge	
	Great Wilbraham Common	8.1	Potentially – combustion	
	Fulbourn Fen	8.9	No obvious SSSI IRZs present	
	Upware South Pit	9.3	Yes - combustion	
	Devil's Dyke	9.4	No obvious SSSI IRZs present	
Site area I- Pipeline to new outfall north-east of Milton	Stow-cum-Quy-Fen	2.7 .	Yes -Discharge Yes-Infrastructure	
	Cam Washes	7.1	Yes -Discharge	
	Upware South Pit	9.9	Yes -Discharge	
	Stow-cum-Quy-Fen	2.7 1.8	Yes -Discharge Yes-Infrastructure	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
	Cam Washes	7.1 5.	Yes -Discharge	
	Upware South Pit	9.9 8.6	Yes -Discharge	
Site I access road	Stow-cum-Quy-Fen	4.3	Yes – Combustion	
	Wilbraham Fens	6.	Potentially – Combustion.	
	Cam Washes	7.3	Yes – combustion Yes - discharge	
	Great Wilbraham Common	8.5	Potentially – combustion	
	Fulbourn Fen	9.1	Potentially – combustion	
Site area J	Histon Road	1.4	Yes- Combustion.	Red
	Traveller's Rest Pit	3.3	Yes- Combustion.	
	Stow-cum-Quy Fen	4.5	Yes- Combustion.	
	Wilbraham Fens	5.6	Yes- Combustion.	
	Madingley Wood	5.6	No obvious SSSI IRZs present	
	Cherry Hinton Pit	6.6	No obvious SSSI IRZs present	
	Gog Magog Golf Course	7.9	No obvious SSSI IRZs present	
	Great Wilbraham Common	8.0	Yes- Combustion.	
	Roman Road	8.1	No obvious SSSI IRZs present	
	Cam Washes	8.2	Yes- Combustion.	
	Fulbourn Fen	8.6	Yes - Discharge	
	Fleam Dyke	9.8	Yes - Discharge	
Site area J -Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	1.8	Yes -Discharge Yes-Infrastructure	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
	Wilbraham Fens	3.6	Yes - Discharge	
	Great Wilbraham Common	6.0	Yes - Discharge	
	Cam Washes	5.6	Yes -Discharge	
	Upware South Pit	8.6	Yes -Discharge	
Site J access road	Histon Road	2.5	Yes- Combustion.	
	Traveller's Rest Pit	4.5	Yes- Combustion.	
	Stow-cum-Quy Fen	5.1	Yes- Combustion.	
	Wilbraham Fens	6.5	Yes- Combustion.	
	Madingley Wood	6.5	Potentially- Discharge.	
	Cherry Hinton Pit	7.5	Potentially - Discharge	
	Great Wilbraham Common	8.9	Yes- Combustion.	
	Roman Road	8.7	Yes- Combustion.	
	Cam Washes	8.0	Yes- Combustion.	
	Gog Magog Golf Course	9.2	Yes - Discharge	
Site area K	Histon Road	1.1	Yes- Infrastructure.	Red
	Traveller's Rest Pit	1.7	Yes- Infrastructure.	
	Madingley Wood	3.4	Yes-Infrastructure	
	Stow-cum-Quy Fen	7.5	No obvious SSSI IRZs present	
	Caldecote Meadows	8.8	No obvious SSSI IRZs present	
	Gog Magog Golf Course	8.9	No obvious SSSI IRZs present	
	Roman Road	9.3	No obvious SSSI IRZs present	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
Site area L	Stow-cum-Quy Fen	1.1	Yes -Discharge Yes-Combustion Yes – Rural non-residential Potential for impact due to connectivity with Site via Black Ditch	Red
	Wilbraham Fens	1.3	Yes -Discharge Yes-Combustion	
	Great Wilbraham Common	3.7	Yes -Discharge Yes-Combustion	
	Fulbourn Fen	4.5	Yes -Discharge Yes-Combustion	
	Cam Washes	6.2	Yes -Discharge Yes - combustion	
	Devil's Dyke	7.8	Potentially – Combustion.	
	Newmarket heath	8.5	Potentially – Combustion.	
	Upware South Pit	9.2	Yes - Combustion	
Site area L- Pipeline to new outfall north-east of Milton	Stow-cum-Quy Fen	2.7	Yes -Discharge Yes-Combustion Yes – Rural non-residential	Red
	Wilbraham Fens	3.5	Yes -Discharge Yes-Combustion	
	Great Wilbraham Common	6.1	Yes -Discharge Yes-Combustion	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
	Fulbourn Fen	6.7	Yes -Discharge Yes-Combustion	
	Cam Washes	7.7	Yes -Discharge Yes - combustion	
	Devil's Dyke	9.4	Potentially – Combustion.	
Site access area L	Stow-cum-Quy Fen	1.9	Yes-Combustion Yes – Rural non-residential	Red
	Wilbraham Fens	1.3	Yes-Combustion	
Site area M	Traveller's Rest Pit	1.3	No obvious SSSI IRZs present	Red
	Madingley Wood	2.0	Yes - Combustion	
	Histon Road	3.0	No obvious SSSI IRZs present	
	Cherry Hinton Pit	5.8	No obvious SSSI IRZs present	
	Hardwick Wood	6.4	Potentially – Combustion.	
	Gog Magog Golf Course	6.5	No obvious SSSI IRZs present	
	Eversden and Wimphole Woods	8.8	Yes - Combustion	
	Kingston Wood and Outliers	9.9	Yes - Combustion	
Site area N	Traveller's Rest Pit	3.4	No obvious SSSI IRZs present	Red
	Cherry Hinton Pit	3.6	Yes - combustion	
	Gog Magog Golf Course	4.0	Yes - combustion	
	Histon Road	4.5	No obvious SSSI IRZs present	
	Madingley Wood	4.8	No obvious SSSI IRZs present	
	Roman Road	4.9	Yes - combustion	

Site area	SSSIs within 10km	Approximate distance (km)	SSSI IRZ	RAG rating
	Denford Fen	5.9	No obvious SSSI IRZs present	
	Sawston Hall Meadows	8.1	No obvious SSSI IRZs present	
	Eversden and Wimphole Woods	9.2	Yes - Combustion	

4 Discussion

4.1 Stage 2 RAG assessment

The 14 longlisted sites shown in Table 3 were taken from the July 2020 Stage 2 – Course Screening report. Table 3 lists the Stage 2 RAG assessment scores for the 14 longlisted site areas as reported in July 2020 and the updated Stage 2 RAG scores (based on the SSSI IRZs). The SSSI IRZ RAG scores, which were incorporated to provide the updated Stage 2 RAG scores were added to Table 3 and the Stage 2 RAG assessment scores for 10 sites (A, B, C, D, E, F, G. J, K, and M) were re-assessed Red, based upon the SSSI IRZ RAG assessment.

Table 3: Stage 2 RAG Assessment of 14 longlisted sites

Site area	Updated Stage 2 RAG scores	July 2020 Stage 2 RAG scores	Comment(s)
A	Red	Amber	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
B	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Green.
C	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Green.
D	Red	Amber	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
E	Red	Amber	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
F	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
G	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
H	Red	Red	No change for overall RAG assessment scores for site area H, when SSSI IRZ RAG assessments were considered.
I	Red	Red	No change for overall RAG assessment scores for site area I, when SSSI IRZ RAG assessments were considered.
J	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Green.
K	Red	Green	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Green.
L	Red	Red	No change for overall RAG assessment scores for site area I, when SSSI IRZ RAG assessments were considered.
M	Red	Amber	The presence of SSSI IRZs within the site area changes the RAG assessment score from Amber to Red,
N	Red	Red	No change for overall RAG assessment scores for site area I, when SSSI IRZ RAG assessments were considered.

As part of the Stage 2 assessment each of the 14 longlisted site areas was evaluated against 17 RAG criteria. The results for each site area were compared with one another on a qualitative basis to identify the best performing site areas to be included in the shortlist. Although the results have been reviewed holistically certain criteria were considered to be of greater importance in the context of the WWTP development. In order of importance these were:

- Impacts on local communities;
- Shape of land parcel and construction complexity;
- Green Belt policy;
- Policy, site allocation and planning permissions; and
- Carbon emissions.

Where, based on the RAG assessment and option comparison, site areas were compared with the other site areas these were removed from further assessment. Site areas D, E, F, G, K, M and N were removed on this basis.

The remaining seven site areas fell into two distinct groups.

- Site areas A, B and C – Site areas that are outside of the Green Belt and have higher tunnelling impacts and risk (due to longer tunnels and greater impact on the Lower Greensand, which is designated as a Principal Aquifer).
- Site areas H, I, J and L – Site areas that are within the Green Belt and have lower tunnelling impacts and risk (due to shorter tunnels and reduced impact on the Lower Greensand and Grey Chalk, both of which are designated as Principal Aquifers).

4.2 Stage 3 RAG Assessment

The seven shortlisted site areas (A,B,C,H,I, J, and L) and their infrastructure including the Pipeline to new outfall north-east of Milton and access roads, were RAG assessed against the nature conservation criterion of statutory and non-statutory designated sites, protected species, habitats and GCN presence. Table 4 below shows the overall RAG assessment for Stage 3, which incorporates the updated RAG scores based on the presence of SSSI IRZs. The additional SSSI IRZ RAG assessment results for site areas B, H,I, J, and L did not result in a change in the site's overall Stage 3 RAG assessment scores (Red). Whereas, site area A and C were re-assessed from Amber to Red, due to the presence of SSSI IRZs.

Table 4 Stage 3 Overall RAG Assessment of Seven Shortlisted Sites

July 2020 Stage 2 Coarse Screening	Updated Stage 2 RAG score	Protected species	Habitats	GCN	Access Roads and pipelines	July 2020 Stage 3 RAG Score	Overall updated Stage 3 RAG scores	Comment(s)
Amber	Red	Amber	Amber	Amber	Amber	Amber	Red	Stage 3 report categorised site area A as Red due to the presence of SSSI IRZ within the site elements.
Green	Red	Red	Amber	Amber	Amber	Red	Red	Stage 3 report categorised site area B as Red due to reports of protected species within the site elements and the presence of SSSI IRZ.
Green	Red	Amber	Amber	Amber	Amber	Amber	Red	Stage 3 report categorised site area C as Red due to the presence of SSSI IRZs within site elements.
Red	Red	Amber	Amber	Amber	Amber	Red	Red	Stage 3 report categorised site area H, as Red due to the identification of potential impact pathways between the site area and either statutory or non-statutory designated sites during the Stage 2 Coarse Screening report and there were SSSI IRZs present within the site elements.
Red	Red	Red	Amber	Amber	Amber	Red	Red	Stage 3 categorised site area I as Red due to the identification of potential impact pathways between the site area and both statutory or non-statutory designated sites during the Stage 2 Coarse Screening, the presence of SSSI IRZ, and due to reports of protected species within the indicative WWTP boundary.
Green	Red	Red	Amber	Amber	Amber	Red	Red	Stage 3 report categorised Site area J as Red due to reports of protected species within the indicative WWTP boundary and there were SSSI IRZs present within the site elements.
Red	Red	Red	Amber	Amber	Red	Red	Red	Stage 3 report categorised site area L as Red due to the identification of potential impact pathways between the site area and both statutory or non-statutory designated sites during the Stage 2 Coarse Screening, and the presence of

July 2020 Stage 2 Coarse Screening	Updated Stage 2 RAG score	Protected species	Habitats	GCN	Access Roads and pipelines	July 2020 Stage 3 RAG Score	Overall updated Stage 3 RAG scores	Comment(s)
								SSSI IRZ, and due to reports of protected species within the indicative WWTP boundary.

5 Conclusion

5.1 Stage 2 -Course Screening

To ensure completeness of the Stage 2 -Course Screening Report, each of the 14 longlisted site areas were evaluated against SSSI IRZ RAG criteria. The results for each site area were compared to the overall RAG assessment scores on the basis to identify any changes within the overall RAG assessment scores.

There were changes to the Stage 2 overall RAG assessment scores for 10 of the longlisted sites. Overall, the 14 site areas scored Red due to the presence of SSSI IRZ. Four RAG assessment scores for site areas A, D, E, and M were changed from Amber to Red due to the presence of SSSI IRZs and six sites (B,C,F, G, J, and K) RAG assessment scores were changed from Green to Red. There were no changes to site area H, I, L, and N overall RAG scores as these were assessed as Red in the July 2020 Stage 2 report.

The results of the Stage 2 Course screening assessment identified shortlisted sites (A,B,C,H,I, J and L) to be considered for further assessment and site areas (D, E, F, G, K, M and N) were removed from further assessment.

5.2 Stage 3- Fine Screening

The RAG assessment results for the Stage 3 report were reviewed and there were changes to the Stage 3 overall RAG assessment scores for the shortlisted sites. RAG assessment scores for site area A and C were changed from Amber to Red due to the presence of SSSI IRZs. The five site areas (B, H, I, L J) RAG score did not change and remained as Red.

This addendum does not change the conclusions of Stage 2 - Course Screening Report and the Stage 3 – Fine Screening Report decision on the best performing site areas I, J and L, which are referred to in Stage 4 – Final Site Selection as site areas 1, 2 and 3 respectively.

6 References

Mott MacDonald Ltd. (2020a). Cambridge Waste Water Treatment Plant Relocation Project Stage 2 – Course Screening Report.

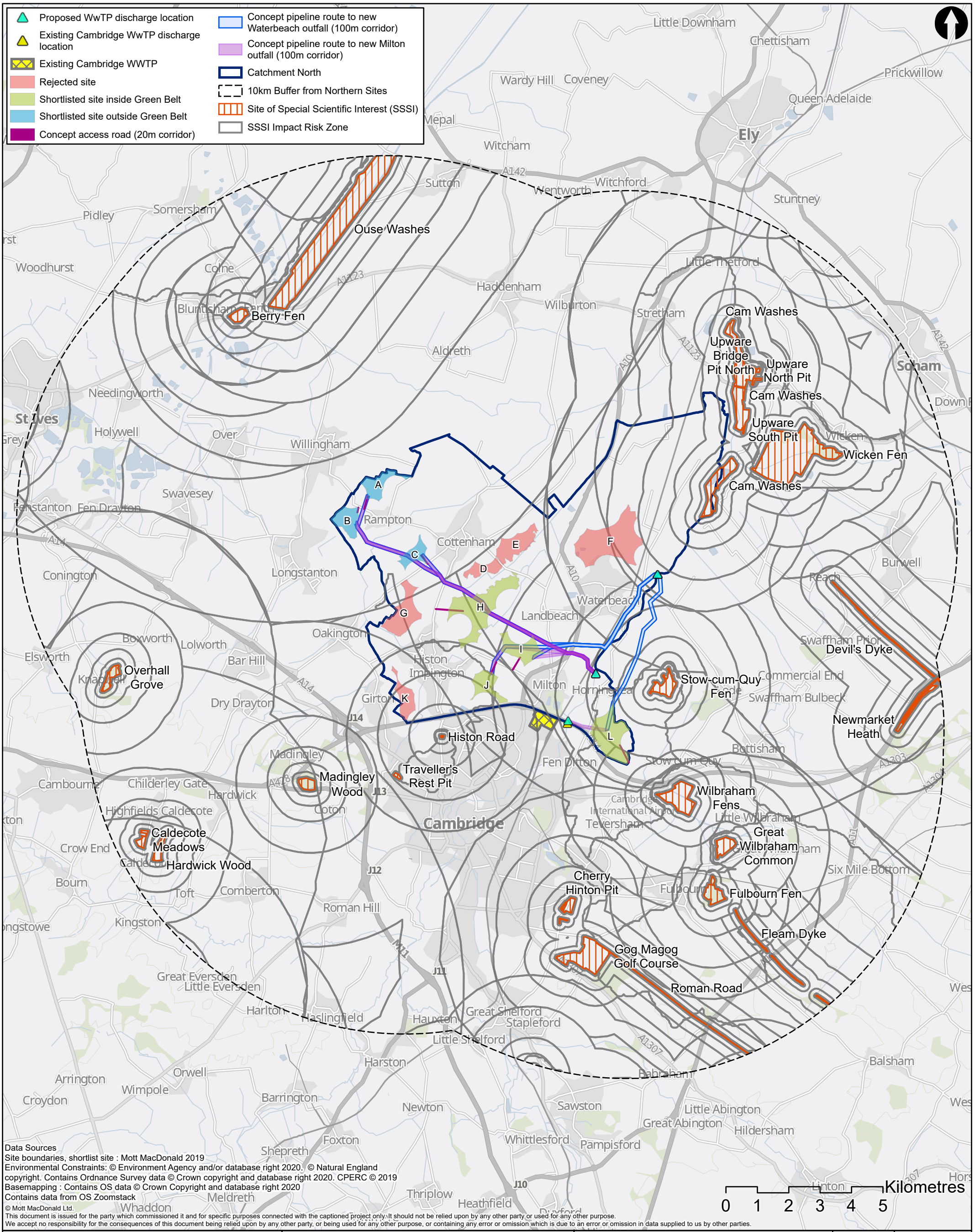
Mott MacDonald Ltd. (2020b). Cambridge Waste Water Treatment Plant Relocation Project Stage 3 – Fine Screening Report.

Natural England (2020) Natural England's Impact Risk Zones for Sites of Special Scientific Interest, (For use by Local Planning Authorities to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites and determine when to consult Natural England), User Guidance, Version Magic v3.3. Available online: https://magic.defra.gov.uk/Metadata_for_magic/SSSI%20IRZ%20User%20Guidance%20MAGIC.pdf

Appendices

A. Maps

A.1 Figure 2: Sites of Special Scientific Interest Impact Risk Zone Location Plan for northern section of Study Area



Data Sources
Site boundaries, shortlist site : Mott MacDonald 2019
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Contains data from OS Zoomstack

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Rev	Date	Drawn	Description	Ch'k'd	App'd
C	04/12/20	NC	Final	JD	TC

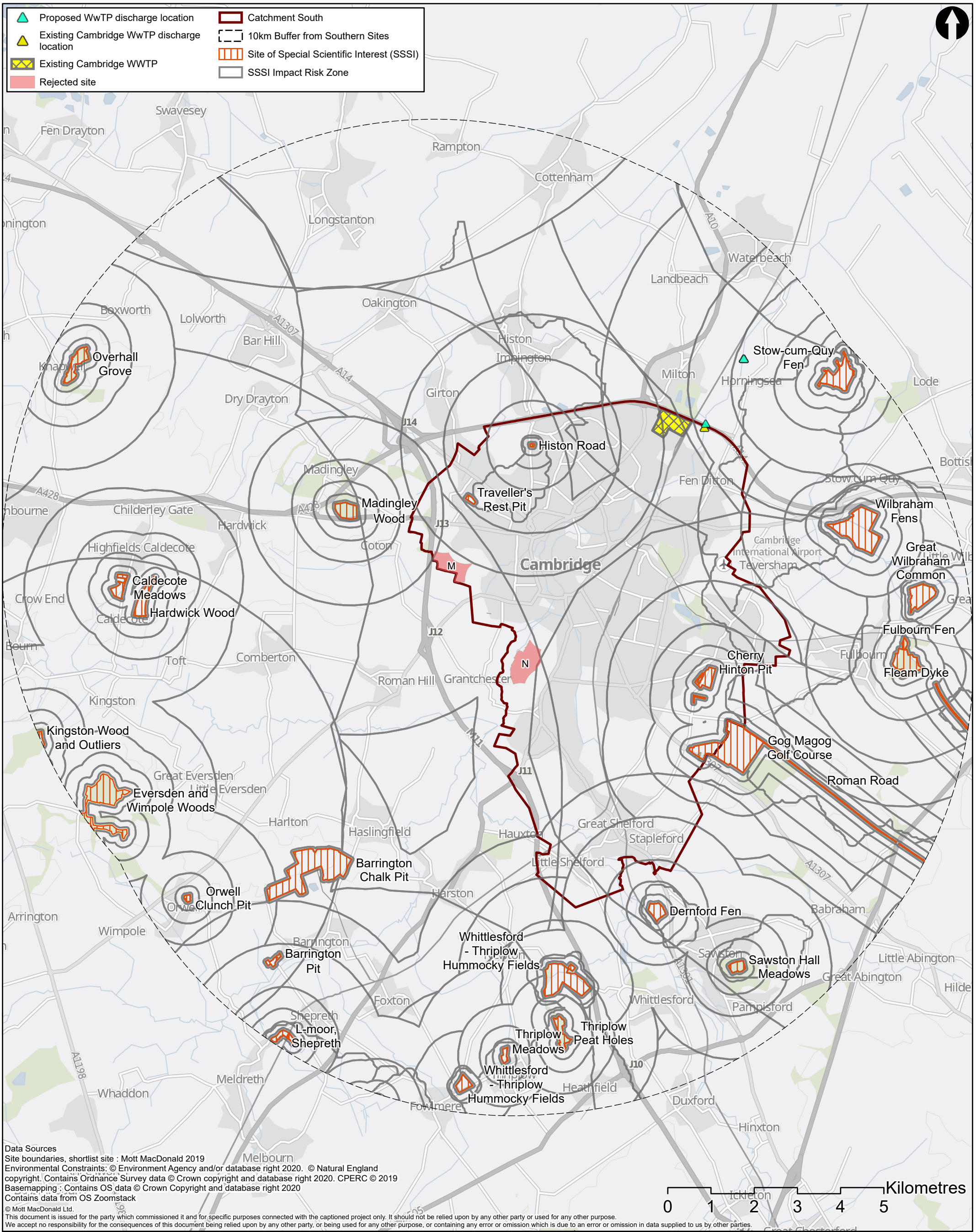
Title
CWWTPR Project
SSSI Impact Risk Zone Map
North Region

Drawn	N Critten
Checked	J Dye
Approved	T Cook
Scale at A3	1:110,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0707

Security	Status	Rev
STD	PRE	C

A.2 Figure 3: Sites of Special Scientific Interest Impact Risk Zone Location Plan for southern section of Study Area



Data Sources
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C	04/12/20	NC	Final	JD	TC

Title: CWWTPR Project
SSSI Impact Risk Zone Map
South Region

Drawn	N Critten
Checked	J Dye
Approved	T Cook
Scale at A3	1:80,000

Drawing Number: 409071-MMD-00-XX-GIS-Y-0708

Security	Status	Rev
STD	PRE	C

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