G. Programme assessment

G.1 Assessment methodology

G.1.1 This assessment considered whether there are significant programme risks associated with implementing any of the options either pre-construction or during construction.

G.1.2 As the project is funded by the UK Government (through Homes England) the project is controlled by strict governance including a programme for the completion of the project, which contains fixed milestones for the start/completion of defined stages. Therefore, an assessment of the risks of not achieving the defined programme is important to identify if any of the proposed options would be not be possible to complete in the required timescales.

G.1.3 This criterion will consider the potential impacts and constraints that have been identified in the assessment of the operational, environmental and planning criteria and what impact they could have on the programme. The main three areas of programme risk that were considered in this assessment are as follows.

- Constraints or activities that could delay the submission of the DCO application or gaining DCO approval
- Constraints or activities that could extend or delay the start of construction on site
- Constraints or activities that could extend or delay the construction period.

G.1.4 In the unmitigated scenario, the identified risks will be considered without any measures to minimise the potential impact on the programme. The mitigated scenario will consider what measures could be put in place to minimise the programme risks and where, even with measures in place, residual risks of delay to the programme would remain.

G.1.5 In order to compare the various options with one another, the following RAG evaluation categories have been established for programme risks.

Table G.89: Programme risks – RAG definitions

Green	Amber	Red
Low risk of programme impact Likely to achieve all HIF milestones and the final HIF deadline for project completion	Moderate risk of programme impact Unlikely to achieve all HIF milestones but the final HIF deadline for project completion could be met	High risk of programme impact Unlikely to achieve all HIF milestones and the final HIF deadline for project completion might not be achieved

G.2 Assessment of unmitigated options

DCO submission and DCO approval

G.2.1 The risks of delay to the submission of the DCO application are considered to mainly relate to uncertainty in relation to the enhancement and mitigation measures required. Due to the fact that all three site areas are located within green belt and potentials impacts have been identified in relation to landscape character, visual amenity, the setting of heritage assets and biodiversity, there is a potential that statutory consultation could result in the need to develop extensive enhancement and mitigation proposals to ensure that the scheme would gain DCO approval.

G.2.2 The need to investigate and design extensive enhancement and mitigation plans following either of the two phases of statutory consultation would potentially have a major impact on the programme and cause a delay to the DCO application submission.

G.2.3 It is considered that this risk is highest in relation to site area 3 due to the contribution to Green Belt purposes of the existing site, the changes in landscape character of the area, impacts on heritage assets and disruption of Green Infrastructure plans for the area. This risk is also moderate for site area 1 due to its contribution to Green Belt and the potential changes to the landscape character of the area. Whereas, the contribution to Green Belt purposes and the character of site area 2 has already been eroded by the presence of the surrounding land uses and infrastructure and therefore a WWTP in this area may not be as problematic.

G.2.4 The promotion of site area 2 for an extension to the Cambridge science park presents a significant risk of delays in the submission of the DCO application and gaining DCO approval.

Start of construction

G.2.5 The programme allows for a six month period between the grant of the DCO and start of construction on site to discharge the requirements set by the Secretary of State. It is assumed in this programme risk assessment that the planned programme of statutory consultation and establishment of technical working groups with statutory consultees will result in well defined requirements following DCO approval, which can be satisfactorily discharged within the period prior to the start of construction. However, there are certain aspects of the scheme that present additional risks to the start on site, which area described below.

Archaeological potential

G.2.6 There is very high potential for archaeology relating to the Roman period within site area 3 and a high archaeological potential for Iron Age and Roman remains within site areas 1 and 2. If significant archaeology were to be discovered during the archaeological investigation then this could have a significant impact on the programme for all three sites whilst the finds are investigated. In addition, there are areas of high archaeological potential within the pipeline corridors for all of the options and therefore finds in these areas could also impact on the programme.

Presence of Great Crested Newts

G.2.7 GCNs have been recorded within site area 2 and within 250m of the Waterbeach pipeline corridors for site areas 1 and 2 and within 350m of the Waterbeach pipeline corridor for site area 3. If further surveys determine that populations of GCN are present and could be impacted by the scheme then it may be necessary to obtain a protected species licence from Natural England and develop a mitigation strategy to define how impact on GCN and their habitats will be avoided or minimised. If impacts cannot be avoided e.g. if GCN are located with the scheme

boundary then translocation and habitat creation will be necessary, which could have a significant impact on the programme of all three sites.

Connection with designated sites

G.2.8 Due to the hydrological connection between site area 3 and part of Stow Cum Quy Fen SSSI, it is possible that extensive and long term monitoring will be required to further investigate the hydrological regime and demonstrate the SSSI will not be affected by the new WWTP; this could potentially delay commencement of construction on the site.

G.2.9 There is also uncertainty in relation to dewatering at site area 1 and 2 and what impact this may have on the water supply to the Cottenham Moat CWS. This may require investigation to demonstrate that dewatering would not have a detrimental effect on the CWS and the population of Great Crested Newts it supports. This could potentially delay to commencement of construction on the site. However, the risk of an adverse impact is considered to be low.

Contamination risks

G.2.10 4.4.10 Ground investigation will determine the extent of any existing soil or groundwater contamination on WWTP sites or along tunnel/pipeline routes. Due to the location of site area 2 being in proximity to Milton Landfill there are potential risks to programme, if the ground investigation identifies that remediation or mitigation measures are required prior to construction of the new WWTP such as gas protection measures.

Railway crossings

G.2.11 All options will require waste water transfer infrastructure (tunnel or pipeline) to cross the Cambridge to Ely railway line that lies to the west of the River Cam and the Waterbeach pipeline option for site area 3 will also need to cross the railway to north-east of Waterbeach. There are stringent regulations in place to protect railways from being impacted by construction work and the process of agreeing such work can be protracted. Therefore, there is a risk that if any changes to the required crossing are necessary the process to agree these changes could cause a delay to the programme.

Enhancements and mitigation measures

G.2.12 As discussed above there is a potential risk of the need for additional enhancement and mitigation measures to be required at site area 3 and to a lesser extent site area 1. It is possible that statutory stakeholders could stipulate in the DCO discharge requirement that these measures must be put in place prior to the commencement of construction. Depending on the extent of these measures this could have a significant impact on the programme for starting construction on site.

Construction and commissioning

G.2.13 One of the main differentials between the delivery stage of the programmes for each site area option is the period of construction and commissioning for the waste water transfer infrastructure, which in an unmitigated scenario is mainly governed by the length of the waste water transfer tunnel and treated effluent transfer tunnel/pipeline associated with each of the site areas. An outline of construction and commissioning durations for the 3 site areas is detailed in Table G.90.

G.2.14 Although there are two route corridor options for the treated effluent transfer (A and B) at site areas 1 and 2, the differences in length or construction method (i - tunnel or ii - pipeline) of these options does not have a significant impact on the construction duration and therefore no

differentiation is presented between these options. However, the routes and methods for all of the waste water transfer infrastructure do vary in terms of potential risks that could impact on the programme, which are discussed later in this section.

Table G.90: Construction and commissioning duration

Option	Duration of construction and commissioning (months)	Variance to site area 3 (shortest duration site) in months
Site area 1 (Option A(i), A(ii), B(i) and B(ii)	43	2
Site area 2 (Option A(i), A(ii), B(i) and B(ii)	48	7
Site area 3 (Option A(i) and A(ii)	41	-

G.2.15 The table shows that the construction and commissioning duration for site area 2 options is considerably longer than for the other sites. In isolation the duration for site area 2 would be achievable within the overall agreed programme, although it could result in one or more of the interim milestones being missed. However, it does mean there would be limited flexibility in the event of delays due to other factors. The duration of construction and commissioning for site areas 1 and 3 are relatively similar and would allow some flexibility in the event of delays due to other factors.

G.2.16 As mentioned above there are potential risks in relation to the routes and method for the construction of the waste water transfer infrastructure that could have an impact on the programme, which are detailed in table. There are some differences in the construction of the Waterbeach waste water transfer in relation to each site. However, it is considered that this element of the scheme is not part of the critical path in the programme and therefore it is assumed that delays in its construction would not have a significant impact on the overall programme, as such the difference as not considered in this assessment.

Table G.91: Waste water transfer infrastructure programme risks

Site area	Option	Potential unmitigated risks
1 and 2	A	The waste water transfer tunnels to site area 1 and 2 and the shafts located at the sites are likely to penetrate the Lower Greensand aquifer. This present potential difficulties in relation to groundwater pressures and stability of the sand during construction of the shafts and tunnel, which could cause delays to construction. The likelihood of interaction with the aquifer is higher for site area 2 due to the longer length and route of the tunnel. Corridors for both the waste water transfer tunnel and treated effluent are relatively tightly constrained as they pass below the A14, the cycle bridge and between the Milton Landfill and Milton village, if unexpected contamination is discovered this could delay construction of the tunnel. If the treated effluent transfer is constructed as a pipeline there are a number of constraints along this route that could cause a delay to construction such as: Proximity to Milton Landfill and the A14, crossing of the A10 in close proximity to Milton, navigating through the commercial businesses on Cambridge Road and crossing the railway.
	B	Risks for waste water transfer tunnel are the same as option A. The route corridor for the treated effluent transfer is less constrained and therefore there is more opportunity to avoid sensitive receptors if a pipeline method was chosen, such as the Milton cemetery and Rectory Farm reservoir. However, this route would still require crossing of the A10 and the railway.
3	A	Route for waste water transfer tunnel passes below the railway, River Cam and the A14. However, the tunnel is the shortest of the three sites and the risk of unexpected contamination is very low therefore risks are considered to be lower than sites area 1 and 2. Route for treated effluent transfer is short and only crosses one minor road, it is considered that this does not pose a significant risk of delay to the programme whether constructed as a tunnel or pipeline.

G.2.17 In addition to the constraints discussed above any unplanned changes to working practices during the construction period, that have not been included in the DCO, such as increases in noise levels, night working or construction traffic access, will require subsequent application to the relevant local planning authority. This is a potential risk to the programme for all sites. However, there is potentially a greater risk at site areas 1 and 2 where there are more sensitive receptors within proximity to the sites.

G.2.18 Using the risks outlined above and the RAG categories provided in Section G.1 each site options have been evaluated to define the programme risks in an unmitigated scenario, the results of the evaluation are provided in Table G.92.

Table G.92: Unmitigated programme risk RAG results

Option	Unmitigated Programme risk RAG	Justification
Site area 1 (Option A(i) and A(ii)	Amber	Moderate risk of delay in DCO submission in relation to potential need to develop additional environmental enhancement and mitigation measures. The risks of archaeological finds across the scheme area, the potential for GCNs within the pipeline corridors and constraints associated with the treated effluent corridor present a moderate risk of delay to the start of construction. Potential for additional enhancement and mitigation measures and the potential need to deliver them prior to starting on site presents a moderate risk of delay to the start of construction Shorter length of waste water transfer tunnel allows some flexibility in construction programme in case of other delays. Combination of risks result in a moderate risk of impact on the programme
Site area 1 (Option B(i) and B(ii)	Amber	As above, with the exception that there are less constraints along the treated effluent corridor. However, this does not change the overall risk to the programme.
Site area 2 (Option A(i) and A(ii)	Red	The promotion of site area 2 for an extension to the Cambridge science park presents a significant risk of delays in the submission of the DCO application and gaining DCO approval. The risks of archaeological finds across the scheme area and potential presence of GCNs within the site area, constraints associated with the treated effluent transfer corridor and the potential for contaminated land associated with the landfill adjacent to the site area presents a high risk of delay to the start of construction. Construction duration for long waste water transfer tunnel limits the flexibility in case of other delays. Risks in relation to interaction with the Lower Greensand aquifer and other constraints associated with the waste water transfer tunnel route present a moderate risk of delays to the construction programme. Combination of risks result in a high risk of impact to the programme
Site area 2 (Option B(i) and B(ii)	Red	As above, with the exception that there are less constraints along the treated effluent corridor. However, this does not change the overall risk to the programme
Site area 3 (Option A(i) and A(ii)	Red	High risk of delay in DCO submission in relation to potential need to develop extensive environmental enhancement and mitigation measures. The risks of archaeological finds across the scheme area and the potential for GCNs within the scheme area present a moderate risk of delay to the start of construction. Potential need for surveys and monitoring due to connection between drainage network at site area 3 and Stow Cum Quy Fen SSSI present a moderate risk of delay to the start of construction Potential for extensive enhancement and mitigation measures and the potential need to deliver them prior to starting on site presents a moderate risk of extending the construction programme Shortest duration of construction of the three site areas could allow some flexibility in case of other delays. Combination of risks result in a high risk of impact on the programme

G.3 Assessment of mitigated options

DCO submissions and DCO approval

G.3.1 With mitigation in place there is still a residual risks of delay to the submission of the DCO application in relation to the potential need additional enhancement and mitigation measures required for site area 3 and to a lesser extent site area 1. This is due to residual risks associated with landscape and visual impacts, setting of heritage assets and the contribution of these areas to Green Belt purposes.

G.3.2 The promotion of site area 2 for an extension to the Cambridge science park presents a significant risk of delays in the submission of the DCO application and gaining DCO approval.

G.3.3 The highways improvements required for construction and operational access to site area 3 present a potential risk to the submission of the DCO application and the discharge of requirements following DCO approval. The proposed improvements for operational access are extensive and require revision of existing Traffic Regulation Orders on local highways and changes to an asset that could impact on the strategic highways network (bridge over the A14). In addition, a different access route is proposed during construction to allow for the operational access improvements to be completed in conjunction with the WWTP and associated infrastructure. These proposals will require agreement with both the local highways authority and Highways England, who have both expressed concerns in their responses to consultation. Therefore, it is considered that there is a risk that these authorities could stipulate certain requirements that would be difficult to discharge within the programmed six month period between DCO approval and start of construction.

Start of construction

G.3.4 As discussed above, the programme allows for a six month period between the grant of the DCO and start of construction on site to discharge the requirements set by the Secretary of State. However, even with mitigation measures in place there are certain aspects of the scheme that present additional risks to the start on site, which are described below.

Archaeological potential

G.3.5 Archaeological investigation (including geophysical survey and trial trenching) may identify areas of greater archaeological potential within the site areas and infrastructure corridors, which 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 such there remains a risk of unexpected finds during construction for all of the site area options.

G.3.6 There is also a specific concern around the location of Fleam Dyke in relation to the highway's improvements required on High Ditch Road for site area 3 and the extent of archaeological investigation that may be required to ensure the highways improvement do not impact on the Dyke.

Presence of Great Crested Newts

G.3.7 The principal measure for mitigating the risk of impact on GCN is avoiding the loss of suitable waterbodies and terrestrial habitat. The nature conservation assessment has indicated that all of the scheme areas contain areas of habitat suitable for GCN and the presence of GCN have

been recorded within site area 2[76], within 250m of the Waterbeach pipeline corridors for site areas 1 and 2 and within 350m of the Waterbeach pipeline corridor for site area 3.

G.3.8 It is considered that it will not be possible to completely avoid loss of habitat in any of the options. Therefore, there is risk that habitat creation and translocation may be required for all options, which would need to be completed prior to commencing construction in the areas of habitat loss. As construction of the Waterbeach waste water transfer pipeline is not considered to be a critical path item in the programme, it is likely that mitigation required within the corridors would not impact on the overall programme. However, there is potentially a higher risk of habitat loss within site area 2 and if mitigation is required within the site area then this could delay the start of construction on site, which could have a significant impact on the overall programme.

Connection with designated sites

G.3.9 Due to the hydrological connection between site area 3 and part of Stow Cum Quy Fen SSSI, it is possible that extensive and long term monitoring will be required to further investigate the hydrological regime and demonstrate the SSSI will not be affected by the new WWTP; this could potentially delay commencement of construction on the site.

G.3.10 There is also uncertainty in relation to dewatering at site area 1 and 2 and what impact this may have on the water supply to the Cottenham Moat CWS. This may require investigation to demonstrate that dewatering would not have a detrimental effect on the CWS and the population of Great Crested Newts it supports. This could potentially delay commencement of construction on the site. However, the risk of an adverse impact is considered to be low.

Contamination risks

G.3.11 Due to the location of site area 2 being in proximity to Milton Landfill, there are potential risks to programme, if the ground investigation identifies that remediation or mitigation measures are required prior to construction of the new WWTP such as gas protection measures. Completing the ground investigation within the site area as soon as possible after site selection would allow time to adjust the scheme design accordingly to minimise the potential risks and to establish a plan for any remediation and/or mitigation measures required.

Railway crossings

G.3.12 As discussed in Appendix G.2. all options will require crossing of the Cambridge to Ely railway line and there are stringent regulations in place to protect railways from being impacted by construction work and the process of agreeing such work can be protracted. Early engagement with Network Rail and establishing a Construct Management Plan for the infrastructure crossing the railway as soon as possible should mitigate the risk to programme.

Enhancements and mitigation measures

G.3.13 As discussed above there is a potential risk of the need for additional enhancement and mitigation measures to be required at site area 3 and to a lesser extent site area 1. It is possible that statutory stakeholders could stipulate in the DCO discharge requirements that these measures must be put in place prior to the commencement of construction. Depending on the extent of these measures this could have a significant impact on the programme for starting construction on site.

[76] Although as set out in section 4.2.27, the record does not appear to be linked to a waterbody or pond and, therefore, if further surveys do not identify presence of GCN, it will need to be discounted based on up to date survey data

Construction and commissioning

G.3.14 In the mitigated scenario the main difference in the delivery programmes for each site area option remains to be the period of construction and commissioning for the waste water transfer infrastructure, specifically the waste water transfer tunnel and treated effluent transfer tunnel/pipeline associated with each of the site areas. However, there is also some uncertainty around the WWTP design and how this could affect the construction programme.

G.3.15 The construction and commissioning duration for site area 2 options is considerably longer than for the other sites and lacks flexibility in the event of delays due to other factors. However, the risk of major design changes in relation to the WWTP are considered to be relatively low.

G.3.16 The duration of construction and commissioning for site areas 1 and 3 are shorter than for site area 2, are relatively similar to one another and would allow some flexibility in the event of delays due to other factors. However, the uncertainty around the enhancement and mitigation required could result in a longer construction period if extensive measures are necessary, for example if major earthworks are needed.

G.3.17 As discussed in Appendix G.2, there are potential risks in relation to the routes and method for the construction of the waste water transfer infrastructure that could have an impact on the programme. The residual risks in a mitigated scenario are detailed in Table G.93.

Table G.93: Waste water transfer infrastructure residual programme risks

Site area	Option	Potential mitigated risks
1 and 2	A	Extensive ground investigation will be carried out at the new WWTP site and within the corridors for the waste water transfer tunnels, which will define the interaction with the Lower Greensand aquifer and identify the presence of contamination. The results will be used to influence the route design and construction techniques to ensure that risks during construction are managed effectively. Therefore, it is considered that the interaction with the aquifer and unexpected contamination do not present a major risk to the programme with this mitigation in place. There are numerous constraints associated with the treated effluent transfer if it is constructed as a pipeline and there is limited opportunity for avoidance in route alignment due to the constrained corridor. Therefore, it is considered that constructing the transfer as a pipeline presents a higher risk of delay to the programme than if it were constructed as a tunnel.
	B	Risks for waste water transfer tunnel are the same as option A. The route corridor for the treated effluent transfer is less constrained and therefore there is more opportunity to avoid sensitive receptors if a pipeline method was chosen. Therefore, the risk of programme delay for this route are considered to be lower than for option A.
3	A	Route for waste water transfer tunnel passes below the railway, River Cam and the A14. However, the tunnel is the shortest of the three sites and the risk of unexpected contamination is very low therefore risks are considered to be lower than sites area 1 and 2. Route for treated effluent transfer is short and only crosses one minor road, it is considered that this does not pose a significant risk of delay to the programme whether constructed as a tunnel or pipeline.

G.3.18 Using the risks outlined above and the RAG categories provided in Appendix G.1 each site options have been evaluated to define the programme risks in an unmitigated scenario, the results of the evaluation are provided in Table G.94.

Table G.94: Mitigated programme risk RAG results

Option	Mitigated Programme risk RAG	Justification
Site area 1 (Option A(i) and A(ii)	Amber	Moderate risk of delay in DCO submission in relation to potential need to develop additional environmental enhancement and mitigation measures. The risks of archaeological finds across the scheme area present a moderate risk of delay to the start of construction. Potential for additional enhancement and mitigation measures and the potential need to deliver them prior to starting on site presents a moderate risk of delay to the start of construction. Shorter length of waste water transfer tunnel allows some flexibility in construction programme in case of other delays. Combination of risks result in a moderate risk of impact on the overall programme.
Site area 1 (Option B(i) and B(ii)	Amber	As above, with the exception that there are less constraints along the treated effluent corridor. However, this does not change the overall risk to the programme.
Site area 2 (Option A(i) and A(ii)	Red	The promotion of site area 2 for an extension to the Cambridge science park presents a significant risk of delays in the submission of the DCO application and gaining DCO approval. The risks of archaeological finds across the scheme area and potential presence of Great Crested Newts within the site area presents a moderate risk of delay to the start of construction. Construction duration for long waste water transfer tunnel limits the flexibility in case of other delays. Combination of risks result in a high risk of impact on the programme.
Site area 2 (Option B(i) and B(ii)	Red	As above, with the exception that there are less constraints along the treated effluent corridor. However, this does not change the overall risk to the programme.
Site area 3 (Option A(i) and A(ii)	Red	High risk of delay in DCO submission in relation to potential need to develop extensive environmental enhancement and mitigation measures. Potential need for surveys and monitoring due to connection between drainage network at site area 3 and Stow Cum Quy Fen SSSI present a moderate risk of delay to the start of construction Highways improvements required present a moderate risk of delay in gaining DCO approval and commencing construction on site. The risks of archaeological finds across the scheme area present a moderate risk of delay to the start of construction. Potential for extensive enhancement and mitigation measures and the potential need to deliver them prior to starting on site presents a moderate risk of extending the construction programme. Shortest duration of construction of the three site areas could allow some flexibility in case of other delays. Combination of risks result in a high risk of impact on the programme.