Cambridge Waste Water Treatment Plant Relocation Project
Anglian Water Services Limited

Environmental Statement Chapter 3: Site Selection and Alternatives

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Contents

Tables

Figures

1 Introduction

1.1.1 This chapter of the Environmental Statement (ES) provides a description of the site selection process and the approach undertaken by The Applicant to refine the design of the proposed Cambridge Waste Water Treatment Plant Relocation Project (CWWTPRP) and the alternatives which have been considered as the CWWTPRP has developed.

1.1.2 This chapter sets out the main alternatives considered for the CWWTPRP in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations). There is no requirement under the EIA Regulations to consider alternatives, however, where alternatives have been considered, the ES is required to set out the main alternatives considered and explain the main reasons for the choice between alternative options. The National Policy Statement for Waste Water highlights the approach to consideration of alternatives under the applicable Environmental Impact Assessment (EIA) at paragraph 3.4.3.

1.1.3 Site selection and the evolution of the CWWTPRP's design at the selected sites has been informed and shaped by the EIA process (which included ecological, archaeological, water quality and traffic surveys), through consideration of engineering and economic issues and through early and ongoing engagement with a wide range of stakeholders and landowners. Stakeholder engagement has been a key aspect of both site selection and CWWTPRP design, with the four phases of consultation undertaken providing opportunities for stakeholders to review and provide information to the Applicant, influencing the decision-making process.

1.1.4 This chapter explains how the CWWTPRP site has been selected and how the CWWTPRP design has evolved, from CWWTPRP inception to the point of application for the DCO. During this process, alternatives were considered in the following nine broad categories:

- The need to relocate the existing works (Section 1.2);
- Initial options appraisal (Section 2.1);
- Site selection – development of shortlist for public consultation (Section 2.2);
- Final site selection following public consultation (Section 2.3);
- Preliminary siting and landscape design (Section 3);
- Tunnelling and pipeline routeing and construction (Section 4);
- Treatment technology selection including odour management (Section 5);
- Traffic access arrangements (Section 6); and
- Landscape evolution, building heights and finishes (Section 7).

1.1.5 It should be noted that information in respect of treatment technology is provided in outline only in Section 5. Much of the engineering decision making was based around commercial and technical appraisal and is primarily neutral in respect of its environmental implications. The EIA Regulations require the "reasonable" alternatives studied by the Applicant to be considered, not the provision of an exhaustive list of possible alternatives.

1.2 The Need to Relocate

1.2.1 As discussed in the Planning Statement accompanying the DCO application (App Doc Ref 7.5), the relocation of the Cambridge Waste Water Treatment Plant to a new location is needed to allow delivery of housing and other development in North East Cambridge (NEC), formerly known as the Cambridge Northern Fringe East (CFNE). This area has long been identified by Cambridge City Council, South Cambridgeshire District Council and Cambridgeshire County Council (as landowners and planning authorities) as a highly sustainable location for housing and as one of the most suitable sites within Cambridge for redevelopment. The area has benefitted from Transport Infrastructure Fund (TIF) funding for Park & Ride and completion of Cambridge Guided Bus public transport infrastructure, the delivery of the Cambridge North rail station, the Chisholm Trail and, most recently, has secured Housing Infrastructure Fund (HIF) funding from Homes England for the relocation of the existing Cambridge WWTP.

1.2.2 At the strategic level, two main alternatives to relocation were considered; (a) a "do nothing" approach to the NEC area, leaving the NEC area undeveloped or (b) the potential to co-locate housing and commercial development either alongside the existing treatment works either in their current form or on a consolidated footprint.

1.2.3 In respect of option (a) ("do nothing"), such an approach would result in the failure to fully deliver on required housing numbers in Greater Cambridgeshire and/or necessitate the delivery of housing at less sustainable locations.

1.2.4 As discussed in the Planning Statement, option (b) (co-location of new development alongside the existing treatment works) would be heavily constrained by planning policy, including the provisions of the Cambridgeshire and Peterborough Minerals and Waste Local Plan, adopted in July 2021. Policy 16 of the local plan establishes a presumption against development of buildings which would be regularly occupied by people within a consultation area of 400m from the edge of the site of a Water Recycling Area.

1.2.5 This policy would restrict development at NEC to employment land-use with largely general industrial and office uses on the fringes of the area. Housing development would not be possible on a core 35ha of land forming the gateway between Cambridge North station and the Cambridge Science Park.

1.2.6 Consideration was additionally given to consolidating the existing treatment assets to occupy a smaller area of the existing site. However, this approach would not fully

remove the presumption against development on large parts of the remainder of the site described above. Furthermore, the business case for the HIF funding award could only be sustained on the relocation of the whole WWTP, to enable regeneration of most of the site for housing. Funding was not available for a partial solution and without it, consolidation would be uneconomic. There was no partial solution which could sustain HIF support.

2 Site Selection

2.1 Initial Options Appraisal

2.1.1 Having established the principle of relocation, consideration was then given to what form the relocated facilities could take. An Initial Options Appraisal was carried out (provided at Appendix 3.1, App Doc Ref 5.4.3.1) which considered the strategic factors influencing the selection of a new site, or sites, for the relocated facilities. These strategic factors included:

a) The need to treat waste water in proximity to the waste water source:

- Locating new WWTPs near to the source of waste water reduces both capital costs (for waste water transfer infrastructure such as tunnels and pipelines) and operating costs (due to the pumping of large volumes of waste water). Reduced transfer infrastructure construction and energy usage also reduces environmental impacts including lower carbon emissions.
- The "proximity principle" established under the EU Waste Framework Directive (2008/98/EC) transposed by Regulation 18 of the Waste (England and Wales) Regulations 2011 highlights a need to treat and dispose of waste water in reasonable proximity to its point of generation. The principle seeks to minimise the environmental impact of waste water transport and treatment and makes communities responsible for the wastes that they generate.

b) The number of sites required to treat the waste water:

- There are benefits and disadvantages in having a single large site compared with two or more smaller sites. A single site has the advantage of employing larger, generally more efficient, process units which, due to economies of scale, would result in both lower unit capital costs and lower unit operating costs than would be expected for multiple smaller WWTPs with the same overall capacity. Additionally, total land take for a single site is normally lower than that for multiple smaller WWTPs (with the same overall treatment capacity) due to use of more efficient (larger) treatment process tanks and buildings and the lower proportion of total area needed for access roads and administration buildings within the WWTP boundary. However, a multiple treatment site (decentralised) approach may have the advantage of flexibility in terms of network connectivity (waste water can be diverted to treatment at several points in the drainage catchment area).
- The National Policy Statement (NPS) for waste water considers at paragraph 2.4.14 that while a de-centralised approach to waste water treatment is most appropriate for smaller, dispersed rural communities,

for urban areas centralised treatment is more likely to be more appropriate.

c) The ability to expand existing sites or develop a new site or sites.

d) The broad type of treatment technology.

2.1.2 In respect of (d), three broad alternatives were considered in respect of available types of treatment technology:

- Type 1: Low energy, larger footprint technologies;
- Type 2: Standard UK approach (as used at the existing Cambridge WWTP); and
- Type 3: High energy, smaller footprint technologies.

2.1.3 A more detailed description of these types of treatment technology is included at pages 14-17 of Initial Options Appraisal (Appendix 3.1, App Doc Ref 5.4.3.1).

2.1.4 The appraisal concluded that Type 1 technologies would not be appropriate for the CWWTPRP due to the large population served and hence extremely large land area that would be required for treatment. The proposed WWTP would be more than twice the size of a project utilising Type 2 technology if trickling filters were used and would need to be five to seven times greater for a constructed wetland approach. Additionally, Type 1 technology would give rise to a greater risk of failure to meet the required effluent quality standards for ammonia and phosphorus. These significant drawbacks were considered to outweigh the lower carbon emissions benefit of such processes.

2.1.5 Type 3 technologies (higher energy, smaller footprint) are less tolerant of rapidly varying flows (such as following heavy rain) than Type 1 or Type 2 systems so tend to be less preferred when serving combined sewer networks (containing both foul sewage and a proportion of rainwater) such as in the existing Cambridge drainage catchment area. The higher energy and chemical consumption associated with such processes also result in higher operational carbon emissions. Balancing energy use, carbon emissions, footprint size and reliability it was concluded that the options taken forward would all utilise a Type 2 treatment process, which would give rise to around a 22ha footprint for a new treatment plant of the required size. Technology choice was also considered at later stages of the site selection and design process, discussed further below.

2.1.6 Consideration of these factors resulted in the six potential options shown in Figure 2.1 being selected for initial appraisal.

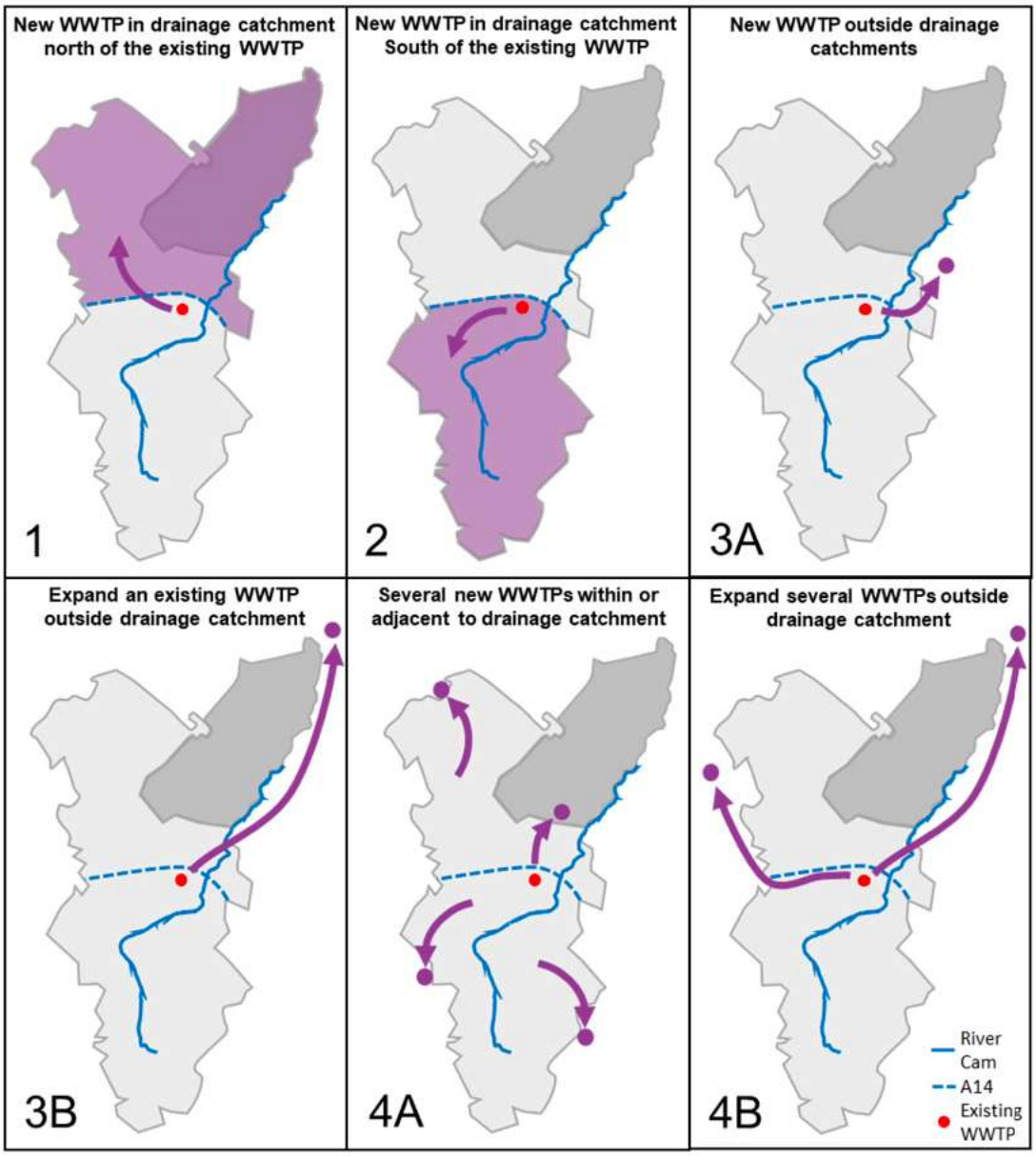


Figure 2.1: Initial options appraisal

2.1.7 As discussed in the initial options appraisal, Options 3B, 4A and 4B performed poorly across a range of criteria. Multiple sites (Options 4A and 4B) were assessed as likely to give rise to excessive cost and carbon emissions and those with longer waste water transfers (3B and 4B) similarly gave rise to high levels of cost and carbon emissions, while also failing to meet the proximity principle. Option 4A, involving multiple sites and transfers in a more urbanised environment, was also considered likely to give rise to high levels of construction complexity and community impact. Option 3A (involving a shorter transfer distance than options 3B, 4A and 4B) performed better than these options but less favourably than Options 1 and 2, both of which considered a new single site located within the drainage catchment area.

2.1.8 Option 1, with its location within the existing drainage catchment but outside of the urban area, would provide the ability to comply with the proximity principle, avoid disruption to urban areas, reduce traffic impacts during operation and reduce carbon

emissions and costs. The performance of Option 2 would be dependent on whether a suitable site could be identified outside of the urban area, in which case construction complexity and impacts on the local community could be reduced, and for that reason the study areas forming both Options 1 and 2 were taken forward to the site selection process.

2.2 Development of Shortlist for Public Consultation

2.2.1 The two options identified in the initial appraisal formed the basis of the site selection process. This process followed four stages; the first three stages focused on selecting a shortlist of sites for public consultation.

2.2.2 The study area encompassed by Option 1 and 2 included the whole of the Cambridge drainage catchment area, north and south of the A14, together with the Waterbeach drainage catchment area, as shown in Figure 2.2.

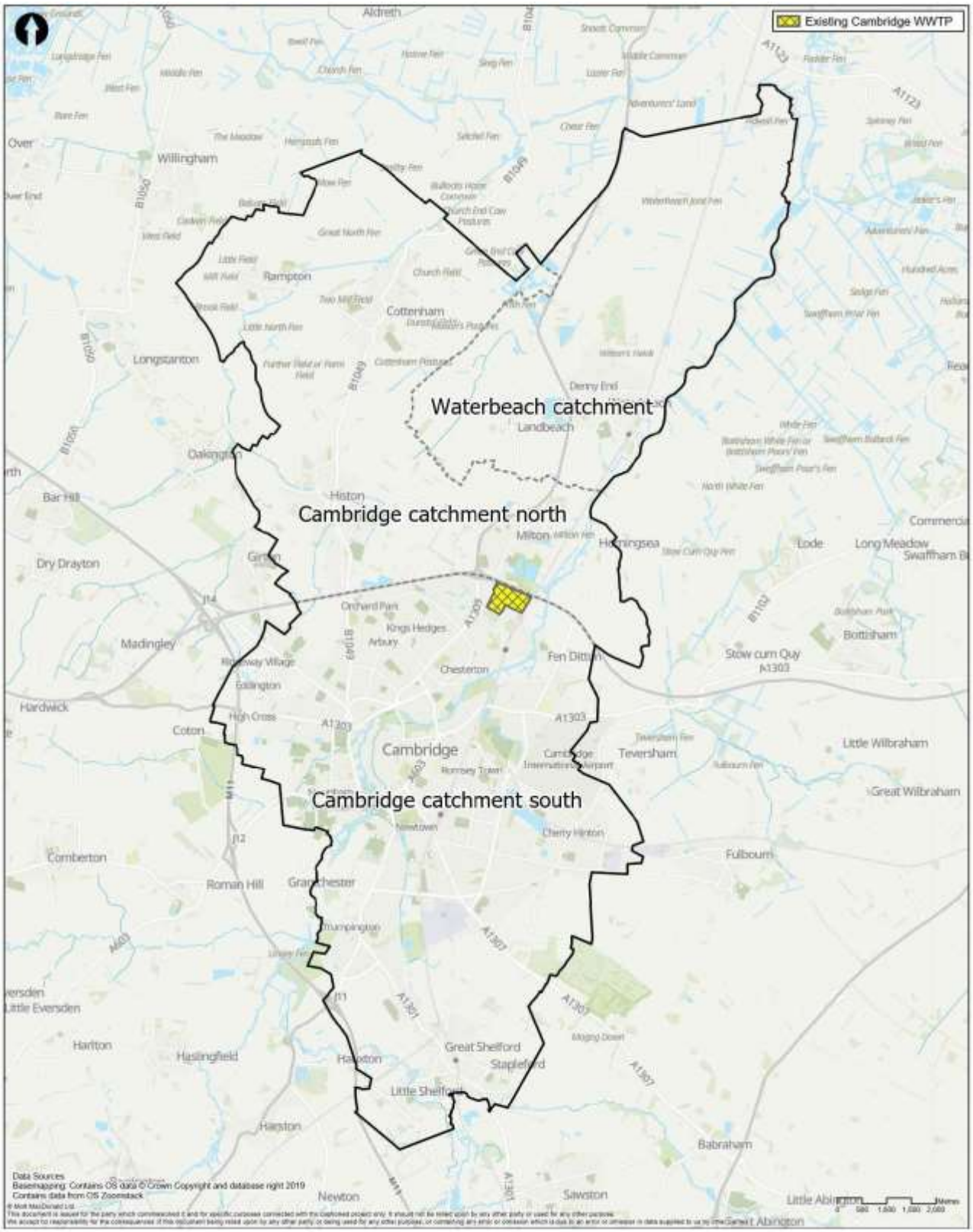


Figure 2.2: Site selection Option 1 and 2

Stage 1 – Initial Site Selection

2.2.3 The Stage 1 site selection process is described in the report provided to support this Chapter (Appendix 3.1, App Doc Ref 5.4.3.1).

2.2.4 The objective of Stage 1 was to identify a "longlist" of potential site areas for the proposed WWTP which could then be taken forward for more in-depth assessment in Stage 2.

2.2.5 A preliminary list of potential environmental, community and operational constraints were mapped within the study area in a Geographical Information System (GIS) to identify potential sites for the proposed WWTP. Based on the adoption of "Type 2" technology (the UK standard approach, described in Section 2.1) a base case for a minimum project footprint for the treatment works of 22ha was established.

2.2.6 The Green Belt was also identified as an important planning constraint that must be considered when selecting suitable sites for the proposed WWTP. However, it was considered that the Green Belt should not be used as a primary constraint at the initial stage of site selection for the following reasons:

- The Cambridge Green Belt covers a large proportion of the study area (approximately 50%) and the remaining area comprises the Cambridge urban area and rural areas relatively distant from the existing Cambridge WWTP.
- As the Green Belt designation is a non-statutory planning policy designation, development within it may be acceptable if very special circumstances exist.

2.2.7 The relevant national, regional and local policies were reviewed to identify the primary constraints and, where appropriate, buffer zones were applied around them. The use of buffers ensured that any unconstrained areas would be away from residential properties, protected and statutory designated sites and existing important infrastructure in order to limit any potential impacts on them.

2.2.8 The Applicant mapped the following constraints to identify "unconstrained area" that might be suitable for the CWWTPRP:

Environmental constraints, including:

- flood zones;
- landfill sites;
- 500m buffer around protected and statutory designated sites e.g. Sites of Special Scientific Interest (SSSI); and
- 100m buffer around watercourses.

Community constraints:

- 400m buffer around all residential properties to reduce the risk of potential odour impacts.

Operational constraints, including:

- airfields and runways e.g. Cambridge Airport;
- major transport infrastructure e.g. buffers around A, B roads and railways; and
- buffer around oil, gas and electrical infrastructure in the area.

2.2.9 Applying the minimum project footprint, 14 unconstrained areas equal to, or greater than, 22ha, were identified, labelled A-N in Figure 2.3.

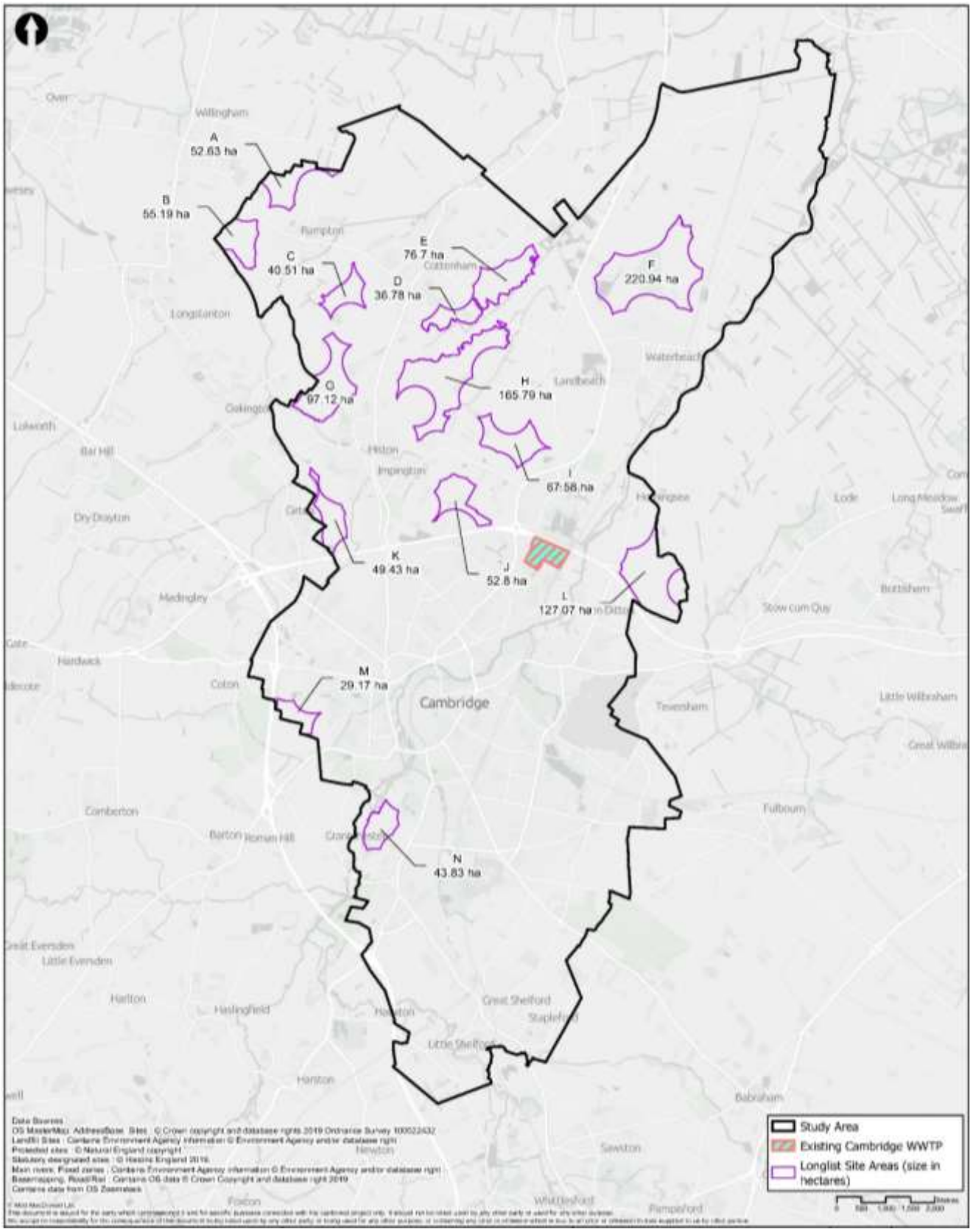


Figure 2.3: Identified unconstrained areas

Stage 2 – Coarse Screening

2.2.10 The Stage 2 site selection process is described in the report provided to support this Chapter (Appendix 3.3, App Doc Ref 5.4.3.3).

2.2.11 Stage 2 involved a 'sieving' approach to reduce the longlist to a shortlist of possible site areas after the initial Stage 1 assessment. Desk-based studies drawing on publicly available information were carried out for the criteria listed below. Further details of those studies are provided in the Stage 2 report.

2.2.12 Each site area was then evaluated against those criteria using a Red, Amber, Green (RAG) assessment system. The results of the RAG assessment for each site were compared against each other to identify a shortlist of the best performing sites.

2.2.13 The following criteria were assessed at Stage 2:

Impacts on the environment, including:

- risk of building on contaminated land;
- potential risks to groundwater aquifers and watercourses;
- potential impacts on sites designated for nature conservation;
- potential impacts on the historic environment, for example on the setting of listed buildings or on archaeological remains;
- potential landscape and visual effects, including on Public Rights of Way (PRoWs) and communities; and
- consideration of the agricultural land classification and the extent of high-grade agricultural land within the site areas.

Impacts on the community, including:

- traffic impact e.g., throughout construction and operation (including spoil removal during tunnelling);
- noise and air quality during construction;
- local residents' amenity (i.e., recreational and rights of ways) during construction and operation of the scheme; and
- impacts on community facilities and businesses in the local area.

Operational constraints, including:

- whether the shape of the site area would be suitable for a WWTP;
- how easy it would be for heavy goods vehicles (HGVs) to access the site; and
- the length of tunnels and pipelines required, how difficult they would be to construct and the scale of the carbon emissions resulting from construction.

Planning constraints, including:

- policy, site allocation and planning permissions;
- sensitivity of neighbouring land uses; and
- whether the site lies within the Green Belt.

2.2.14 Additionally, a separate carbon study was undertaken to assess the carbon emissions of the CWWTPRP. The assessment concluded that the site areas furthest from the existing Cambridge WWTP (site areas A and B) had the highest estimated carbon emissions, whilst site areas which are closer to the existing Cambridge WWTP (i.e. site areas I, J and L) had the lowest carbon emissions. This is due to the site areas further away from the existing WWTP requiring longer tunnels and pipelines than the closer site areas.

2.2.15 In terms of scale, the results indicated that the carbon emissions of site areas I, J and L were all less than half of the carbon emissions of site areas A and B. This is demonstrated in Figure 2.4, which illustrates the RAG rating of the carbon emissions for the potential site areas.

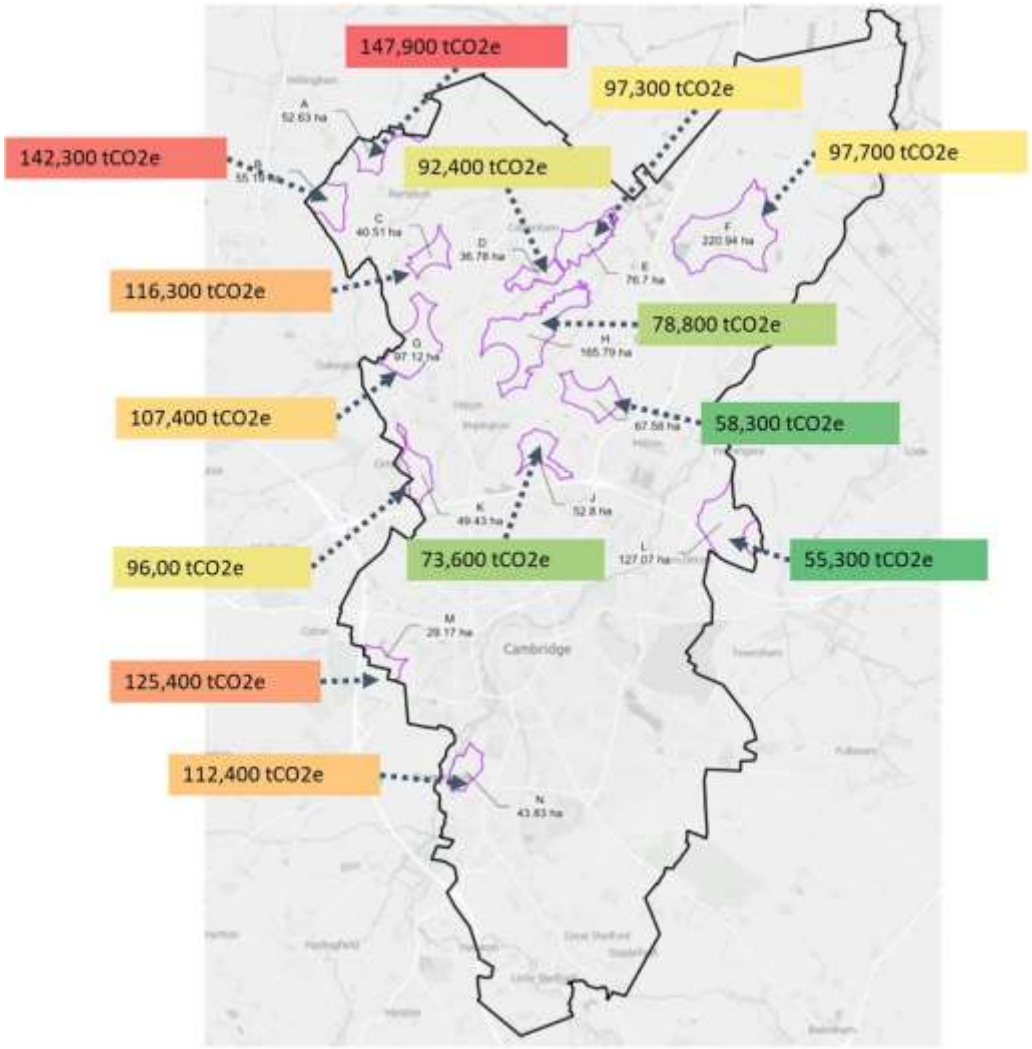


Figure 2.4: RAG rating of the carbon emissions for the potential site areas

2.2.16 Following the completion of the RAG assessments, the results for each site area were compared with one another to identify the best performing site areas to be included in the shortlist.

2.2.17 There were several site areas which performed poorly against a range of important criteria and these sites were removed from further consideration. The remaining site areas (A, B, C, H, I, J and L) all had constraints that would need to be overcome, but otherwise performed better overall than the site areas removed from further assessment.

2.2.18 The remaining site areas fell into two groups (site areas A, B and C and site areas H, I, J and L). Site areas A, B and C benefited from being located outside of the Green Belt but had the disadvantage of high potential impacts on local communities, as well as greater construction risks (for example due to tunneling complexity), higher carbon emissions and the risk of impacts to groundwater.

2.2.19 Site areas H, I, J and L are located within the Green Belt but all performed better in terms of minimising potential impacts on local communities and, as they needed shorter tunnels and pipelines to transport the waste water, they also have lower construction impacts, carbon emissions and less risk of impacts to groundwater.

2.2.20 These seven sites formed the shortlist of sites taken into Stage 3 of the site selection, shown in Figure 2.5 and Figure 2.6.

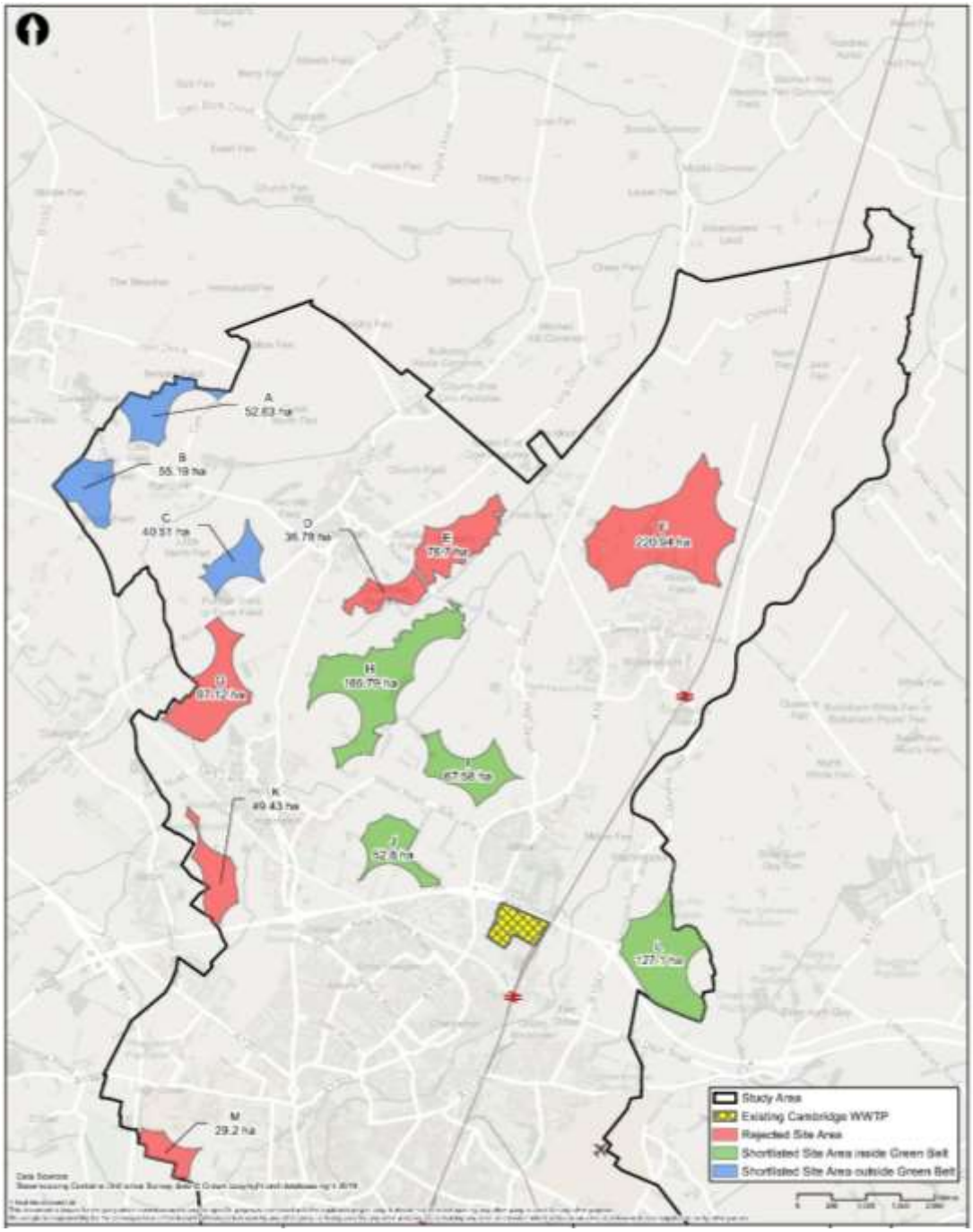


Figure 2.5: Stage 2 results – shortlist of sites (north)

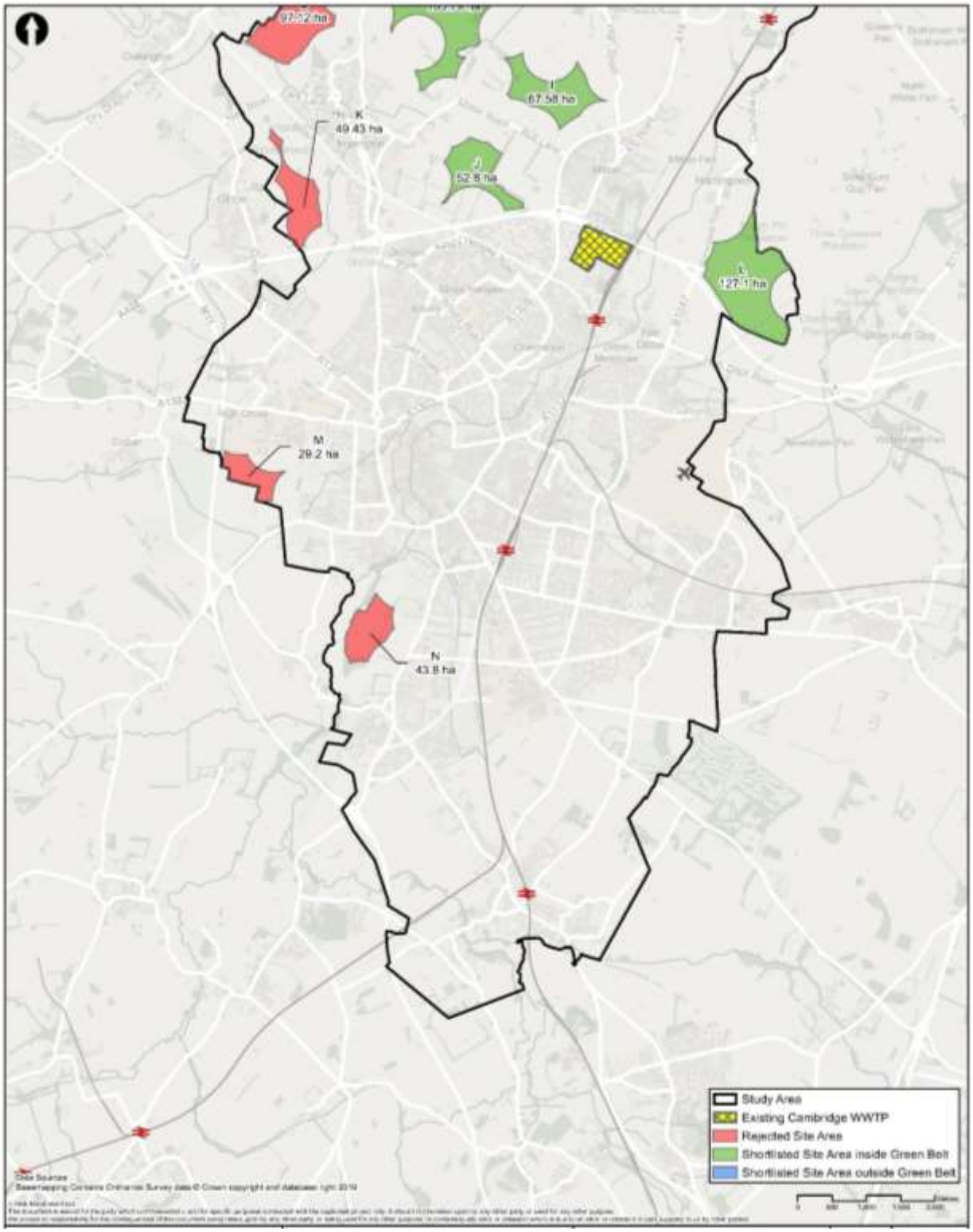


Figure2.6: Stage 2 results – shortlist of sites (south)

Stage 3 – Fine Screening

2.2.21 The Stage 3 site selection process is described in the report provided to support this Chapter (Appendix 3.4, App Doc Ref 5.4.3.4).

2.2.22 At Stage 3, a more detailed assessment of the remaining seven shortlisted site areas was undertaken to identify the final site area options to take forward to public consultation. As well as an increased level of detail in respect of environmental, carbon, community, operational and planning criteria, consideration was also given to the relative affordability of the sites, an important factor given the public funding of the CWWTPRP by the Government's HIF.

2.2.23 The following criteria were assessed at Stage 3:

Environmental:

- carbon emissions – for the tunnels, shafts, pipelines and pumps needed for each site over the lifetime of the CWWTPRP;
- landscape and visual sensitivity – potential impact on the landscape context and visual amenity for each site;
- nature conservation and biodiversity – potential impact on designated sites, habitats and protected species;
- historic environment – consideration of any potential heritage risks and constraints;
- contaminated land – assessment of the potential sources of contamination and the extent of the risk of this;
- groundwater – assessment of the potential negative impacts of the tunnels and shafts on groundwater; and
- surface water – consideration of the extent to which the potential negative impacts on bodies of water such as rivers, ponds and lakes can be mitigated.

Community:

- non-traffic impact of construction – assessment of potential construction impacts on noise, dust and disruption;
- traffic impact of construction – assessment of potential construction traffic impacts on congestion, air quality, noise and road safety; and
- impact on PRoW – assessment of potential impacts on PRoW.

Operational:

- ease of access – suitability of connecting road access for Heavy Goods Vehicles and other large or sensitive loads

Planning:

- Green Belt – assessment of whether development would be within the Green Belt; and
- risk to aviation – assessment of the potential impacts of development on aviation in relation to Cambridge Airport.

Economic:

- affordability – would development of the proposed WWTP on the site be achievable and provide value for money within the limits of Government's HIF?

2.2.24 The Stage 3 process found that:

- Under planning policy, development at site areas I, J, H and L, which are within the Green Belt, would necessitate the demonstration of "very special circumstances". Site areas A, B and C are outside of the Green Belt and would not need to demonstrate such circumstances.
- Development at site areas A, B and C would not be affordable, and could not be deliverable under the HIF. This lack of affordability was primarily a function of the significant additional tunnelling necessary to transfer waste water to sites outside of the Green Belt.
- Site areas I, J and L performed best under the cost and carbon assessment with the lowest carbon emissions for construction and operation of the waste water transfer infrastructures (tunnels, pipelines and pumping stations). The shorter length of the tunnel to each site area from the existing Cambridge WWTP, and the return pipeline or tunnel to the river, was a key factor meaning site areas I, J and L perform better the other site areas for cost and carbon. Sites furthest away from the existing site (A, B, C) would be significantly more costly, and more carbon intensive, requiring longer tunnels and pipelines.
- Sites areas I, J and L provided better road access, and lower traffic impacts, with potential road transport routes from the main strategic road network to these locations shorter and not passing through the centre of any villages. The routes for the four other site areas would all pass through the centre of at least one village or pass community facilities such as schools and nurseries.
- Non-traffic impacts on community receptors were also considered to be likely to be higher at site areas A, B and C.
- Site area H presented a greater impact on the local community, higher carbon emissions and greater risk of impact on groundwater in comparison to site areas I, J and L.

2.2.25 For these reasons, the Stage 3 process concluded that site areas I, J and L were the best performing site areas. All three sites were considered to be suitable and feasible for the CWWTPRP against the criteria assessed at this stage.

2.2.26 These site areas were taken forward for public consultation, followed by Stage 4 of the site selection process.

2.3 Final Site Selection

2.3.1 Between 8 July and 14 September 2020, the Applicant carried out public consultation on the three shortlisted sites, I, J and L, which were renamed Sites 1, 2 and 3, shown in Figure 2.7.

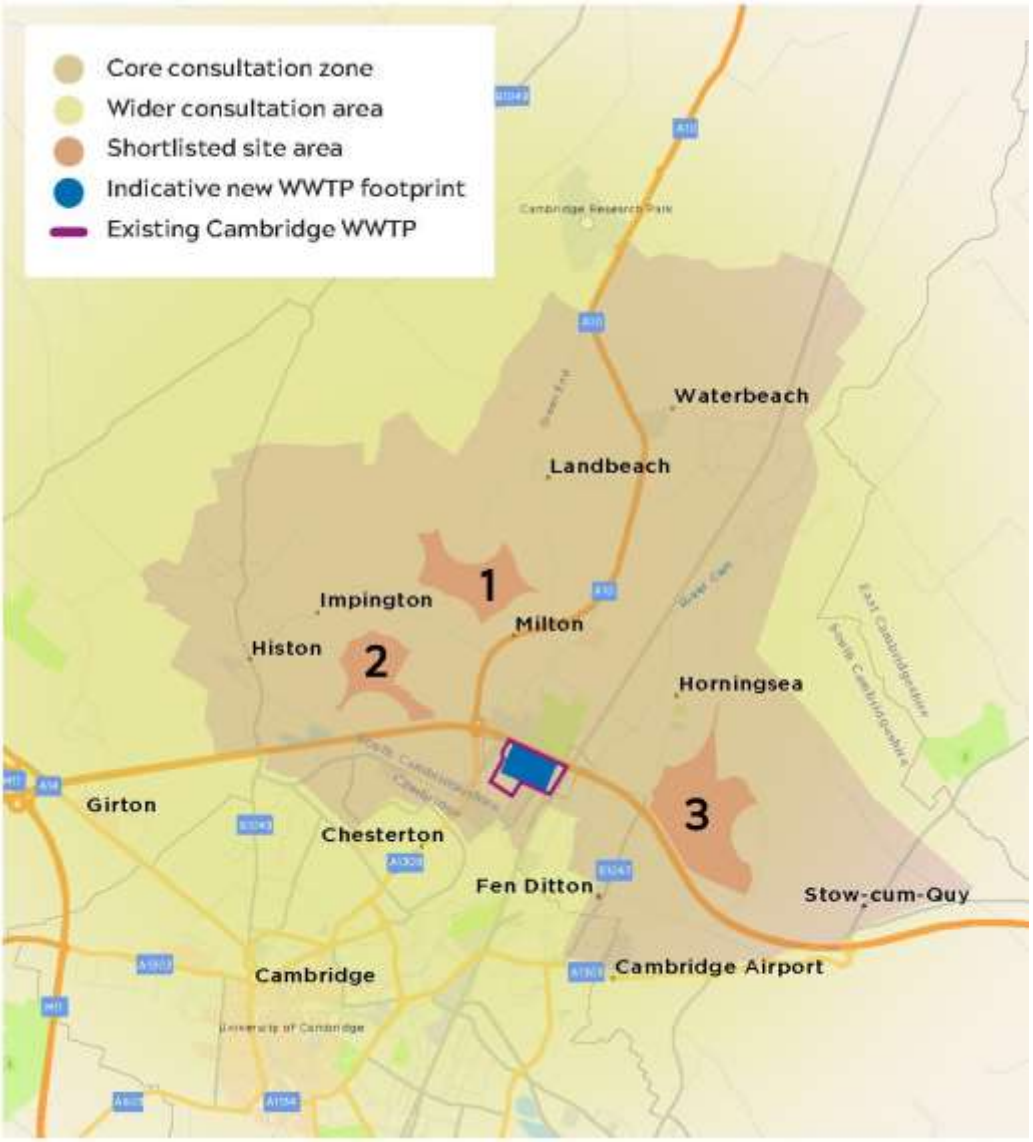


Figure 2.7: Three sites for consultation

2.3.2 In addition to the local community, consultation took place with elected representatives, including parish councillors in whose area the proposals are sited and those in adjoining councils, county councillors, local authority elected members and MPs. Statutory consultees such as Natural England, the Environment Agency, highway authorities and bodies such as the Internal Drainage Board (IDB) were also consulted along with local interest groups, residents' associations, and organisations such as Bedfordshire, Cambridgeshire and Northamptonshire Wildlife Trust.

2.3.3 The Phase One Consultation Summary Report, published in November 2020, provided an analysis of the resident and stakeholder feedback received on the site options.

2.3.4 The final (Stage 4) site selection process incorporated a more comprehensive level of analysis than was possible for the large number of sites considered at Stages 1-3.

2.3.5 Preliminary ecological, landscape and historic environment field surveys were carried out on the site areas between April and November 2020. Additional, site-specific desk-based studies were also commissioned in respect of issues such as landscape and visual impact, flood risk assessment, traffic and transport and preliminary odour modelling. The Stage 4 site selection report provided to support this Chapter (Appendix 3.4, App Doc Ref 5.4.3.4) provides more detail on these assessments, which were carried out by appropriately qualified experts in those fields.

2.3.6 The size of all three of the shortlisted site areas was larger than the 22ha considered by the Applicant at Stage 1 to be the minimum likely footprint of the proposed WWTP. To facilitate the assessment of potential impacts during the Stage 3 and Stage 4 process, an indicative CWWTPRP location was selected within each of the site areas. This allowed representative and worst-case modelling to take place for odour. As described in the Stage 4 report, in each case the indicative location was based on a rectangular project configuration with an area of 22ha.

2.3.7 The economics of each of the site areas, based on indicative CWWTPRP locations, including indicative highways access and transfer tunnel and pipeline routes, was assessed.

2.3.8 Assessment of each of the site areas took place, using the criteria described in Table 2-1. This assessment carefully considered the responses received from the consultation described above. As part of this assessment, mitigation was identified for any possible environmental effects and the potential for environmental enhancement was considered. The cost options for each site area were refined to include the costs of delivering of such mitigations or enhancements.

Table 2-1: Stage 4 final site selection criteria

Theme	Criteria
Environmental	• Nature conservation and biodiversity • Landscape and visual amenity • Historic environment • Land and water quality • Carbon emissions • Noise • Air quality • Odour

Theme	Criteria
Community	• Land use, property and business viability • Traffic • Amenity (based on the combined impacts of air quality, odour, noise, landscape and visual and traffic)
Operational considerations	• Delivery of Anglian Water's strategic corporate commitments • Odour (operational) • Future urban growth • Future operational needs (post 2050) • Transport and access • Flood risk
Planning	• Evaluation of site against national and local planning policies
Economic	• Assessment of development, capital and operational costs of each site, with and without appropriate environmental mitigation
Programme risks	• Whether the site could be developed within the timeframe required by the Homes England funding agreement

Comparison of site areas

2.3.9 The site areas were compared against each other, based on the selected criteria relevant to each costed and mitigated indicative CWWTPRP, as recorded in the site area assessments.

2.3.10 The Stage 4 final selection assessment process was complex and incorporated a considerable amount of information. To facilitate understanding of the comparison, a graphical representation of the findings was developed in the form of a "bubble chart" to illustrate the performance of each site area option against the others and collectively against all the assessment criteria.

2.3.11 The criteria taken through to this analysis were assigned a relative weighting, reflecting their importance to the Anglian Water development team (drawing on their professional judgment), their prominence in consultation feedback and guidance in planning policy. These weightings were represented by the size of the bubbles in the chart.

2.3.12 Figure 2.8 illustrates the method of comparison. Each criterion is represented by a separate bubble, with the position of the bubble denoting the comparative performance of the criterion across the site areas. For example, Bubble A is not a distinguishing factor between any site area i.e., all site areas perform equally.

Whereas Bubble B shows a moderately distinguishing factor (radial location is halfway between centre and edge of circle), with performance favouring site areas 1 and 3 i.e. site areas 1 and 3 perform equally but better than site area 2. Bubble C is s a strongly distinguishing factor (radial location is close to edge of circle), with performance favouring Site area 1, i.e., site area 1 performs better than both site areas 2 and 3, which perform equally to one another. Note that all these bubbles would be considered of equal importance as their bubble size is the same.

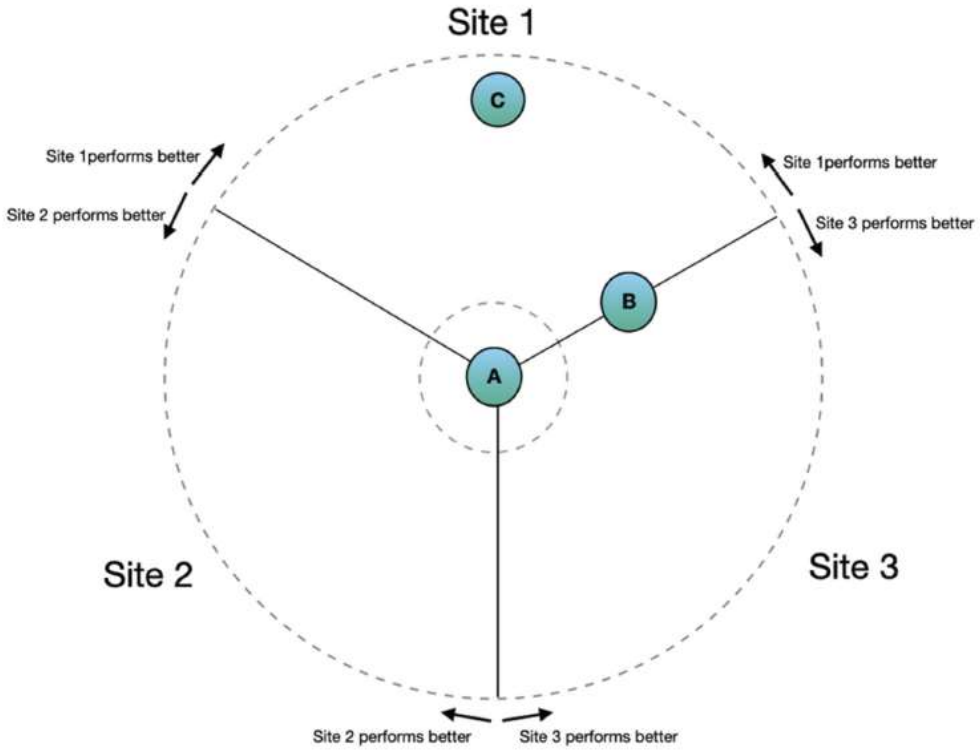


Figure 2.8: Method of comparison applied to the criteria and sites

2.3.13 At this point some refinement of the criteria took place at this stage to facilitate the comparison process:

- Because the original "amenity" criterion was based on considerations of the cumulative effect of other factors it did not need to be carried into the multi-factor analysis, which automatically assessed cumulative issues.
- Traffic, transport and access issues were separated into two criteria; "Highways upgrades" to reflect the proposed mitigation, which influenced the traffic and access assessment, and its additional costs to the CWWTPRP. "Traffic and access" was used to reflect the potential impacts of mitigated operational access to the site areas by heavy goods vehicles.
- The "historic environment" criterion was split in to two criteria to reflect the different considerations and risk profiles relating to the potential for future archaeological finds ("Archaeology") and the legal protections afforded to designated heritage assets ("Heritage Assets").

- The "Land and water quality" criterion was split to reflect the differing issues of land contamination and groundwater impacts highlighted by the environmental assessments.
- The criterion "Anglian Water's Strategic Commitments" was considered as part of the assessments around carbon and biodiversity and therefore, to avoid double counting, was not taken through to the multi-factor analysis.
- The assessment of the "planning" criterion largely reflected the findings of the environmental assessment and therefore to avoid double counting it was not taken through to the multi-factor analysis. However, one issue, Green Belt, was considered to represent a particularly important aspect of the planning assessment and, because it is a policy rather than an environmental designation, was not fully reflected in the environmental criteria. Therefore, "Green Belt" was taken forward as an additional criterion into the multi-factor analysis. The "Competing land use" criteria incorporate the remaining significant elements of the planning assessment.

2.3.14 This multi-criteria site area comparison is detailed further in Section 7 of the Stage 4 site selection report. The conclusions of the graphical analysis are shown in Figure 2.9.

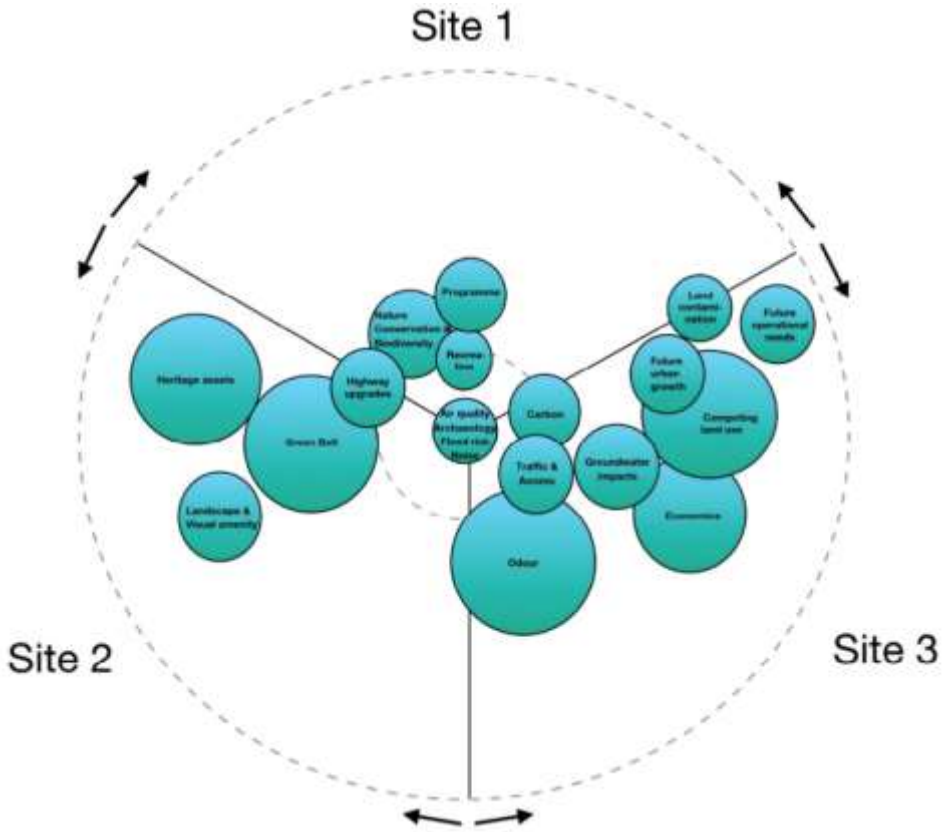


Figure 2.9: Visual comparison of sites

2.3.15 Overall, the graphical analysis demonstrates that in the majority of assessments, including the most important elements (shown by the largest bubbles), site area 1 performed poorly in comparison with either site area 2 or 3.

2.3.16 Site area 1 was the compromise site in almost all aspects, with the exception of ecology and recreation, although the differences between all sites in these aspects are considered to be relatively minor. Site area 1 has weaker contribution to Green Belt purposes than site 3. However, it is in open landscape in close proximity to Landbeach and Milton and, unlike sites 2 and 3, additional odour control measures would be required to mitigate the risk of odour impact at the nearest high sensitivity receptors. Locating a WWTP at site area 1 would also have a significant impact on the fruit farming business within the site area, potentially resulting in extinguishment of the business and loss of employment which presents a significant socioeconomic impact. Like site 2, there would be traffic impacts during construction and operation at Butt Lane/A10.

2.3.17 Therefore, it was considered that site area 1 was not a preferable option. This left the comparison between site areas 2 and 3, which present contrasting strengths and weaknesses for almost all assessments.

2.3.18 Site area 2 makes a lesser contribution to green belt purposes than site area 3, in an area more compromised and congested than the other sites and has less risk of impact on heritage assets and the local landscape. However, it is relatively closer to multiple residential areas and carries significant risk of delays to the CWWTPRP programme due to the competing land use.

2.3.19 At the time of the Stage 4 site selection process a strategic landowner (Trinity College Cambridge), was promoting the land forming the site for technology related development compatible with growth aspirations for Greater Cambridge and the Government's growth prospectus for the OxCam Arc "key economic priority" area. This competing land use was considered to be credible and viable at the time of the Stage 4 site selection process and this criterion weighed heavily against site area 2.

2.3.20 Subsequently, in early 2020, a call for sites was issued by the Greater Cambridge Shared Planning Service (GCSPS) as part of the Greater Cambridge Local Plan process. In response to this call, and as part of the associated consultation process, the landowner at site area 2 submitted a proposal for over 185,000sqm of commercial floor space on the site, to form an expansion to the Cambridge Science Park.

2.3.21 The Science Park expansion proposals were not taken forward by GCSPS as part of the First Proposals for the Local Plan in Autumn 2021. Furthermore, although the OxCam Arc initiative received strong governmental support through the publication of a policy paper (DLUHC & MHCLG, 2021) in February 2021, that initiative has subsequently stalled and some elements of the government strategy, most notably the construction of the Oxford-Cambridge Expressway, having been cancelled.

2.3.22 However, although the promotion of the site was not successful in 2020/21, the Anglian Water CWWTPRP team, supported by appropriate local planning and property advice, consider that future urban growth and development pressures would be likely to affect the long-term resilience of this site for a WWTP due to the close proximity to the Cambridge urban fringe. The site represents the highest construction cost option and a high risk remains that CWWTPRP viability could be undermined by significant increases in land value associated with possible future promotion of the land for commercial development. These risks are far lower at site areas 1 and 3. Therefore the original analysis made at the time of the Stage 4 site selection process remains accurate.

2.3.23 Opportunities to deliver significant enhancements to the environment and to connectivity (e.g. footpaths) around site area 2 were considered to be more restricted compared to site areas 1 and 3.

2.3.24 Site area 3 makes a stronger contribution to green belt purposes than site area 2. Together, with the potential impacts on heritage assets and the local landscape, this site area has a higher consenting risk profile than site area 2. However, it is the best performing for future operational needs and performs equally with site area 2 for odour (no additional mitigation would be required) and distance to highest sensitivity receptors in the prevailing wind direction. It also presents the lowest cost option and lowest lifetime carbon emissions. It provides a greater long-term ability to accommodate growth and maintain suitable distance from residential properties, reducing risk of impact on amenity.

2.3.25 However, the potential environmental impacts at site area 3 could be appropriately mitigated and enhancement measures could improve the value of the area in terms of biodiversity and wider landscape and recreational connectivity. Site area 3 also offers a better opportunity to overcome green belt harm as a result of these mitigation and enhancement measures. Whereas the potential issues associated with site area 2, in relation to competing land uses and future resilience would be more difficult to overcome.

Conclusions of Stage 4 site selection process

2.3.26 The Stage 4 site selection process concluded on balance, that site area 3 represented the best performing site, based both on numbers of criteria and on their relative importance. The site area provides significant opportunities for environmental enhancement, overcoming Green Belt harm. Environmental risks to landscape, biodiversity and heritage assets can be appropriately mitigated, including through the delivery of biodiversity net gain. In contrast, the risks posed by site area 2, in relation to competing land uses and future resilience would be difficult to overcome.

Back check

2.3.27 During the design evolution, described within Sections 3 to 7, the Applicant has carried out back checks to ensure that the integrity of the site selection process has

not been compromised by subsequent design decisions or by new information coming to light, either through the public consultation process, or otherwise.

2.3.28 As discussed at paragraphs 2.3.21 and 2.3.22, further information has arisen in respect of the development status of land at site area 2. However, as concluded at paragraph 2.3.22, this did not materially affect the findings of the site selection process.

2.3.29 As noted at paragraph 2.3.6, during the Stage 3 and Stage 4 site selection process, indicative plant locations were based on a rectangular project configuration with an area of 22ha. As discussed in Section 3, subsequently a circular project configuration was adopted for the proposed DCO design. However, the location of the works as considered at Stages 3 and 4 were not materially different from those proposed as part of this DCO application and the change to a circular layout is not material to the assessments carried out at Stages 3 and 4, particularly in respect of odour issues where a comparison of the modelling results in the Stage 4 site selection report indicates broadly compatible assumptions to those applied in this ES.

2.3.30 The potential access arrangements for site area 3 applied during site selection differed from those adopted in this DCO application, with construction access originally considered from the north of Low Fen Drove Way or via the south-west, from junction 35 of the A14. However, as discussed in Section 6, the access eventually selected represents a significant improvement on that originally proposed and therefore this change would not have materially affect the findings of the site selection process.

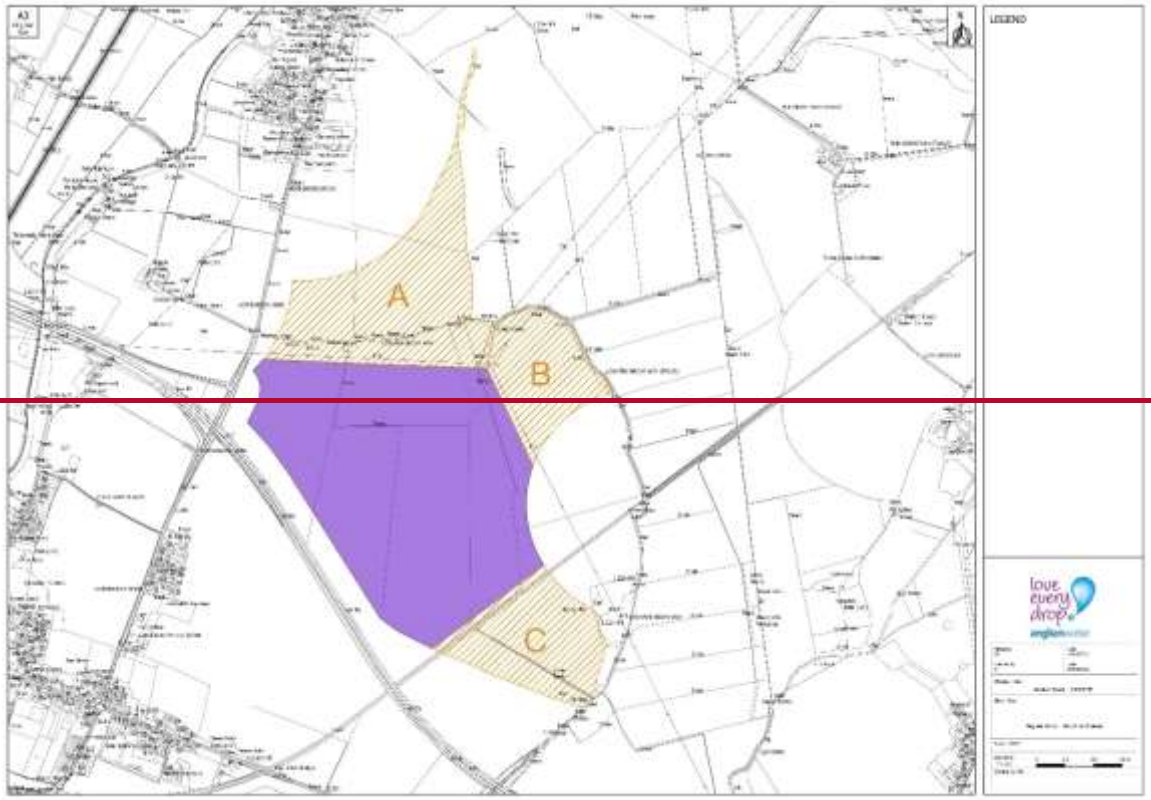
2.3.31 Back checking and further analysis by the development team has therefore confirmed that the criteria used in the site selection process remain relevant and valid at the time of the DCO application.

3 Preliminary Siting and Landscaping Decisions

3.1 Site refinement

3.1.1 Having selected site area 3, the Applicant carried out further studies to determine the best location for the treatment works and associated landscaping within the 127ha area.

3.1.2 The area north of Low Fen Drove Way (marked “A” in Figure 3.1) was considered insufficient to accommodate the treatment plant and associated landscaping without adversely affecting Horningsea or bisecting the northern part of Low Fen Drove Way. The CWWTPRP team considered these visual, amenity and recreational impacts would be significant and needed to be avoided or reduced.


A
B
C
LEGEND

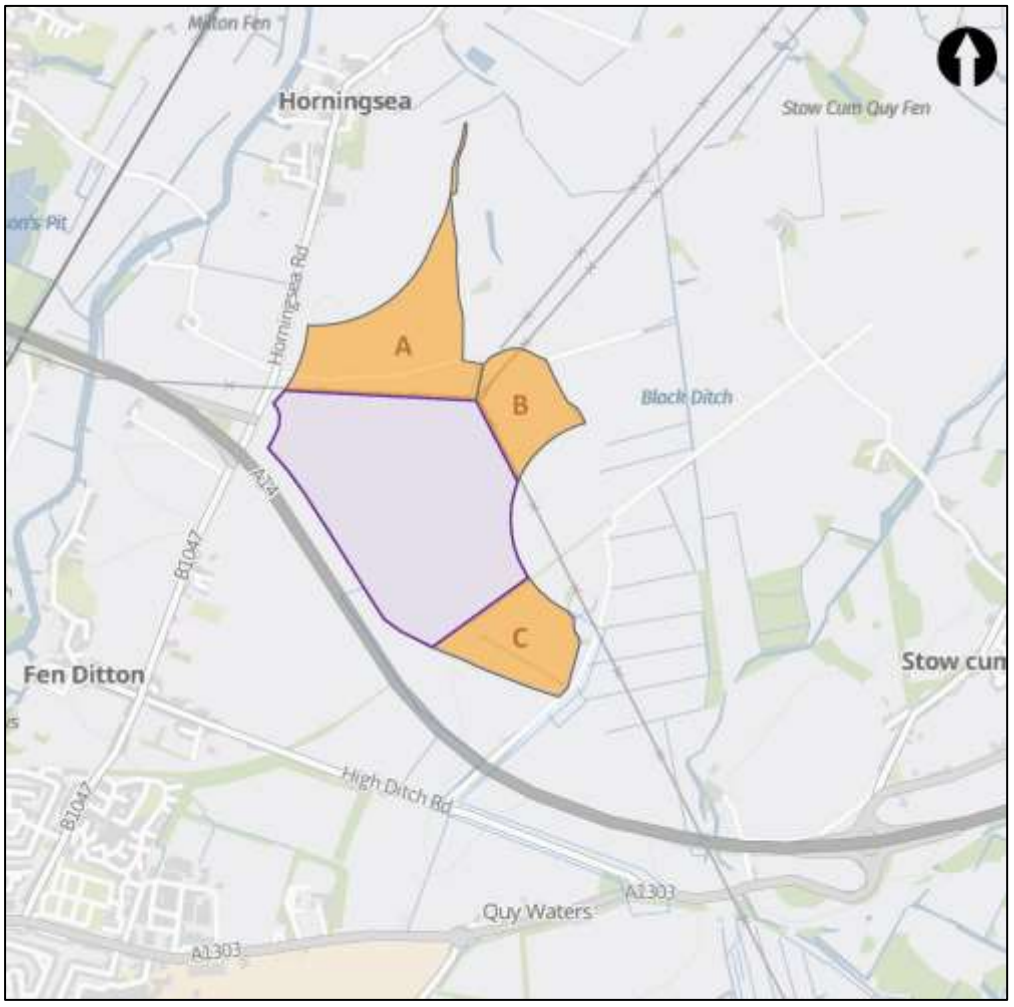


Figure 3.1: Site refinement

3.1.3 Safe construction and operation of the CWWTPRP necessitated a buffer around the existing high-voltage power lines across the site. It was considered that the land to the North and East of those power lines, including area "B" on Figure 3.1, was of insufficient size to accommodate the treatment plant and it would not be practical to split the treatment plant either side of the buffer around the power lines. In addition, following discussion with UK Power Networks, it was not considered practical or economic to bury or divert the over-head power lines.

3.1.4 A further constraint arose from the County Wildlife Site (CWS) associated with the dismantled railway crossing the site. It was concluded that the location of any construction works should fall outside of a 50m buffer around the CWS, to ensure that its features, included protected species, were not adversely affected. Furthermore, consultation with local authorities and other stakeholders highlighted a long-term strategic aspiration to utilise the route of the former railway for recreational initiatives, it was therefore considered important not to prejudice this potential.

3.1.5 These considerations also excluded the potential of utilising the land to the South-East of the railway line, area "C" in the figure above, which would be of insufficient

size to accommodate the works. The grassland within area "C", in the immediate vicinity of the area known as Honey Hill, to the east of the site, was also considered to be of higher biodiversity value, providing a further constraint against development.

3.1.6 It was therefore concluded that the CWWTPRP should be located within the area shown shaded purple in figure 3.1.

3.2 Development of plant layout and approach to landscaping

3.2.1 Having selected an optimised site location, the design and layout of the site was refined further. As described in the Design and Access Statement (App Doc Ref 7.6), a Design Vision and Environmental Objectives were developed for the CWWTPRP, drawing on the National Infrastructure Commission's Design Principles for National Infrastructure. Building on these guiding principles, three design concepts were developed for Anglian Water by its architectural and landscape architectural advisors. These were:

- A functional initial concept, supported by a landscape plan aligned with existing field patterns

Figure 3.2: Functional initial concept

- A "rotunda" design, utilising retained excavation spoil to construct a landscaped feature (round bund) in the local environment, inspired by local dykes and hillforts

Figure 3.3: "Rotunda" design

- A design utilising linear "green fingers", with a sculptural landscape of retained spoil delineating a fragmented treatment plant

Figure 3.4: Linear "green fingers" design

3.2.2 All three designs utilised a 22ha footprint for the treatment plant, within a wider landscaped area bounded by Horningsea Road to the West, Low Fen Drove Way to the North and East and the A14 to the South, totaling 127ha. This landscaped area would also accommodate associated development such as access roads, new paths to mitigate potential adverse effects on the users of existing rights of way and emerging requirements for Biodiversity Net Gain (BNG).

3.2.3 The location of the CWWTPRP within Green Belt, together with its relative proximity to villages and public rights of way, necessitated the need for additional land to mitigate environmental effects, an issue raised during the first stage of consultation

by stakeholders, including the local authorities, who signaled a need for a significant package of mitigation measures.

3.2.4 Following further advice from the Design Council, including a formal design panel review from independent built environmental experts of the three design concepts, the "rotunda" concept design was selected for further consideration. The functional design with its supporting linear landscape plan resulted in a triangular layout which was not suited to the process flows within a WWTP and was considered to offer a lower level of screening compared with the other two designs.

3.2.5 The "green fingers" design was considered to be too expensive and operationally challenging, particularly because of its fragmented, partial sunken design, would inhibit long-term adaptation and present a less pleasant working environment. The additional earthworks and ground engineering operations would give rise to a larger carbon footprint compared with the other two options. It also presented a more alien form in the landscape compared with the "rotunda" design which offered more naturalistic screening.

3.2.6 Preliminary consultation took place with stakeholders in our technical working groups, which included Natural England, National Trust, RSPB, Wildlife Trust, Cam Valley Forum, Quy Fen Trustees, the Environment Agency and Cambridge Past, Present and Future (CPPF). Discussion took place on the proposed elements of the "rotunda" design, including landscaping. Further refinement of the landscape design was carried out to mitigate adverse visual impacts and increase opportunities for ecological and recreational benefits.

3.2.7 In accordance with the Statement of Community Consultation (SOCC), agreed with the local councils, a single concept design, "the rotunda", was taken forward for public consultation to seek opinions on issues such as screening and architectural finishes. This second stage of consultation took place between June 23 2021 and August 18 2021.

3.3 Location of treatment works within site

3.3.1 Having developed an outline design, the proposed location of the CWWTPRP was refined within the site boundaries described above. This refinement considered issues including visual and Green Belt impacts, proximity to ecological receptors, including the County Wildlife Site, preliminary odour modelling, spoil and soil management and three potential access arrangements.

3.3.2 Four alternatives were considered:

- Central location: Locating the rotunda design in the centre of the site would allow visual impacts on the three closest villages, Horningsea, Fen Ditton and Stow-cum-Quy, to be balanced as far as possible. This location would also allow space for a construction stand-off area from the CWS, reducing potential adverse effects on biodiversity.

- North west of the selected site: Locating the rotunda design as far as possible to the north-west of the selected site, at a location next to Horningsea Road, could, based on a qualitative review of field boundaries, have reduced the scale and impacts of potential severance of agricultural land parcels. However, this location was considered likely to significantly increase visual impacts on users of Horningsea Road, on Horningsea village and on the listed building at Biggin Abbey. Selecting a more central location would reduce these impacts and provide greater scope for the provision of landscaping around the rotunda.
- Southern location, closer to A14: Locating the rotunda design at this location would provide little, or no, opportunity to provide landscaping to mitigate views from the South, particularly from High Ditch Road and Fen Ditton. Additionally, preliminary odour modelling suggested that odour impacts could arise on receptors south of the A14.
- Easterly location: A layout located to more to the east, whilst still respecting the initial buffer around the CWS, was also considered. This location provided a theoretical opportunity to retain potential agricultural activities on the far west of the site, adjacent to Horningsea Road. However, once landscape planting to reduce visual impacts on Horningsea and Biggin Abbey, and possible access arrangements were considered, only a relatively small parcel of land would be unaffected. Furthermore, this location provided higher environmental risks given the proximity of construction activities to the CWS buffer, including disturbance to protected species, such as bats, utilising that site.

3.3.3 On balance, and for the reasons outlined above, the central location was selected and presented during the second round of consultation, as shown in Figure 3.5. The placement of the rotunda in a central position potentially increased the level of severance to parcels of agricultural land, however, given that the aim of the placement was to mitigate visual and other environmental effects, the level of severance was considered by the CWWTPRP team to be justified. Furthermore, the use of those potentially severed parcels provided an opportunity to improve the landscaping scheme, further mitigating the CWWTPRP's Green Belt, visual and environmental effects.

3.4 Preliminary landscape design

3.4.1 Having selected a preliminary, central, location for the rotunda, the design team and professional landscape and architectural advisors, sought to refine the levels of visual and other environmental mitigation presented in the preliminary concept design. Consideration was given to what the appropriate area of landscaping should be. In addition, consideration was also given to how the potential recreational impacts could be mitigated by providing new paths.

3.4.2 The landscape architects, ecologists and recreational specialists advising on the CWWTPRP recommended that the treatment plant and its landscaping bund should be situated within a parkland-like setting of trees and grassland. The recommendation was based on the suggested design providing a high level of visual

shielding from sensitive viewpoints, while delivering BNG, and offering improved recreational opportunities. An alternative of more densely planted woodland was considered by the specialists to be inappropriate as not in keeping with the local landscape character. Lowering the levels of woodland planting from those proposed would reduce the efficacy of the landscaping and shield less of the treatment works.

3.4.3 Stakeholders during consultation, including National Trust, the local Wildlife Trust, recreation groups supported the aspirations of the design and proposed further improvements, including the provision of a new public right of way along the former railway line to the north east of the Gatehouse, towards Anglesey Abbey, to mitigate impacts on users of the existing rights of way network.

3.4.4 An alternative bridleway arrangement, proposed by stakeholders and running along the length of the former railway line from the A14 to the Gatehouse and then onwards to Anglesey Abbey was not adopted by the Applicant. This route, although compatible with longer term aspirations for a cycle route from Fen Ditton to Wicken Fen, could not be delivered by the Applicant alone because it would require acquisition of access rights south of the A14 and the construction of a new bridge over that road. The more limited bridleway proposal included within the DCO application was considered to be a more proportionate and appropriate approach to mitigating impacts on users of the existing rights of way network, while avoiding disturbance from leisure users to the features of the CWS bordering the former railway line.

3.4.5 In order to reduce land acquisition costs and impacts to agricultural holdings the design team concluded that the footprint of the landscaping in the preliminary concept designs could be reduced. Analysis concluded the appropriate level of landscaping could be accommodated within a 94 ha area surrounding the treatment plant, meaning land requirements could be reduced from 127 ha to 94ha.

3.4.6 The rotunda design, located at the centre of the site, together with its associated landscape, biodiversity and recreational features was presented at Phase Two Consultation in the form shown in Figure 3.5.

Figure 3.5: Site design presented at Phase Two Consultation

4 Tunnelling and pipeline routeing and construction

4.1.1 The site selection process was based on an indicative route corridor for the Waterbeach pipeline, the transfer tunnel from the existing Cambridge WWTP to the proposed WWTP and the final effluent and storm pipelines to the outfall on the River Cam, as shown in the Stage 4 site selection report (Appendix 3.5, App Doc Ref 5.4.3.5).

4.1.2 Following the more detailed siting of the CWWTPRP described in Section 3, the location of the infrastructure within this corridor was refined, drawing on further studies including ground investigations.

4.1.3 Options were reviewed around whether the outfall should be upstream or downstream of Baits Bite Lock. Both options were considered as part of the original site selection process with the location described in the Chapter 2: Project Description being preferred for Site 3 based on environmental impact, river quality, carbon and cost. Based on its longer route and closer proximity to heritage assets, the route downstream of Baits Bite Lock was discounted for Site 3. In addition, the upstream option meant that the discharge could be located in close proximity to the existing outfall, minimising the disruption to the river environment. This location was agreed with the Environment Agency.

4.1.4 In the case of the transfer tunnel from the existing Cambridge WWTP to the proposed WWTP, two alternative construction methodologies were considered; installing a segmentally lined bored tunnel or using a technique known as "pipe jacking". Both methodologies were considered from a cost (CAPEX and OPEX), safety, programme, environmental impact and risk perspective. Pipe jacking was chosen as the preferred methodology due to a reduced requirement for below ground working, reduced material usage and spoil generation, reduced risk of ground contamination, and reduced cost.

4.1.5 The routing of the Waste Water Transfer Tunnel was determined by applying four primary rules:

- the tunnel was not to pass under any existing buildings;
- the tunnel was to cross major infrastructure (such as railways, roads or rivers) as close to perpendicular as possible to minimise crossing length;
- construction shafts should, where possible, be spaced as evenly as possible to reduce cost and environmental impact and be in areas not subject to environmental risk (such as flooding) and where good traffic access could be achieved; and
- significant bends should be avoided to minimise turbulence and the potential creation of odour.

4.1.6 Preliminary routing and shaft location took place to inform the Phase Three Consultation, where works plans were shared with landowners and other consultees.

In response to consultation concern was raised by stakeholders about the proposed location of a tunnel shaft east of the River Cam ("Shaft 4"), shown as "Site A" in Figure 4.1. Local residents considered the shaft to be too close to their property and were concerned about its proposed use for permanent tunnel ventilation.

4.1.7 In response to these consultation responses three alternative locations, shown in Figure 4.1 as Site B, C and D, were considered by the Applicant.

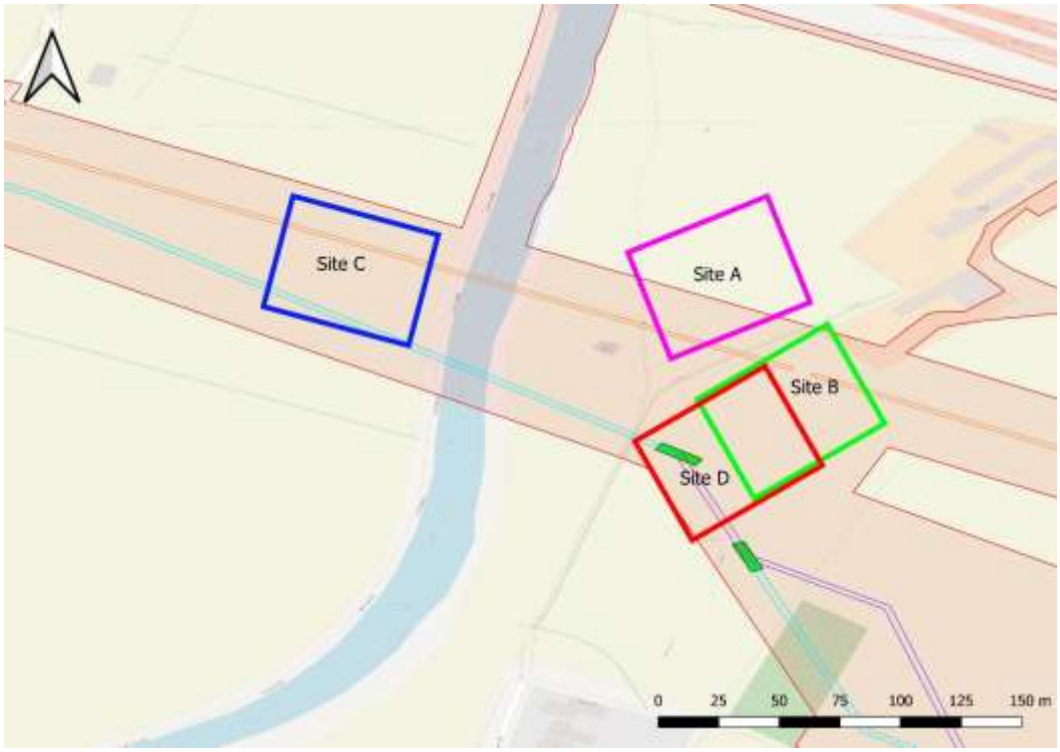


Figure 4.1: Proposed shaft 4 location

4.1.8 Site A was initially selected as the preferred location for Shaft 4 as it is approximately midway between Shafts 3 and 5. However Site B would maintain an efficient straight tunnel alignment while being located further from residential properties, in an area of lower value habitat and would avoid the need for access through a mature hedgerow.

4.1.9 Site D was less preferred to Site B because it would require a new alignment of the tunnel route which would be less efficient, more expensive and more carbon intensive. Shaft depths would need to be increased to maintain the required tunnel slope, which would increase both construction and operational carbon. The straighter alignment offered by Site B would provide better long-term hydraulic efficiency.

4.1.10 Site C, although located across the River Cam and therefore further away from the residential properties, was on more detailed study considered to be less preferred due to the presence of higher value ecological receptors and flood risk as well as the need for access along Fen Road, a residential area.

4.1.11 Site B was therefore adopted as the preferred alternative and incorporated into the CWWTPRP design. Additional review concluded that Shaft 4 could be made temporary and an operational vent removed, thereby removing all long-term visual, odour and noise impacts at this location.

5 Selection of treatment technology

5.1.1 As discussed at sections 2.1 and 2.2 (Initial options appraisal and Stage 1 – initial site selection) the preferred site was selected on the assumption that the CWWTPRP would utilise a treatment process which balanced energy use, carbon emissions, footprint size and reliability, giving rise to around a 22ha footprint for a new treatment plant of the required capacity.

5.1.2 Following site selection this assumption was backchecked and the choice of broad treatment approach and 22ha footprint was confirmed.

5.1.3 The detailed selection of treatment processes was carried out through a series of "Risk, Opportunity and Value" (ROV) studies and workshops which considered the options available for the main elements of the treatment works to take forward for assessment as part of the EIA process.

5.1.4 Each of the ROV studies focused on an element of the CWWTPRP, comparing available technologies against comparison criteria. As discussed at paragraph 1.1.5, the technologies under consideration were largely neutral in terms of the potential for significant environmental effects. All the technologies considered would deliver the discharge permit requirements for water quality. The main variation in respect of environmental performance related to carbon efficiency.

5.1.5 The ROV studies filtered out the poorest performing technologies, which the EIA process has then considered as the main alternatives.

5.1.6 The main treatment process alternatives considered as part of the EIA process, and the criteria used for selection are summarised in Table 5-1.

Table 5-1: Treatment process alternatives

Process	Main options considered	Criteria used for selection
Primary treatment	Radial Primary Settlement Tanks, rectangular Primary Settlement Tanks, dissolved air flotation, high-rate lamella settlement, no primary settlement phase	Capital cost, operational cost, carbon, reliability, odour profile, familiarity, availability, and operational complexity
	Preferred technology - radial or rectangular settlement tanks	

Process	Main options considered	Criteria used for selection
	Main reasons for selection - cost, carbon, reliability, familiarity	
Secondary treatment	Activated Sludge Process (ASP), Enhanced Biological Nutrient Removal, Granular Sludge, Membrane aerated biofilm reactor (MABR), Membrane bioreactors (MBR), Anaerobic membrane bioreactor (AnMBR)	Capital cost, operational cost, carbon, reliability, odour profile, familiarity, availability, programme, operational complexity, future consent requirements, opportunities for synergies (re-use, biogas, nutrient harvesting)
	Preferred technology - Membrane Aerated Biofilm Reactor (MABR) **Main reasons for selection** - cost, reliability, odour profile, synergies	
Tertiary treatment	FLI Rapisand, Evoqua CoMag, Bluewater Bio FilterClear, Pile Cloth Disc Filters, Deep Bed Sand Filtration	Capital cost, operational cost, footprint size, carbon, reliability, performance against permit (phosphorous), future regulatory requirements, and emerging contaminants
	Preferred technology - continuously backwashing sand filters **Main reasons for selection** - Capex, footprint, carbon, phosphorous removal	
Sludge Treatment Centre	4 options - HpH (Heating, Pasteurisation and Hydrolysis) or Thermal Hydrolysis, each with either Combined Heat and Power (CHP) or alternative biomethane usage	Capital cost, operational cost, carbon, sludge strategy, traffic, reliability, familiarity, complexity, future regulatory requirements

Process	Main options considered	Criteria used for selection
	Preferred technology - HpH with biomethane usage ("gas to grid") with an alternative of gas usage on site in combined heat and power engines (CHP) **Main reasons for selection** - cost, carbon, reliability, familiarity	

5.1.7 As discussed in Chapter 2: Project Description (App Doc Ref 5.2.2) a level of optionality has been retained in respect of utilisation of biogas, renewable energy and nutrient recycling. The reasons for retaining this optionality are explained in that chapter.

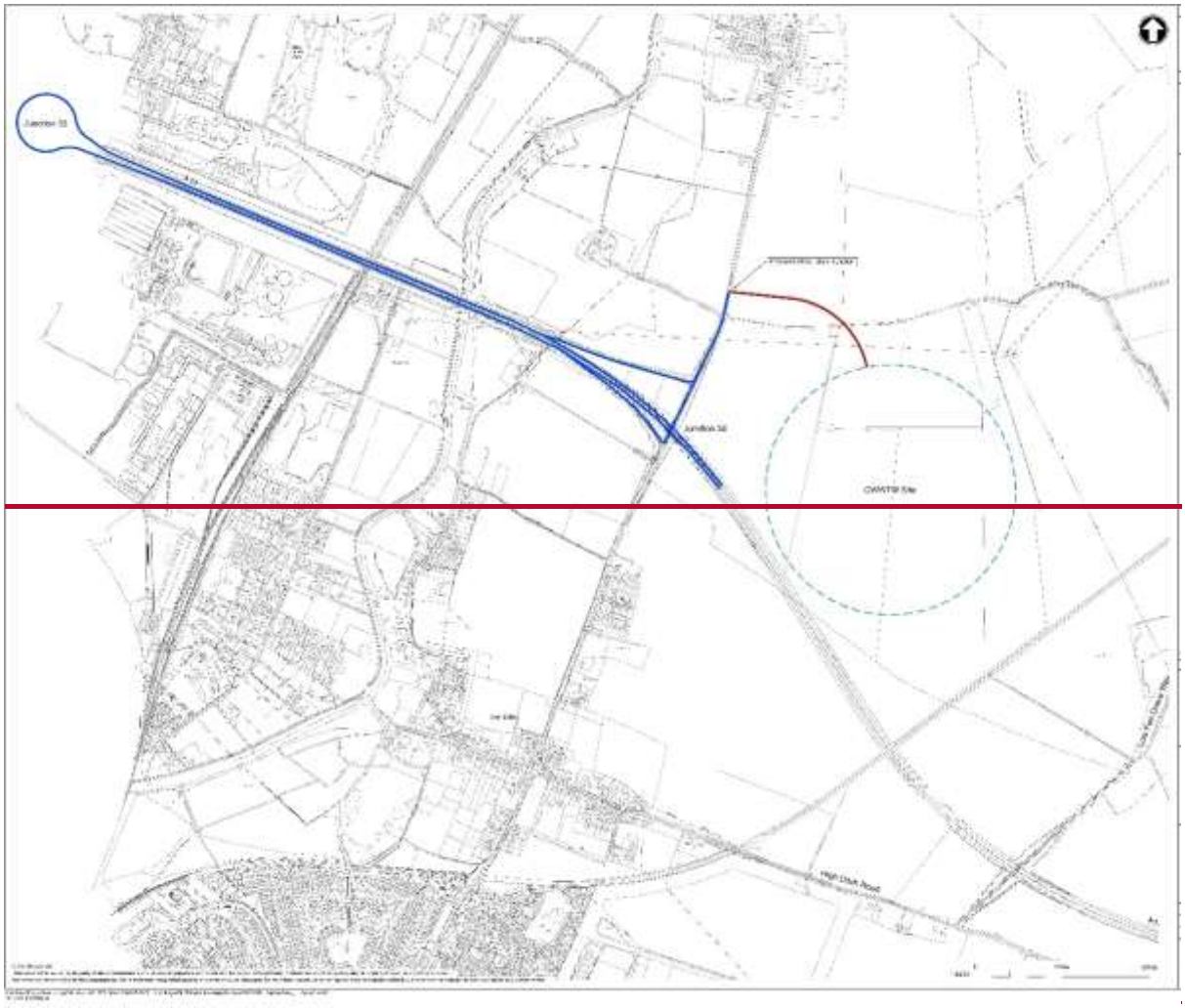
6 Traffic access arrangements

6.1.1 As discussed at paragraph 2.3.30, the access arrangements for Site area 3 considered during the Stage 4 site selection process either utilised an access from the north of Low Fen Drove Way or via the south-west, from junction 35 of the A14.

6.1.2 Following site selection further highways assessment and design was carried out and three options for the construction and permanent access were presented at the second stage of public consultation.

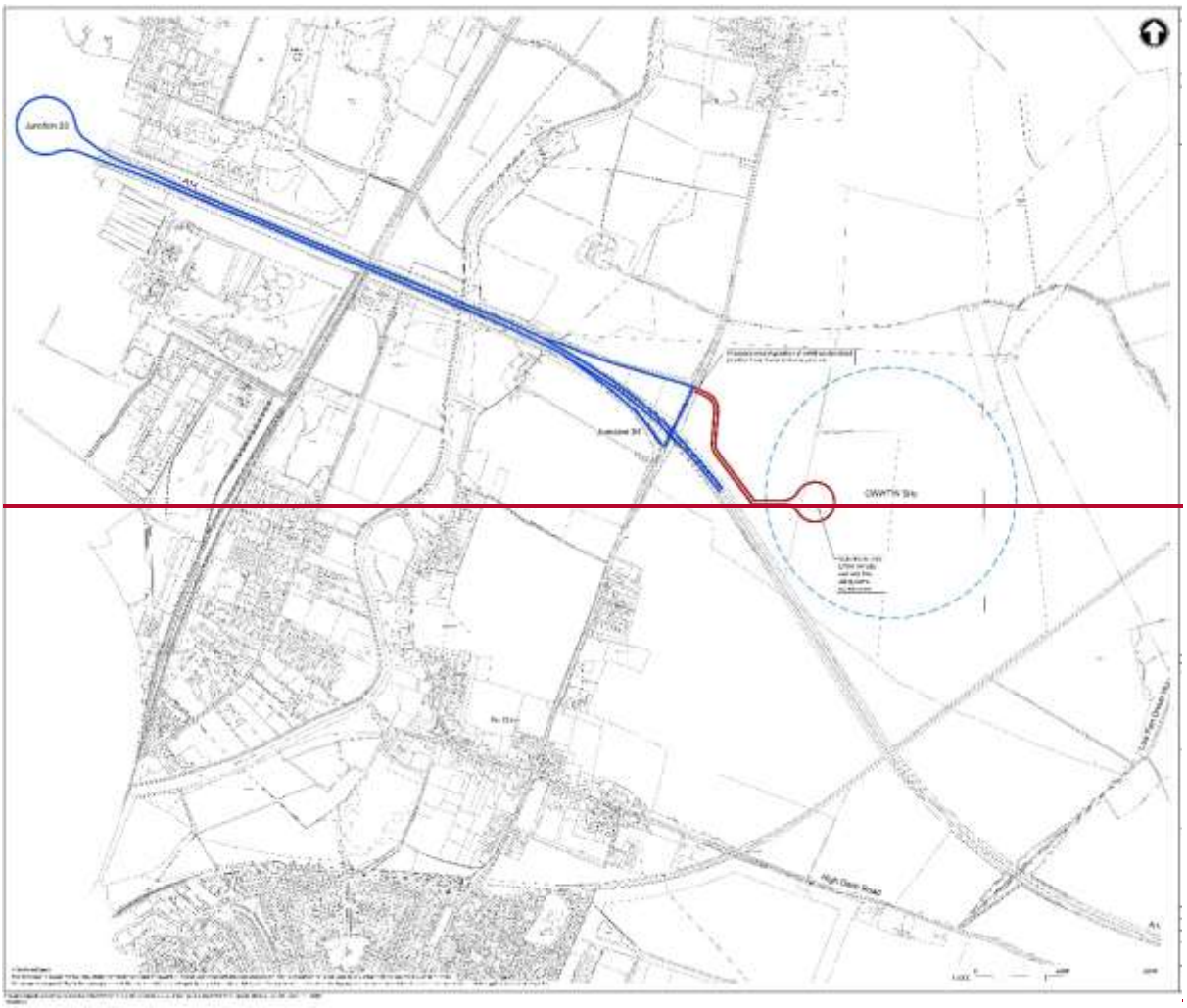
6.1.3 Option 1 would utilise the existing A14 slip road to access the site via Junction 34 of the A14, and off Horningsea Road.

6.1.4 Sub-option 1A, shown in Figure 6.1, would involve a 'Ghost Island Junction', which includes road markings to create an additional lane for traffic waiting to turn right off Horningsea Road onto a new road to the facility.



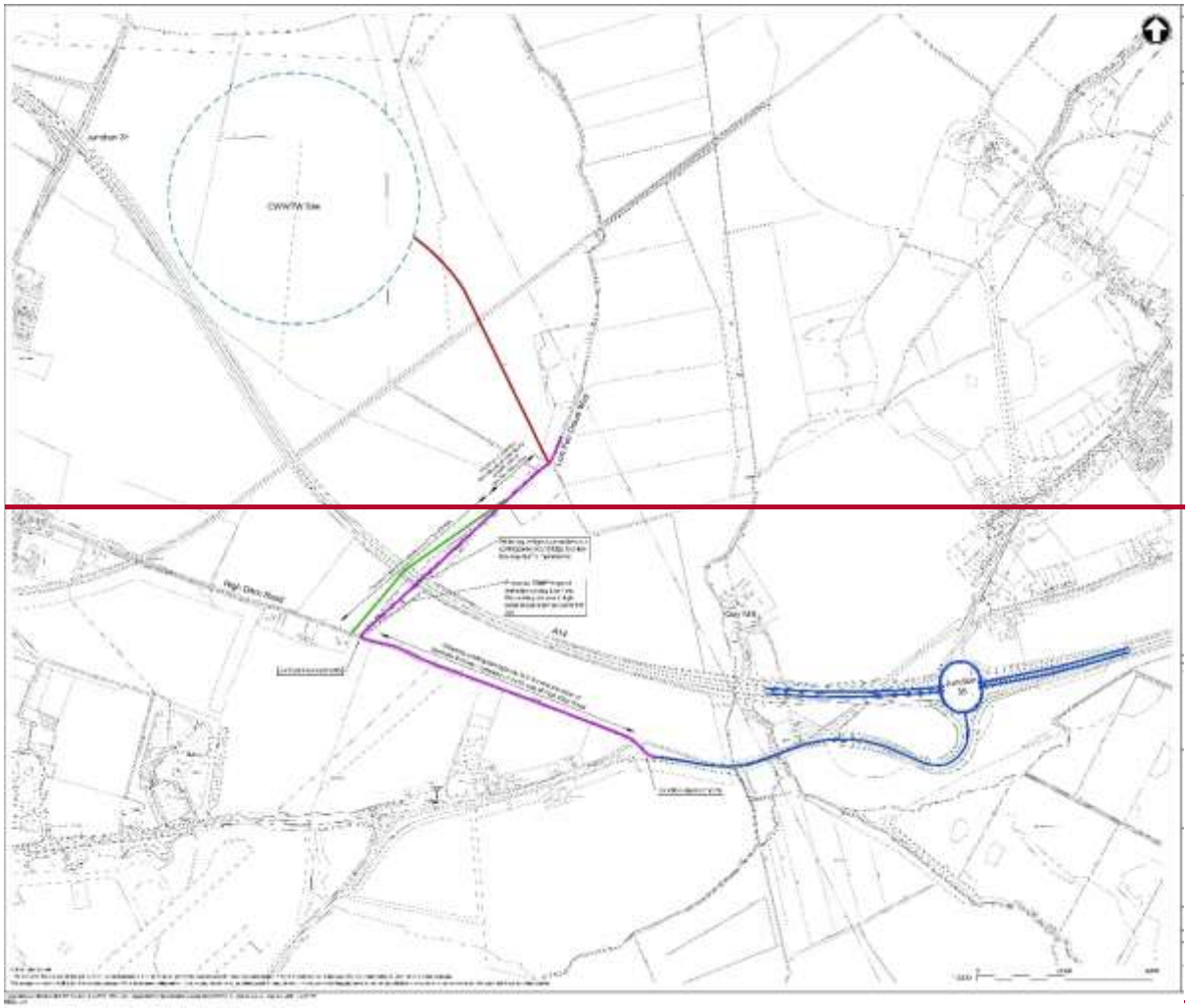
~~Figure 6.1: Option 1A~~

6.1.5 Sub option 1B, shown in Figure 6.2, would involve reconfiguring the existing junction between the A14 east bound exit slip and Horningsea Road into a 4-arm signalised junction, also connecting to a new road to the facility.



~~**Figure 6.2: Option 1B**~~

6.1.6 Option 2, shown in Figure 6.3, would utilise junction 35 south off the A14 and the existing highway network of Newmarket Road, High Ditch Road and Low Fen Drove Way. This would involve significant works to improve the existing highway network to mitigate the impacts of HGV traffic movements along the proposed routes. This would include junction improvements between Newmarket Road and High Ditch Road, the widening of High Ditch Road, the provision of a separate footway and cycleway, and improvements to the existing bridge on Low Fen Drove Way as it crosses over the A14.



~~Figure 6.3: Option 2~~

6.1.7 Option 3, shown in Figure 6.4, would involve constructing a new junction on the north side of the A14 only, between the current junctions 34 and 35. A new road would be constructed from this junction to the facility.

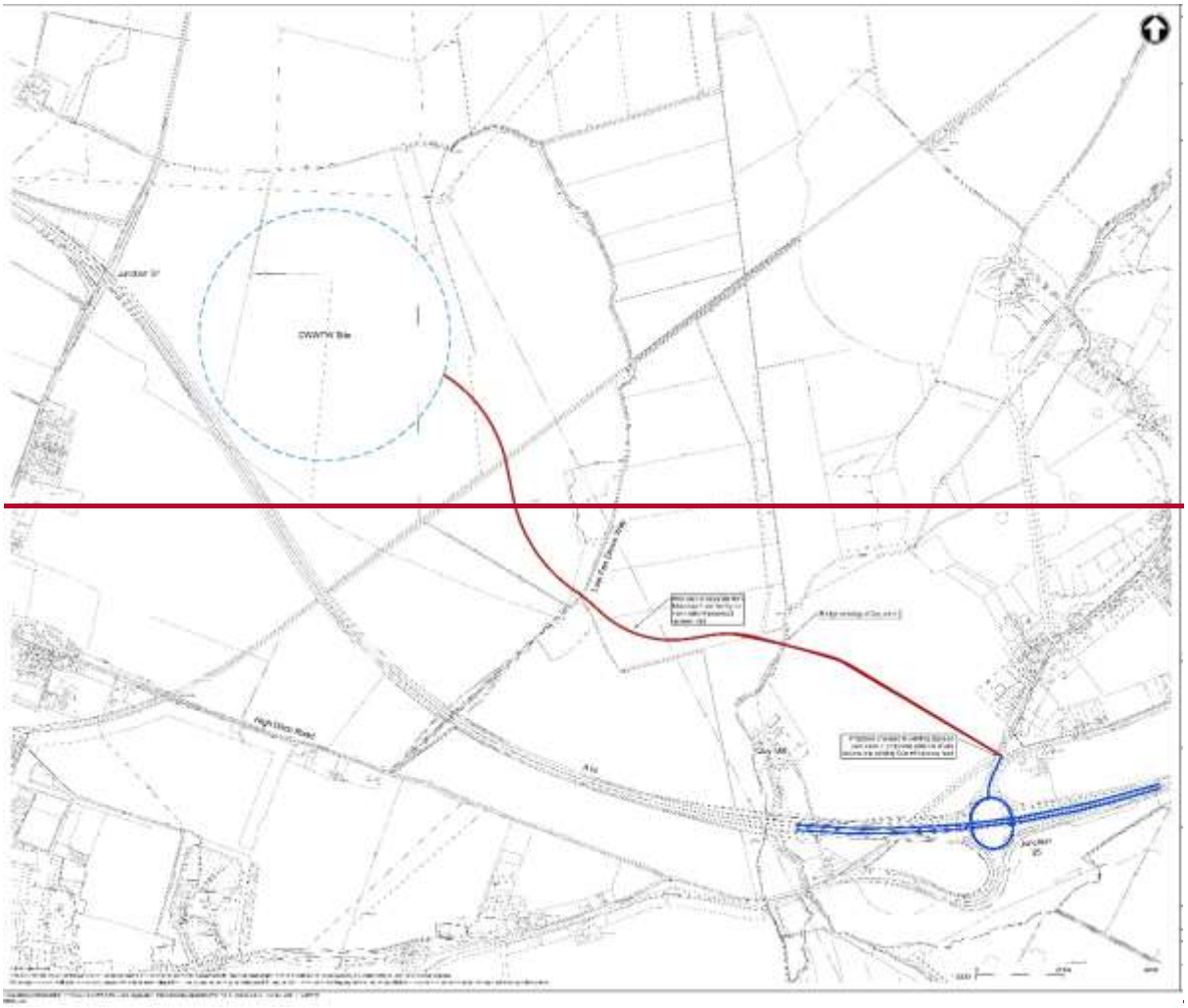


Figure 6.1: Option 1A

Figure 6.2: Option 1B

Figure 6.3: Option 2

Figure 6.4: Option 3

6.1.8 At the second stage of consultation, National Highways and Cambridgeshire County Council confirmed that allowing access directly from the A14 would be contrary to Department for Transport policy, stating that Option 3 would only be acceptable where there were no viable alternatives and a need for a new junction off the Strategic Road network could be evidenced.

6.1.9 The Applicant carried out a traffic assessment and undertook a detailed, wider appraisal, assessing the 3 options against criteria including:

- impacts on the strategic network;
- safety of the strategic network;
- impacts on local road network (traffic capacity);
- local road safety;
- local amenity;
- cost;
- programme;
- impacts on public rights of way;
- land take;
- land ownership;
- operational carbon;
- construction carbon; and
- visual impact and green belt.

6.1.10 Option 1 generally out-performed options 2 and 3, providing a lower cost option which was quicker to deliver while reducing land take and minimising impacts on visual amenity and green belt. All three options were capable of being delivered without adversely affecting road safety or the capacity of the strategic road network.

6.1.11 While Option 3 performed best in respect of impacts on the local road network and local amenity it was considered that these matters could be appropriately managed through a construction traffic management scheme.

6.1.12 The wider appraisal therefore concluded that a viable alternative to option 3 was available in the form of option 1 and it was not possible to evidence a need for a new junction off the A14.

6.1.13 Following the Phase Three Consultation, the Applicant selected Option 1B as the best performing option for providing access off Junction 34. This solution, shown in Figure 6.5, was favoured because it would limit construction and operational traffic movements, which would not travel northwards on Horningsea Road from junction 34 with traffic accessing the site from the A14 proceeding straight across Horningsea Road under signal control. Furthermore, Low Fen Drove Way would not need to be

crossed by construction traffic, avoiding impacts on ecology and recreational users of the byway.

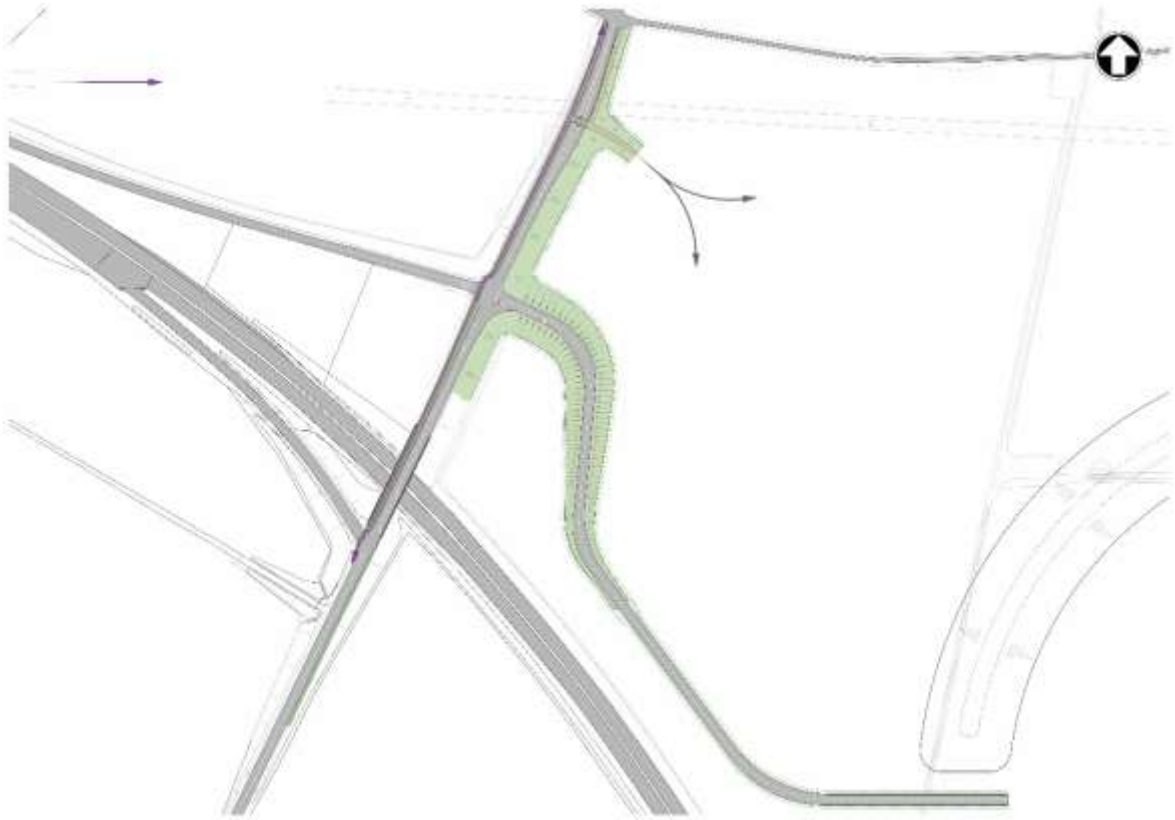


Figure 6.5: Selected option – Option 1B

7 Landscape Evolution, Building Heights and Finishes

7.1.1 Following the second stage of consultation, the landscape design, building heights and building finishes were evolved further to minimise potential landscape and visual impacts. The following alternatives were considered by the Applicant.

7.2 Earth Bank Height

7.2.1 At the second stage of public consultation the circular earth bank's height was not defined, with the "rotunda" design discussed at Section 3 above being described as a "high" earth bank.

7.2.2 Following the consultation round, further design work took place in respect of the volume of soil required to create the earth bank and the relationship between the bank and the height of the buildings forming the proposed WWTP.

7.2.3 The purpose of the earth bank is to provide an immediate screen to the operational activities of the proposed WWTP and the lower parts of the structures in the early years whilst the planting scheme matures.

7.2.4 Alternative heights for the earth bank were considered with the aim of finding the right balance between the height and mass of the earth bank and its screening function. The higher the earth bank, the more it will screen but the greater the impact the earthwork itself will have on the landscape and historic environment.

7.2.5 Consideration was given to the amount of soil required to construct the bank and to the relationship between the bank and the structures within the proposed WWTP.

7.2.6 The CWWTPRP team concluded that a 5m high earth bank would screen the majority of the structures of the proposed WWTP, with only the taller elements (including the digesters at 20m high, gas holder at 16m high and boiler stack at 24m high) visible above the earth bank. The lowering of the ground level inside the earth bank by 1m would allow a 5m earth bank to be the equivalent of a 6m screening barrier.

7.2.7 Planting (comprising trees and hedgerows) on the earth bank was proposed to further screen the proposed WWTP. The planting combined with the 5m high earth bank will provide screening at 10 to 13m high above ground level, at which level most of the proposed WWTP infrastructure will no longer be visible.

7.2.8 An increased bank height above 5m was considered. However, the volume of soil required to create the earth bank increases substantially with height. The excavation of the WWTP development described in Chapter 2: Project Description (App Doc Ref 5.2.2) would produce approximately 264,000m^3 of spoil, which would supply all the required material for a 5m bank. Exports of material from the site would be avoided. However, a bund of 7m high would require a further 264,000m^3 of soils. These would need to be transported to the proposed WWTP, resulting in an approximately 52,800 lorry movements, increased carbon emissions and an additional cost of around £7.4

million, as all the material would be imported from outside the site. The construction programme could be increased and there would be substantial traffic impacts for local residents.

7.2.9 Furthermore, it was concluded by the CWWTPRP team, drawing upon professional advice, that increasing the height of the earth bank by 2m would substantially increase its presence in the landscape and enlarge the area from where it would appear above the skyline. A 7m high earth bank would be more prominent in close views than a 5m high earth bank but would not have a noticeably greater screening effect when viewed from more distant locations because the tallest elements on the proposed WWTP would remain visible above the earth bank.

7.2.10 Taken with the reduction in building height achieved as the CWWTPRP design has evolved it was concluded that the 5m high bank represented an optimum height, providing effective visual screening minimise the landscape and visual impact of the proposed WWTP, by screening the majority of the structures within the proposed WWTP while being integrated into its landscape setting without excessive cost or import of additional material. A taller bank would screen slightly more of the infrastructure within the proposed WWTP, however it would also increase adverse environmental impacts (particularly in association with additional construction traffic movements, a greater carbon demand associated with transportation and construction and resource use) and would be harder to successfully integrate into the landscape due to its greater mass and footprint.

7.3 Material and Finishes

7.3.1 The design of materials and finishes has developed through consultation feedback.

7.3.2 At Phase Two Consultation, two alternative approaches were considered and consulted on.

7.3.3 Option 1 proposed an engineered screen with coloured expression of visible taller structures to make a visual statement. An example of this approach is shown in Figure 7.1.

Figure 7.1: Option 1 – visual statement

7.3.4 Option 2 proposed a natural planted screen with muted coloured structures that would blend in with either the groundscape at low level or the sky at high level. An example of this approach is shown in Figure 7.2: Option 2 – natural

Figure 7.2: Option 2 – natural

7.3.5 Consultation responses overwhelmingly preferred Option 2, with the engineered screen and colour palette of Option 1 felt to be an alien intrusion in the landscape. Consultees preferred the planted screen and more muted, natural colours over the brighter palette.

7.3.6 The Applicant responded to these consultation responses, and other factors, including cost, by adopting a palette and selection of materials established in

reference to the surrounding landscape. This is discussed further in the Design and Access Statement (App Doc Ref 7.6).

References

DLUHC & MHCLG. (2021, February 18). *Oxford-Cambridge Arc.* Retrieved from HM Government: https://www.gov.uk/government/publications/oxford-cambridge-arc

Get in touch

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