St Neots North Pedestrian/ Cycle River Crossing

Feasibility Study Report

May 2017
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St Neots North Pedestrian/Cycle River Crossing Feasibility Study Report

Cambridgeshire County Council

March 2017

This document has 61 pages including covers and appendices.

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Executive Summary

Skanska Infrastructure Services has been commissioned by Cambridgeshire County Council to investigate the feasibility and benefits of a potential new scheme in St Neots. The scheme would improve facilities for pedestrians and cyclists on the existing road bridge between Eaton Ford and St Neots and/or provide a new river crossing nearby for pedestrians and cyclists.

The provision of a new foot/cycle bridge over the River Great Ouse, north of the aforementioned road bridge, figured in the first version of the St Neots Market Town Strategy. It was removed from its 2008 revision in order to focus on delivering Willow Bridge, on the south side of St Neots, with the intention to reinstate it afterwards. It has since been included, in some form, in the St Neots Healthcheck report, in the St Neots Neighbourhood Plan. It is understood that it will be included in the new Transport Strategy, which has yet to be published.

The current brief does not include consideration of a new vehicular crossing of the river, modifications to the traffic routes in the town centre, or other measures to address traffic congestion in and around the town centre. These aspects have also been highlighted in documents mentioned in the preceding paragraph. However, the study and its findings should be considered alongside any other reports in determining a holistic way forward for the benefit of all users.

This feasibility study confirms that the existing provisions for pedestrians and cyclists fall short of published guidelines when considering the number of users. In addition, the layout at the east end of the bridge contributes to the potential for conflict between users. This supports the view that improvements are required.

Potential improvements were investigated according to the following hierarchy.

- Space reallocation on the existing carriageway;
- Space reallocation on the existing structure;
- Widening the existing structure; or
- Providing a new structure.

Options for reallocating space on the existing carriageway or on the existing bridge were investigated and found to be limited. Kerbs cannot be moved out as the deck structural concrete rises behind them. This prevents the addition of on-road cycle lanes, as these would be too narrow and would therefore be less safe than the current situation.

The carriageway could be narrowed by moving kerbs towards the centreline such that a wider shared path is created. This could be done symmetrically, widening both paths equally, or asymmetrically, widening one path more than the other. The constrained layout at the east end of the bridge would remain, however, as would the associated potential for conflict between the different types of users. The changes would also require the removal of the eastbound right hand turn filter lane. Whilst the changes would help improve safety on the bridge itself, they could actually make the situation worse at the east end.

An option for widening the existing structure by cantilevering a steel structure from either elevation was considered. In principle, this would be feasible; however, significant residual risks would be likely. One key risk is that it is possible that the new cantilevered structure would not be strong enough to support any vehicles erring from the carriageway through the existing sub-standard parapets. Whilst there is no documented evidence of such an incident occurring, if it did happen, it is likely that the cantilevered structure would collapse. The widening option would also come at considerable cost (£2 - £2.5m) and disruption. Whilst it would alleviate some of the potential for conflict at the east end of the structure, cyclists would still have to venture onto the busy High Street eastwards. The widening option was therefore dismissed.

The provision of a new bridge was investigated at three different locations, each one making use of an identified gap of suitable width within the built environment along the east side of the River Gt Ouse. These locations are as follows:

- Regatta Meadow to St Anselm Place, north of St Neots Rowing Club;
- Regatta Meadow to Priory Lane, south of the Priory Centre; and
- Riverside Park car park to Market Place, south of the existing road bridge.
Each location was considered against existing site constraints and compared on the basis of cost, potential project risks, and benefits to users. A number of types of structural options was considered for each location.

The study concludes that a new foot/cycle bridge should be provided to join Regatta Meadow to St Anselm Place (referred to as Location 1 in the report). This location would serve residents of Eaton Ford wanting to access the town centre well. In addition, it would provide improve links to recent cycling improvements provided between the town centre and Longsands Academy or the Railway Station. It would also provide a quieter link between the section of the Ouse Valley Way in Riverside Park south of the existing bridge and its continuance north of the town centre. It would therefore have the greatest potential for attracting new users and encouraging modal shift.

Furthermore, the study identifies that a landmark structure could be constructed at this location for a small premium compared to the cost of a more standard form of structure. Such a structure would create a sense of place and a stronger identity, which could, in itself, attract additional patronage.

A cable stayed bridge with a single tower along the west bank of the river, spanning 60m in each direction, over the river and over Regatta Meadow, is proposed as a suitable preferred option. This would minimise the impact on the functional flood plain by minimising the number of piers to be constructed in the meadow. It would enable a slender deck to be constructed, and the form would complement and enhance the sensitive setting rather than detract from it. The bridge would accommodate a 4.0m wide shared use path.

Construction of the new structure is estimated at between £3.5 and £4 million, with a further allowance of £0.5m for risks. The structure would take approximately 32 weeks to build. With this form of construction, lifting the deck structure in segments rather than as a whole length could be possible. The segments could be tied to the stay cables in a balanced arrangement around the tower, avoiding the need for a large crane to lift the long span over the river or the need for constructing temporary piers in the watercourse.

The choice of the preferred option is based partly on the idea that the location in question will facilitate travel to other destinations within St Neots whilst still being convenient enough to reach the town centre. This needs to be confirmed through a review of trip generators and origin-destination surveys of residents and users of the existing bridge, followed by a more formal usage assessment for the locations discussed. Once this is completed, the conclusions of the report should be reviewed and revised to take into consideration the findings of the assessment.
1.0 Introduction

The St Neots area has undergone significant growth in recent years, resulting in an increase in traffic and in the number of pedestrians and cyclists using the existing bridge between Eaton Ford and St Neots town centre. This has led to safety concerns by members of the public due to the narrow width of the footways on St Neots Road Bridge.

A new bridge for pedestrians and cyclists, north of the aforementioned road bridge, was proposed in the past to address some of these concerns, and was included in St Neots’ first Market Town Strategy. The bridge would provide a safer and quieter route, with potential to draw people out of their cars to either walk or cycle across the river. This scheme was left out of the 2008 version of the Market Town Strategy in order that the limited funding available could be allocated to delivering a southern crossing, Willow Bridge. However, the intention was that it would be reintroduced once the above had been constructed.

Proposals for a new pedestrian / cycle bridge were reintroduced in the St Neots Healthcheck (2009), alongside consideration of possible widening of the existing bridge to improve provisions for non-motorised users, and consideration of a new northern bypass or, at least, a new road bridge to alleviate congestion on the High Street. Whilst it does not explicitly mention a new such bridge, the St Neots Neighbourhood Plan (2014) highlights the need to improve sustainable travel links around St Neots. It is understood that an updated transport strategy will reiterate this.

Further to discussions between St Neots Town Council and Cambridgeshire County Council (CCC), CCC commissioned Skanska Infrastructure Services to investigate the feasibility and benefits of delivering the above improvements or new provisions for pedestrians and cyclists.

The feasibility study considers the existing conditions with a view to determining whether minor improvements, which would be more economical, quicker to deliver and less disruptive, could be suitable to address the issues highlighted. The potential for widening the existing road bridge is also investigated.

The report then considers the provision of a new structure in order to accommodate pedestrians and cyclists by providing them with a new off-route alternative. In order to do this, existing and potential constraints, for example, ecology, environmental and flooding issues, land availability, ground conditions, the existing built environment, etc, are investigated. A number of potentially suitable locations are investigated, each with different structural option considered. These are then compared in relation to the aforementioned constraints.

The study concludes with a discussion of the implications of a new foot/cycle bridge and a preferred option for it in terms of potential location, form, costs and risks for its construction. Recommendations are made on the early actions required to take the related construction project forward.

Figure 1.1 – View from St Neots River Bridge overlooking river towards north
2.0 Existing Provisions and the Need for a Scheme

2.1 The Site

The site under consideration is centred on the area around St Neots Road Bridge, located at OS Grid Reference TL 180 602. St Neots Road, the B1428, becomes the High Street east of the River Great Ouse.

North of St Neots Road, the Riverside Park (also known as Regatta Meadow in this area) forms a flat open flood plain on the west side of the River Great Ouse, with several footpaths leading to a residential area of Eaton Ford beyond the B1048 Crosshall Road. The Town Centre occupies the east side of the river and consists mainly of low-rise commercial and residential buildings, with some community facilities (eg The Priory Centre, St Neots Town Council and the library) a bit further north along the river. St Neots Rowing Club, St Neots Tennis Club and the marina are to the north of these, beyond which the east bank of the river turns to meadowlands and open grassland.

There are boat moorings that extend along the majority of the east riverbank of the existing site, with some landing stages on the west side of the river on Regatta Meadow. This area is also used annually for the St Neots Regatta as well as the Summer Festival and Dragon Boat Race.

South of St Neots Road, the Riverside Park extends along the west side of the river, where a café and car park are also located. The Town Centre continues on the south side of the High Street on the east side of the river, with the Market Square, a key element of the centre, at its heart. The east bank along this section comprises a tall wall and is generally built onto, except for a short section leading to the Market Square and a small memorial garden, Jubilee Garden, immediately adjacent the existing road bridge.

The River Great Ouse is approximately 46m under the existing road bridge and opens up to approximately 60m width north of this.
2.2 Existing Provisions

Currently, non-motorised users (pedestrians, cyclists and users with pushchairs, wheelchairs or mobility scooters, etc) use St Neots Road Bridge (also known as St Neots River Bridge or the Town Bridge) to reach the High Street in St Neots town centre from the Eatons. Cyclists ride on the carriageway, where cycle symbols are painted on the nearside of the carriageway. Others use the footway. However, the current provisions for these users on the bridge are inadequate compared to current standards and in relation to current demand.

The existing road bridge, built in the 1960s, has a carriageway of 7.315m (24 feet) wide with raised footways 1.83m (6 feet) wide on both sides. The paved carriageway width is sufficient for two standard-width vehicular traffic lanes, 3.65m each, complying with the current TD 27/05 for an urban connector road. However, the footways are narrower than required by modern codes of practice such as TA 90/05. This would require a minimum of 2m width for an unbounded footway (ie without vertical obstructions such as walls or parapets); however, 1.8m width has been used traditionally and is generally sufficient for pedestrians only. For an unbounded cycleway, TA90/05 would require an acceptable minimum width of 2.0m but a preferred width of 3.0m. The code notes that shared use facilities have operated satisfactorily down to a similar minimum width but the preference is to provide at least 3.0m.

For bounded routes, additional width is needed to allow for ‘kerb shyness’ (where users tend to not use the space immediately adjacent the boundary), which reduces the effective width of the route. This further highlights the limitations posed by the existing provisions.

In addition, lighting columns are present on the bridge, locally restricting the available width further. These protrude approximately 150mm into the footway from the parapet face.

The layout at the ends of the bridge adds to the potential for conflict between users, particularly at the eastern end of the bridge, where a puffin crossing is present immediately adjacent the end of the bridge. This also coincides with the access to the Bridge House public house and hotel and the pedestrianised area in front of the Priory on the north side of the road.
On the south side of the bridge, the footway narrows where the aforementioned crossing joins, constrained by an existing building (currently an estate agent) and the posts holding the crossing signals themselves, before existing guardrails forces users to turn right and into the Market Place.

On the carriageway, the presence of a narrow right turn lane to the east of the crossing, leading from the bridge to the Market Place, may force vehicles continuing east onto the High Street to move closer to the kerb, which could pose a hazard to cyclists. Beyond this, loading bays and bus stop laybys line both sides of the road, further contributing to hazardous conditions for less confident cyclists, although the reduced 20mph speed limit along the High Street helps mitigate this.

At the west end of the bridge, conflict is reduced by red cycle lane markings on both sides of the carriageway that help guide cyclists onto the off-carriageway shared paths in advance of the Crosshall Road roundabout. Provisions for non-motorised users are better considered at this end.
2.3 Alternative Crossings

Apart from St Neots Road Bridge, there are currently 5 other crossings of the River Great Ouse that can be used by non-motorised users in or around St Neots. These are:

- A428 bridge
- Eaton Socon Lock footbridge
- Willow Bridge
- Coneygeare Footbridge
- Samuel Jones Catwalk

Of these, the A428 does not carry a footway or a cycleway so users would have to walk or cycle on the carriageway. The crossing at Eaton Socon Lock is narrow and not designed to cater for cyclists or large numbers or pedestrians. It was intended more as a way to gain access over the existing lock and sluice structure.

Willow Bridge was constructed in 2011 to improve provisions for pedestrians and cyclists on the south side of St Neots, between Eaton Socon and Eynesbury. It is located approximately halfway between the A428 and St Neots Road Bridge and serves a desire line for Ernulf Academy particularly well, given that Eaton Socon is within its catchment. It was a welcome improvement to non-motorised user provisions, and together with Coneygeare Bridge (see below), now forms part of the National Cycle Network. Unfortunately, it is too remote from the town centre to address the safety issues that the current scheme is seeking to address.
Samuel Jones Catwalk is located adjacent to the road bridge over the sluice gates near Paxton Mill. It is therefore also too far to address any of the safety concerns related to the use of St Neots Road Bridge by pedestrians and cyclists.

Coneygeare Footbridge is a relatively modern structure built in 2006 to replace an aging and deteriorating timber structure. It joins the southern end of the Riverside Park in Eaton Socon to Eynesbury. At 2.5m wide it meets the width requirements of the time although it does not provide any parapet shyness allowance, nor does it meet more recent cycling infrastructure design guidelines, which would generally require a minimum clear width of 3.5m. Saying that, its location means that, in some respect, it shares some of the patronage with Willow Bridge, mentioned above, particularly for users wishing to get from the north of Eaton Socon to the North of Eynesbury.

Unfortunately, the route from Eaton Socon to St Neots town centre using Coneygeare Footbridge requires a significant detour from the desire line, first to reach the bridge itself through the Riverside Park, then having to follow St Mary’s Street, which is itself busy and relatively narrow, to reach the town centre.
2.4 Usage Assessment and Potential Trip Generators

The existing bridge has high daily flows for its comparatively narrow space allocated to pedestrians and cyclists. On average, between 2010 and 2015, traffic data showed 1578 pedestrians and 407 cyclists crossing the bridge every day. The bridge carried approximately 12,700 vehicles per day over the same period, and previous studies have suggested that a significant number of these are for short journeys between wards or journeys taking place around school drop-off and pick-up times.

Whilst a specific usage assessment for a new crossing has not yet been conducted as part of this commission, the expected growth of St Neots would suggest that the number of non-motorised users will continue to increase. An assessment and the required associated surveys will be carried out as part of the preliminary activities of this project. Without pre-empting the findings and outcome of the above, an initial consideration of potential trip generators is made herein with a view to provide insight into the desire line(s) best served by any new crossing or to assess whether improved provisions at or alongside the existing road bridge would be preferable.

The figure below illustrates potential trip generators that could be served by improvements to the existing road bridge or by a new crossing. The other main river crossings are also shown.

![Figure 2.10 – Potential desire lines and trip generators](image)

St Neots town centre (1) is one of the key destinations for people from the residential areas of Eaton Ford and Eaton Socon. It has a variety of shops and businesses, restaurants, eateries, cafes, banks and churches, along with community facilities such as the library and the Priory Centre. The location of the existing road bridge suits this desire line well, although the safety concerns detailed earlier apply. This destination is not well served by the other two crossings (Willow Bridge and Coneygeare Bridge), which both represent a significantly longer route.
St Neots Station (2) currently accommodates large numbers of commuters to places such as London and therefore represents a second key destination. For residents of Eaton Socon, Willow Bridge and, to a certain extent, Coneygeare Footbridge, present a good alternative to the use of St Neots Road Bridge and the busy High Street. For residents of Eaton Ford and of the northernmost areas of Eaton Socon, this isn’t the case and the High Street represents the shortest route.

Apart from the town centre and market square itself, other key destinations include:

- the cinema and adjacent restaurants / cafes (3),
- Eat N Bowl ten pin bowling and kids soft play centre as well as Priory Hill Park (4),
- Longsands Academy secondary school and sixth form college (5), which includes Eaton Ford in its catchment area), and
- the Ouse Valley Way (6), which currently runs through the Riverside Park (7) before crossing St Neots Road Bridge and running along Islands Common and Lammas Meadow, on the east bank of the River Ouse.

The above list is not exhaustive and other trip purposes also apply. Furthermore, there will undoubtedly be residents of St Neots or Eynesbury North wishing to cross to Eaton Ford, possibly to use the Riverside Park, or to make use of other facilities or for leisure, for whom improvements to the existing road bridge or a new crossing would be beneficial.

Apart from the local trips described above, previous studies have suggested that a significant number of vehicles use the town centre and the existing road bridge as a through route to avoid congestion on the A428 south of St Neots. Proposals for improvements to the A428, if progressed, should help alleviate this.

2.5 Need for the Scheme

With the provisions on the existing St Neots Road Bridge being far from ideal and posing concerns in relation to the safety of users, an increase in patronage will exacerbate the issue. Alternative crossings require a significant diversion from the desire line and therefore people currently using the road bridge are unlikely to change their travel pattern on the basis of safety alone. There is therefore a clear need for a scheme to address this issue.

On this basis, a “Do-nothing” option is ruled out, supporting the conclusions and recommendations made in the documents and reports mentioned in Section 1. The remaining sections of this report consider options that address the safety concerns. These options can be split into two groups: options requiring a new structure or structural modifications to the existing bridge; and options that consider only space reallocation on the existing structure.
3.0 Constraints

There are number of constraints that need to be considered in order to determine potential locations and features for a new crossing or to evaluate the feasibility of improving the provisions for pedestrians and cyclists on the existing road bridge. This section of the report explores them and highlights where additional information is required at an early stage of the project to further inform the decision process.

3.1 The River Great Ouse

Given the proposed site and taking into account the river and existing road bridge, the following constraints apply:

- The width of the river dictates that the span will be around 60m for locations north of the existing road bridge
- South of the road bridge, the span would be around 35m.
- The west bank adjacent to the road bridge is covered with dense vegetation. The area also appears waterlogged between the existing trees. Elsewhere, the west bank is generally open and flat with cut grass and sparse mature trees. It is generally only approximately 300mm higher than the normal retained water level.
- River traffic at the proposed location imposes navigation requirements. Early discussions with the Environment Agency (EA) have established that headroom clearance of at least 3m will need to be provided. It is also presumed the soffit level could not be lower than that of the existing road bridge. As there are currently moorings and landing stages on both sides of the river, this headroom would likely apply throughout, unless the actual location chosen is such that taller boats cannot physically reach the banks (for example, due to shallower water). The provisions at the existing road bridge and other bridges upstream and downstream do not meet these requirements, so there may be some scope for relaxation to these, but this would need to be fully justified.
- The EA have expressed a preference for the river to be spanned openly, with no intermediate supports. Piers in the waterway could be acceptable, subject to additional flood modelling, although impact on the river users, especially during such events as the Regatta or the Dragon Boat Race, would need to be taken into consideration as well. In the temporary case during construction, supports in the river would be acceptable subject to details being approved by the EA.
- The Riverside Park, Regatta Meadow and Sudbury Meadow occupy the flood plain of the river, with Flood Zone 3 extending to the embankment of the B1048 Crosshall Road. Flood Zone 3 also extends to part of the park on St Anselm Place, north of the rowing club.

Figure 3.1 – Extract from Environment Agency Flood Map for Planning showing extent of Flood Zone 3 (dark blue)
To minimise the effect on flood storage and flow, the EA would prefer for any new structure that would be located in the functional flood plain to have open spans and for any solid elevation perpendicular to the direction of flow of the river to be minimised. Any loss of flood storage would need to be compensated on a volume and level basis. Because of the flat topography and extent of the flood plain, this could be a tricky undertaking.

- Existing access routes in Regatta Meadow and Riverside Park are level with the surrounding ground. This means that, if the river overflows, the access paths will also be flooded. Any new structure would then be inaccessible from the west unless the accesses are also raised. A decision would have to be made as to what flooding recurrence would be acceptable, beyond which the paths would be allowed to flood. In the recent past, the paths have generally been accessible for the large majority of the time and therefore perhaps the current condition can continue. If raised paths are required, these would need to permit the passage of flood water such that the floodplain is not sectioned. Equivalent balancing flood storage would also need to be found.

- The level difference between the west bank and the east bank is approximately 2m, the east bank being the higher of the two.

The area of interest for the proposed bridge also falls within a flood plain and passes over a main river. Hence, Environment Agency consent for the works will be required. The Environment Agency’s exact requirements are not clear at this stage, but it is thought likely that it will include requirements to mitigate any effects from a new bridge on river flow or flood storage. This is likely to result in any approach ramps having to be of an open construction.

The Environment Agency are responsible for navigation along this particular stretch of watercourse, which carries a lot of narrow boats and rowing boats and is within the racing stretch for most river events. Any works affecting navigation, either permanently or during construction, will require their consent and a Navigation Order. As such, it is thought that the soffit of the main span of any new bridge will not be permitted to be lower than the soffit of the adjacent road bridge. In addition, historic experience has suggested that any construction approach paths to the bridge may have restrictions in terms of materials and construction methods. Checks will need to be made to understand if any adjacent moorings will be affected by the new bridge during its construction.

3.2 Existing Built Environment

As the west side of the river is generally open, there is very little in the way of built obstructions to a new crossing or other improvements excepting the existing road bridge itself.

On the other hand, the east side of the river, where the town centre is located, is built up. Between Hen Brook and St Neots Marina, there are only a handful of gaps between existing buildings that would be suitable to accommodate a new crossing or its access. Most of the buildings are occupied or have plans for occupation, with some buildings being listed whilst others are relatively modern.

The river is generally walled on its east side, but little details are available with regards the walls or sections of walls. These generally appear to be of brick or masonry construction. If a new structure is built, it would be prudent to investigate the construction details of the walls before confirming the design. This would include non-destructive testing methods such as ground penetrating radar (GPR). However, it would probably also necessitate intrusive investigation and testing of the walls, including exploratory drilling/coring through the wall, dynamic probing and trial excavations to expose and visually inspect the back of the wall.
Figure 3.2 – Satellite image of St Neots highlighting the location of gaps in east bank built environment

Figure 3.3 – Position of gaps shown on images of east river bank

A length of floating moorings is present in front of the Priory Centre, extending south to connect to a hinged access ramp. The moorings themselves are unlikely to be affected, although if a new structure at this location is chosen as the preferred option, some modifications or the relocation of some moorings may be required.

If the preferred option requires construction to be carried out near to an existing building, precautions will be necessary to ensure there is no damage, whether in the short term or longer term, to the building in question or to its foundations. This may require carrying out condition surveys and monitoring during construction.
3.3 Land Ownership

Most of the land on the west side of the river is in public ownership, generally with Huntingdonshire District Council (HDC). Preliminary discussions with HDC’s Estates and Open Spaces department established that they are generally amenable to a new structure, subject to discussion and agreement with the relevant stakeholders.

Huntingdonshire District Council also owns a lot of the land and buildings on the west side of the river where access for a new structure is possible. Some of these are subject to long leases, for example to St Neots Town Council for their offices and the Priory Centre, and to St Neots Rowing Club for the clubhouse, hangar and slipway. Properties between the Priory Centre and the existing road bridge are generally in private ownership, except for a small access to the river, which is publically owned.

The owners of the Bridge Public House also own the narrow strip of land between the building and the existing bridge and the frontage to the river, which forms their garden. The property also includes the densely vegetated parcel across the river, immediately to the north of the road bridge. Whilst maintenance access to the road bridge would have been secured in deeds at the time of its construction, construction of a new structure alongside the bridge would most likely require purchase of additional land or rights, either via direct negotiation of via the compulsory purchase route. This structural option is detailed later in this report.

Private ownership extends on the west side of the river between the road bridge and Hen Brook, with the exception of the memorial garden immediately south of the road bridge.

3.4 Construction Access and Site Location

Potential construction access routes are shown indicatively on Figure 3.4 below. All access routes considered will require permission from the landowners.

Any access from the east side of the river will be restricted by the narrow streets leading up to the riverbank through the town centre. However, these roads are used regularly by heavy commercial vehicles making deliveries to the numerous nearby shops and therefore the difficulty isn’t unsurmountable. The narrow roads and many of the buildings would have been there when construction work would have taken place for the existing river bridge and for other modern buildings such as the Priory Centre or the River Terrace houses, which would tend to confirm the point.

Access to the west side of the river is generally more open and governed more by the stability and strength of the ground and water obstacles than by existing buildings or structures. If an option south of the existing bridge is preferred, access is likely to be required through the Riverside Park car park, which will require careful management.

Figure 3.4 – Potential access routes for location where suitable gaps exist in built environment
All existing approach paths on the west of the river are of unknown load carrying capability for construction vehicles, but they are all likely to be inadequate for the larger plant at the very least. Therefore, it is likely that a new access route would be required to enable construction of any new structure of the size envisaged.

3.5 Utilities

Enquiries have been made regarding the likely presence of utilities services in the vicinity of the site under consideration. Based on the information received from the relevant statutory undertakers, the following key constraints have been identified:

- British Telecoms and Virgin Media buried plant are present in both footways along the existing road bridge. These appear to run in ducts cast into the edge cantilever of the structure during construction and would need to be accommodated if the structure was to be strengthened or modified to accommodate improvements. Additionally, street lighting and the associated ductwork is present in the footways.

- A medium-pressure buried gas main runs west-east across Regatta Meadow from Crosshall Road south of Milton Avenue, then runs under the river to reach St Anselm Place / Tan Yard. It is likely that restrictions will be imposed on the proximity of any potential major works to the gas main, which could impact of the position of a new structure in this location. Diverting and relocating this apparatus, given it is crossing under the river, would appear, at this stage, a costly enterprise. However, this would have to be investigated further if a bridge at this location was to be investigated further.

- There are a number of utility services buried under Priory Lane and The Priory, as well as in the vicinity of the Priory Centre. Given the only available space for a new structure here appears to be just south of the Priory Centre, this would have to be investigated further if this option was to be progressed. However, preliminary information suggest that services would not obstruct a new structure.

- A surface water sewer drains into the river from the east bank at the west end of Market Place and River Terrace, conflicting with the only gap of suitable size to accommodate a new structure on the south side of the road bridge.

3.6 Ecology and Environment

An initial investigation using the Multi-Agency Geographic Information for the Countryside (MAGIC) search engine has identified that the area of interest for a proposed new bridge or for improvements to the existing road bridge is not within a zone of statutory designation. However, it falls within a SSSI Impact Risk Zone due to the proximity to St Neots Common Site of Special Scientific Interest (SSSI) (at the nearby Islands Common). Controls will need to be put in place during construction to prevent wastewater and air pollution affecting the latter.

A new structure would be classified as infrastructure development by Natural England; however since it will be dedicated for non-motorised traffic the lack of increased air pollution should not cause concern after the construction phase.

Wildlife that could potentially be affected includes nesting birds, bats, great crested newts, badgers, otters and water voles. An ecological survey will be necessary to confirm the likelihood or presence of these on site. Depending upon the findings, additional surveys or advance ecological activities may be required before construction could be allowed to begin.

Parks and open spaces and the close association with the river have been highlighted in the Neighbourhood Plan as two of the most important aspects of St Neots by its residents, and any proposal would have to take this into consideration. Dependent upon the location and option to be progressed, it is possible that there would be some impact upon mature trees and a nett loss of grassland on both sides of the river. The impact and any mitigation measures would be considered carefully and discussed with stakeholders before progressing the scheme much further, but at present it does not appear that there would be overly onerous requirements with regards ecology and environment that would prohibit the scheme.
3.7 Heritage and Conservation

As stated in the previous section, the site under consideration is within the St Neots Conservation Area. This poses particular requirements on the aesthetics of the structure, the impact on the surrounding area and surrounding buildings (in particular listed buildings or scheduled ancient monuments) as well as protecting all trees within the area.

In addition, a number of buildings on the east side of the river in the town centre area are Grade II listed, as shown on the figure below. Of particular interest is the Bridge House and the buildings south of the High Street between the Market Square and the River, including the Old Falcon Hotel, as these may be impacted by two of the proposals being considered.

Furthermore, the former maltings kiln and the site of the old priory are Scheduled Ancient Monuments. These wouldn’t be affected directly, but the impact upon their setting would need to be considered.
The St Neots Conservation Area Character Statement notes that the area is comprised of visually distinct buildings, each of different type, size and character. The heritage aspect of the town centre, by its own nature, therefore doesn’t actually constrain the type of structure as much as a more uniform environment would. Careful attention to the aesthetics of the structure such that it fits in well in its surroundings, and attention to details in order to provide a high quality structure that enhances the existing surroundings and the river setting rather than detracting from it, remains essential, as described in the following section.

3.8 Visual Impact

Riverside Park forms part of a green strip that runs through the centre of St Neots, giving a pleasant setting. At this stage, without public consultation or engagement with local stakeholders, it is not known whether a preference exists for a visually striking or low impact option. Hence, the options developed will provide a choice.

Regardless of overall visibility of the structure, one key concern will be to ensure that a new bridge fits aesthetically within the existing setting. The existing road bridge offers unobstructed views along the river, particularly to the north. These prominent views would be affected by a new structure. Furthermore, the open landscape to the west of the river will be sensitive to a new structure and its approaches as it will be visible from most areas in Regatta Meadow, from Crosshall Road and from the majority of residences fronting onto it.

To achieve a visually unobtrusive design the main goals would be to ensure that the height of the structure is minimised and the form of the structure is as slender as possible. An example of this could be a through-type structure that will minimise the overall depth of the bridge so it appears lighter when viewed in elevation. Other detailing aspects, such as providing edge cantilevers on the structure to cast a shadow on the elevation of the deck below the walking surface, can break up the depth of the structure visually making it appear more slender. Incorporating natural materials such as timber into elements of the structure, for example for decking, seating or parapets, would link the structure more sympathetically with the park environment. Alternatively, the use of materials such as weathering steel for the structure would give a muted colour and texture and tie the structure to the existing jubilee beacon nearby. Using brick or masonry facings on piers or supports may help link the structure to the nearby river wall or other existing buildings. If the structure is to be painted the use of sympathetic colours should be investigated carefully.

Similar principles still apply for the provision of a landmark structure, the colour, texture and materials are still required to be sympathetic to the surroundings. The aim of a landmark structure is to provide a sense of place within the context of its location. A cable-stayed or bowstring arch would provide a balance between height and proportion. A tall but slender structure draws the eye from its surrounding providing a signpost for the route without intruding excessively on existing views across the landscape or towards the historical town centre.

Figure 3.7 – View looking north from the existing road bridge
4.0 Design Criteria

4.1.1 Bridge Geometry

There are various geometrical requirements for foot/cycle bridges in current design standards:

- In terms of the required width, a number of published documents give recommendations. Amongst these are LTN 1/12\(^1\), LTN 2/08\(^2\), BD 29/04\(^3\), TA 90/05\(^4\), and more recently the draft version of the Sustrans Design Manual on Bridges and other structures\(^5\). Both the draft Sustrans Design Manual and LTN 1/12 are found to be more onerous than the requirements given in BD 29/04. LTN 1/12 states that the preferred minimum effective width for an unsegregated cycle track is 3.0m. Additional 500mm horizontal clearances to vertical features above 600mm high, such as parapets, are also required. This leads to an overall minimum clear width of 4.0m for an unsegregated foot/cycle path on the bridge. The Sustrans Design Manual gives a similar recommendation, particularly for main routes, although it does permit a relaxation to 3.5m for secondary routes or where 4m is not achievable. Segregation would increase the minimum width further.

- Generally, gradients on any footbridge ramp should be no steeper than 1 in 20. In addition, 2m long landings with a maximum rise of 2.5m between them shall be provided on any straight or spiral ramps. In some cases, it can be beneficial to relax the gradient to 1 in 21. The length of inclined ramp is increased but the omission of landings can make its overall length shorter and the line of the elevation can remain continuous rather than being broken by the landing.

- It is possible to increase the slope to a maximum of 1 in 12 (8%) if additional landings are introduced, in accordance with BD 29/04, as long as the rise between landings does not exceed 650mm. This is generally only done where space is limited and a longer ramp would not be feasible. The aforementioned Sustrans Design Manual recommends limiting the length where a gradient of up to 7% is used to a maximum of 30m.

- For spiral and curved ramps, the minimum inside radius of walkway, measured 900mm from the edge of the walkway surface on the inside of the curve, shall be 5.5m.

- In addition to the approach ramps, stairs need to be provided at convenient locations if the ramped access leads to a significant detour for pedestrians.

There are numerous options and associated design requirements for segregation, but they can be considered at a later stage in any design process. Thought also needs to be given as to how any new bridge could tie into existing or new paths at the bases of its approach ramps. Headroom clearance of at least 2.4m needs to be provided above these paths or above any ramp returning upon itself, so this is an important consideration.

4.1.2 Loading

Any new structure would be designed in accordance with the Structural Eurocodes (BS EN 1990 to BS EN 1997), including the loads stated therein. These include pedestrian crowd loading, wind loading (including flutter or vortex shedding) as well as the weight of the bridge elements themselves, as would be expected. The code also gives recommendations for loads that would apply during construction or maintenance, and loads representing vehicles using the bridge either for maintenance or as an act of trespass. The latter would be prevented by providing physical barriers at the base of the approach ramps.

Given its location, the bridge would not be designated as a bridleway and therefore, equestrian loading would not be considered.

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\(^1\) LTN 1/12 Shared Use Routes for Pedestrians and Cyclists, Local Transport Notes, Department for Transport
\(^2\) LTN 2/08 Cycle Infrastructure Design, Local Transport Notes, Department for Transport
\(^3\) BD 29/04 Design Criteria for Footbridges, Part 8, Section 2, Volume 2, Design Manual for Roads and Bridges, Department for Transport
\(^4\) TA 90/05 The Geometric Design of Pedestrian, Cycle and Equestrian Routes, Part 5, Section 3, Volume 6, Design Manual for Roads and Bridges, Department for Transport
\(^5\) Sustrans Design Manual, Chapter 8, Bridges and other structures, (draft) February 2015, Sustrans
4.1.3 Parapets

Parapets of 1.40m minimum height are required on a combined pedestrian and cycle bridge. If suitable separation is provided on a segregated structure, parapets on the pedestrian-only side could be reduced to 1.15m. In addition, where ramps are provided with a gradient of 1:20 or steeper, or where there are stairs, handrails will be required.

On light structures such as footbridges or cycle bridges, the parapets are one of the most visual aspects of the structure. Other recent structures over the River Gt Ouse in the area have simple railings and baluster parapets. If more architectural interest is desired, this can be provided easily by using bespoke designed parapets.

4.1.4 Lighting

The bridge would be located in an area where there is some public lighting already provided. There is some lighting around the Priory Centre and roadside lighting in the town centre. Elsewhere, there is lighting on the existing road bridge, along Crosshall Road as well as for properties and buildings adjacent the site on both sides of the river. Because of this, introducing new lighting on a new structure or on the approaches to this structure isn’t likely to be considered a significant nuisance to the public or to wildlife. However, the lighting needs to be appropriate to ensure the personal security of users without resulting in light pollution or disrupting fauna such as bats.

4.1.5 Foundations

There is currently only limited soils information and thus it is essential to commission a full ground investigation including boreholes. Given the proximity of the river and the very poor ground conditions encountered in the top strata during the construction of other nearby bridges, it is considered that the soil will be of very low strength. Hence, piled foundations are expected. From the borehole records for the river bridge, it appears there is a layer of stiff clay approximately 4.5m below ground level.

4.1.6 Materials

The use of materials with a design life of at least 120 years is required by design codes for the main load-bearing structure, unless the elements can be easily accessed and replaced. In general, concrete and steel are used for foot / cycle bridges. In this case, it is likely that steel would be the material of choice as it would likely result in a lighter structure, both visually and structurally. This would be easier to install and would blend in more easily in its surroundings. Concrete would likely result in a deeper structure that would not only have a more obtrusive appearance but would also be heavier to install, therefore requiring a larger crane to be able to lift it into position.

For the walking or riding surface, if a new structure is preferred, a proprietary resin-based combined waterproofing/anti-corrosion and anti-slip surface would be used. For improvements to the existing bridge, surfacing would match that used elsewhere on the structure.
4.1.7 Pedestrian Comfort

For a new structure that is light and slender, there is a tendency for pedestrians to induce a slight vibration in the structure, which can gradually invite users to walk in step, amplifying vibration to such a point that the structure can start resonating near its natural frequency. The phenomenon has been known for a long time but issues following the opening of the Millennium Bridge in London, which then had to be closed whilst dampers were retrofitted to the structure, led to much research being carried out on the subject. There are now detailed guidance and requirements in the recent structural Eurocodes to this effect and efforts would be made in the design of any new structure to attempt to modify the structure such that its natural frequency is outside of the critical range where this effect is known to occur.

The effect of wind can also be very important on a long and slender structure. Depending upon the final preferred option, wind testing could be required in order to ascertain whether wind loading and wind vibration is likely to be an issue. Given the extensiveness of the testing requirements, this would only be carried out once the design of the preferred structure is well under way.
5.0 **Scheme Options**

As described earlier, two groups of options are considered in this report to form a potential scheme. The first options, discussed in Section 5.1 below, investigate the potential for reallocating space on the cross-section of the existing bridge to make space for cyclists or to improve safety by some other means.

The other options investigate the potential for a new structure to be provided over the river in the vicinity. Four possible bridge locations have been considered, as shown on Figure 5.1 below and in Appendix C.

Options further to the south have not been investigated as they are considered too close to the nearby Coneygeare Footbridge, thus offering little time-saving to the user as an alternative route. Furthermore, there would be diminishing returns in providing a structure on the south side of Hen Brook as either a second structure would need to be provided to cross the latter or users would need to reach St Mary’s Street before coming back onto themselves to reach the town centre and market square area.

Options further to the north have not been investigated as they are considered too far from the user desire line.

The options considered are:
- **Location 1** – A new bridge landing in the field at the end of St Anselm Place, north of St Neots Rowing Club;
- **Location 2** – A new bridge landing to the south of the Priory Centre;
- **Location 3** – A new structure to be cantilevered from the north side of St Neots River Bridge; or
- **Location 4** – A new bridge to the south of the St Neots River Bridge landing in line with River Terrace/Market Place

Locations for a new structure are discussed in more detail in Section 5.2.

5.1 **Bridge Space Reallocation**

Whilst the footways on the existing bridge are already narrower than current standards would require, reallocating some of their width for designated cycling lanes would not be advisable. However, whilst the carriageway’s width complies with the current standard, narrower roads can still provide a reasonable level of service for the type of vehicular traffic experienced here. This section therefore explores the possibility of reducing the existing lanes to as little as 3.0m and reallocating some or all of the additional 1.315m of carriageway width to cyclists.
A number of potential options are possible, as shown diagrammatically on Figure 5.2. Options considered are listed below:

- Nearside cycle lanes 650mm wide on both sides of the carriageway
  - with line and colour delineation only (Figure 5.2b);
  - with low level kerb (e.g., Cambridge kerb) and colour delineation; or
  - with full height kerbing;
- Asymmetric widening of footways from 1.8m wide to 2.0m and 2.9m wide share used paths (Figure 5.2c);
- Widening both footways from 1.8m to 2.45m shared use paths (Figure 5.2d).

Due to the form of construction of the bridge structure, moving kerbs out or lowering the level of the footways is not considered reasonably practicable as the kerbs and the footway surface lie directly against the structural reinforced concrete. Any such modification would require costly and disruptive structural strengthening works and therefore are not considered.

Figure 5.2 – Existing layout (a) and potential bridge space reallocation layout (b to d)

**Cycle Lanes**

The use of 3.0m lanes is typical of rural roads in the county and does not lead to undue loss of level of service, even on roads used by HGVs or buses. Recent works to Hills Road in Cambridge have demonstrated that this is feasible. Furthermore, the use of low profile kerbs to delineate nearside cycle lanes rather than simply lane markings and contrasting surfacing has been well received at that location, reinforcing the message to drivers that the space is reserved for cyclists. This has generally been shown to discourage drivers from using the cycle lane, whereas vehicle incurrence into the space designated for cycling in cases where kerbs are not used frequently occur.

The difference between the aforementioned Hills Road scheme and the present is that the resulting cycle lanes are wider there than would be the case here, in line with recommended guidelines. Indeed, published guidance for cycle lane width generally requires at least 1.5m as a minimum, with 1.2m permitted where valuable over short stretches. Due to the width between existing kerbs, the width of cycle lanes would be limited to 650mm, as shown on Figure 5.2b. However, the width of bicycle handlebars and/or the space occupied by a rider on a bike is often wider than this. Therefore, whilst in principle segregated cycle lanes would be safer, in reality, the tight layout may be more hazardous for cyclists than the current conditions. Drivers may be led to assume there is sufficient space to overtake cyclists safely if marked lanes are present and may therefore be more inclined to make such a manoeuvre than if these were not present. With the current conditions, cyclists also have the option to “take the lane”, riding in a more prominent location within the carriageway lane hence discouraging or preventing vehicles from driving alongside them and forcing drivers to perform a full overtaking manoeuvre.
With narrow lanes, all users would have less room to manoeuvre to avoid obstacles and people in other lanes may be more casual about the layout. Such risk is generally recognised in published documentation on cycle lane widths and incidents, including at least one fatality, have been documented where narrow cycle lanes have been used other than at specific locations near to junctions or other similar locations.

The risk could be mitigated by extending the 20mph speed limit over the length of the bridge to the Crosshall Road roundabout, although, potentially, this could form a recommendation for any space reallocation option, if preferred, or even if the current condition was maintained.

On the basis of the above, providing narrow cycle lanes is not recommended.

Shared use paths

Full height kerbs could be provided on the nearside of two 3.0m wide lanes to create shared use paths on both sides of the bridge. This could be centred on the current carriageway, creating two 2.45m wide shared use paths. It could also be offset such that one side is wider than the other, either giving a 3.0m shared use path on one side and a narrower non-compliant 1.915m shared path on the other side, or a 2.915m shared path on one side and a 2.0m shared use path on the other side. Alternatively, a wider 3.2m shared use path could be created on one side, maintaining the kerb line on the other side.

In the above, the last option would be the cheapest and easiest to construct as it would only involve works on one side of the carriageway. However, whilst it would improve conditions on one side of the road, it could worsen the situation on the other side by removing the additional lane width and moving vehicles closer to the kerb.

Of the other two offset widening options, there would be little value in widening one of the paths by a little more than 100mm given the cost and disruption involved. Creating a shared use path of at least 2.0m width should be considered the minimum. Given the destination is the town centre in general, there isn’t necessarily a justification for having one side wider than the other. If this was to be done, it may be best to only have the wider side designated as a shared use path, and sign it as such, with an appropriate signalised crossings at the west end of the bridge to allow users to reach it, whichever side it may be on. Distributing the width equally seems to offer the best balance and therefore, if space reallocation is to proceed, this would be the preferred method to implement it. It may not offer the same level of service to more able and faster cyclists however; who may still chose to use the road, and therefore the extension of the 20mph speed limit to the west end of the bridge could be considered in this case as well to further mitigate risks.
5.2 **New Route Locations**

The locations considered for a possible new foot/cycle bridge are shown on the figure below.

![Potential locations for new structures](image)

Figure 5.3 – Potential locations for new structures

(Note that ramp lengths shown are preliminary only and subject to further development)

In effect, the locations correspond to those where suitable gaps occur within the built environment alongside the west side of the river, as discussed in Section 3 (see Figure 3.2).
5.2.1 Location 1

The following comments can be made in relation to the advantages of Location 1, which crosses the River Ouse from Regatta Meadow near the existing drain/swale to the small park north of St Neots Rowing Club, at the end of St Anselm Place.

- Considering the existing cycle network in St Neots, creating a crossing to the north of the existing road bridge contributes to a circumferential route around the town centre creating uniform ease of access around St Neots. This would be the case more for Location 1 than Location 2.

- St Neots train station is north east of the town centre. Regardless of route origin from west of the river, journeys by bicycle to the train station would be improved by a well-positioned crossing. Location 1 in particular provides a good link to relatively straight roads that result in a quicker, direct route to the train station, also linking to recent cycleway improvements around Longsands Academy and demonstrating a more joined-up approach.

- Longsands Academy lies along the same east-west line as the train station and would be well served by Location 1. A crossing at this location would improve access for foot/cycle traffic to Longsands Academy from Eaton Ford, which is in the catchment area.

- Location 1 would also serve other destinations well, such as the bowling alley and soft play centre, and would connect well to the Ouse Valley Way without needing to go through the busy areas of the town centre.

- The small parkland on the east bank north of St Neots Rowing Club allows for easier access to construct foundations and ramps at Location 1.

- Being further away from the existing road bridge, a structure at Location 1 would still accommodate views from the road bridge towards parts of Regatta Meadow and the attractive east bank river frontage, with the new structure itself in the background.

- None of the existing moorings or landing stages would be affected by the scheme.

- The additional space available at this location provides greater flexibility to accommodate variations in the design.

- Whilst Location 1 is the furthest away from what would generally be considered the town centre (ie the High Street and Market Square), the distance needing to be travelled to reach its west end from the Crosshall Road roundabout is similar to that needing to be travelled to reach the west end of a structure at Location 2.

![Figure 5.4 – Images of east and west banks at Location 1](image-url)
The disadvantages of this location are as follows:

- The river is at its widest along this section, making the standalone structure more expensive.

- A low-pressure gas main runs under the river close to the proposed Location 1. Depending on the restrictions for construction adjacent to it, the structure may have to be moved further north or skewed across the river leading to a slightly longer span than currently anticipated.

- Whilst the existing park at the end of St Anselm Place makes access for construction easier and provides space for accommodating an access ramp, it is within Flood Zone 3, which means that it could flood during construction, and is used by the rowing club when events are taking place.

- Long ramps would be needed in Regatta Meadow itself. These would most likely be open aspect such that people could walk underneath much of the structure, but where it gets closer to the ground, the structure would form an obstruction within the otherwise open site. Location 1 would have the greatest impact in this respect.

- Construction of a structure at Location 1 would likely require the loss of at least one of the mature trees lining the west bank of the river, as well as the loss of a number of smaller trees on the eastern bank.

- Notwithstanding the earlier comment regarding the distance to reach the approach ramp, it remains that Location 1 is the furthest north of the options considered and the furthest away from the High Street and market square.

- As the Regatta Meadow is within the flood plain, access to the base of the structure may be obstructed

5.2.2 Location 2

Location 2 crosses the River Ouse from Regatta Meadow nearer its southern end to just south of the Priory Centre on the opposite side of the river, connecting to the end of Priory Lane. It shares many of the same advantages/disadvantages as Location 1. These are repeated below for the sake of completeness.

- Location 2 leads cyclists directly into the Town Centre, which was identified as one of the key destinations to be served by the improvements being considered. For potential users wanting to reach this area, the shorter distance to travel would make this option more attractive.

- The west bank at Location 2 is built up already. As a result, it is not subject to flooding and a shorter access ramp could be used on the east side.

- The bridge would provide a good viewpoint towards the north of the river, replacing the vantage point provided by the existing road bridge.

- The landing point at the end of Priory Lane forms a narrow, access only road that does not accommodate much traffic.
Disadvantages of Location 2 include the following:

- Whilst the east end of the bridge at Priory Lane is less busy, the narrow, windy back streets north of the town centre may make this a slow, stop-start route for cyclists wishing to reach destinations beyond this, making it less desirable.

- The east abutment for a structure at Location 2 would have to be constructed very close to the existing Priory Centre so as not to block the stairs accessing the floating moorings on the river adjacent the Priory Centre itself. This could constrain the foundations, construction methodology, deck width and ramp construction, as well as potentially affect the Priory Centre building, its foundations and the river wall construction. Alternatively, access to the floating moorings could be relocated to the north side of the Priory Centre, and the new structure moved away from the Priory Centre. This would also leave space to access the walkway at the back of the Priory Centre, which is designated as a Fire Exit.

- The limited space available at the east end would constrain both the design of the bridge and its ramps as well as the construction of the structure and its foundations. Uncertainty with regards the river wall at this location would remain a construction risk until it can be investigated further.

- There would be a level difference of at least 1m between the finish level of the foot/cycle way on the bridge and the ground at the east end of the bridge. This would require a ramp at least 20m long, which would occupy most of the length to the front of the Priory Centre, requiring the loss of the existing turning head.

- The land south west of the proposed Location 2 is a privately owned residence and building. Whilst attempts may be made to minimise impact upon the property and its residents, a bridge in such close proximity would most likely have some impact. Early discussion with the residents may be advisable to address any potential future objection to a scheme taking place.

Figure 5.6 – Access to terrace alongside Priory Centre, access to moorings and Priory Lane turning head
5.2.3 Location 3

Whereas Section 5.1 investigated options for carriageway space reallocation, the present section looks at whether a new structure could be fixed to the side of the existing bridge or whether the existing bridge could be widened such that additional space could be provided. This could be done on its own or conjunction with kerb realignment as discussed earlier and on one or both sides.

Widening could be done on either side of the structure, or both sides could be widened.

Advantages of Location 3 are as follows:

- The improved route is on the existing desire line for the town centre, which is already well used and convenient for this destination, and it can address directly the safety concerns that are raised in relation to users whilst on the bridge.

- As no new structure is constructed, the existing views from the river bridge and from alongside the river, both upstream and downstream of the existing bridge, are almost entirely unaffected.

- There is no impact upon Regatta Meadow, and no or minimal impact upon flood storage and flood risk.

- This solution could be considered more sustainable than constructing a new structure as it will not require as much new material or construction effort. However, this would need to be confirmed once further investigation has been carried out.

- It would also initially appear to be the cheapest of the options considered. However, the cost of enabling works, temporary works and traffic management should not be underestimated.

There are many disadvantages of this option, however, which include the following:

- The works will incur disruption to the public as closure of the footway will be necessary during the works. Lane closure may also be required during certain activities due to the size of construction plant that may be required on top of the deck.

- Access to the main span of the existing bridge will require extensive temporary works during construction. This will almost certainly require restrictions on navigation but may also require a full navigation closure during parts of the works. Access to the approach spans would be simpler but still require extensive temporary works.

- All options other than this one provide a new route whereas structural widening or modifications at this location improves the existing route and doesn’t add as much to the network. Because of this, there may be a greater potential for conflict at the east end of the bridge where users would need to filter onto the existing provisions. Some carriageway realignment works would be required in order to address this.

- The land between the existing bridge and Bridge House belongs to the owners of the latter and therefore land purchase negotiations or compulsory purchase would be required for widening to the north. The space available between the existing bridge and the adjacent building varies between 3.7-3.9m. As this is one of the means of access to the building and its riverside garden, there is limited scope for widening.

- Widening to the south would not impact access to private properties, but would severely impact the existing Jubilee Garden, possibly making it unusable.

- There are a number of utilities services buried inside the concrete edge cantilevers of the bridge. Depending upon the modifications or widening proposed, diversionary works may be required, which, given the existing layout, may be both costly and disruptive.

- Whilst the existing bridge is not recognised for its architectural merits, it was designed and constructed with some attention to detail and with a certain elegant simplicity in mind. For example, reconstituted stone facings and copings are used along the edge string line. It could be difficult to recreate this in the design of the widening.
The existing bridge is constructed from two distinct types of structure. The main span has a deep reinforced concrete box section, which would likely be able to accommodate a new connected structure or structural widening relatively easily. The approach spans are built using prestressed beams with reinforced concrete infill. This form of construction is much shallower and therefore the widening would not be as easy to accommodate here. The widening may therefore have to be cantilevered from the structure’s existing supports or be supported on new foundations.

On the north side of the structure, the existing stairs leading down to Regatta Meadow would be in the way of the widening. Two options would be possible to overcome this. The stairs could be temporarily removed to enable the widening to continue for the length of the bridge and then be reinstated on the outside of the widening. Alternatively, a ramp could be built to take the widened structure down to ground level in Regatta Meadow. This last option would partly void some of the benefits discussed earlier as users would need to access the end of the ramp by either going through the Riverside Park car park and passing underneath the existing bridge or by going around Sudbury Meadow to reach the ramp from the north. This would be a significant diversion from the desire line, which could detract from using the new structure. For this reason, widening the full length of the existing bridge would be preferable.

Whilst there are no such obstructions on the south side of the structure in the Riverside Park, the existing path within the park would need to be relocated if the widening ramped down to ground level as the two would clash. Such a ramp would need to start after the path crosses under the bridge in order to ensure sufficient headroom to the latter. This would limit savings in structural length by providing a ramp, and again, widening for the full length of the existing bridge would be preferable.

The existing parapets do not comply with modern day standards. Should the structure be widened, new, compliant parapets should be provided. However, these are generally stronger than their predecessors, imparting greater load effects to the supporting structure, which may not be able to resist these.

In addition to the above, unless inboard parapets are provided, the full widening would need to be designed to accommodate loading from accidental vehicle incursion, which would be relatively onerous and may not be achievable.
5.2.4 Location 4

Location 4 investigates a new structure at the only suitable gap between existing buildings from the existing road bridge to Hen Brook.

There are three main advantages that could be realised by installing a structure here:

- The width of the river reduces south of the existing road bridge and is much narrower at the proposed Location 4 than for the other options. This could lead to significant cost savings as a shorter span could be used. This would manifest through material savings, the possibility to use a simpler structural form, deck type, labour and installation plant.

- A bridge at this location would provide a direct connection between the Market Place and the Riverside Park car park. Whilst being on the south side of the existing bridge means that it doesn’t serve Eaton Ford as well, it remains very close to the desire line where the destination is the town centre itself.

- It doesn’t obstruct the open views from the existing bridge towards the north and it is not obtrusive within the Riverside Park as the south section of the park has more trees and has a generally less open aspect to it.

However, there are numerous disadvantages:

- The east landing for the proposed location is on privately owned land which means that negotiations would be required to secure the land, unless compulsory purchase was used. This could delay the scheme if a rapid delivery is desired.

- This landing is also in a narrow gap between two privately owned buildings, one of which is Grade II listed (the Old Falcon). The building to the south (2 River Terrace) is part of a relatively recent development, but its setting would be significantly impacted by the provision of a new bridge at this location. Early engagement with the owners and/or residents would be needed to ascertain whether they would be amenable to the proposal.

- Assuming the respective owners are amenable to the new bridge at this location, considerable precautions would need to be taken during construction to ensure there is no damage to the adjacent properties or their foundations, or to the adjacent river wall. As these details are unknown, it would not be possible to accurately evaluate the risk until further investigations are carried out.

- The presence of the gap itself has been highlighted as important to the setting and the Conservation Area by the Local Planning Authority as it provides a window to the river and through to the Riverside Park. Planning applications for building in this location have been refused in the past and this aspect has formed part of the justification for rejection.

- The constrained east landing site would also limit the size of plant that could operate during construction.
• There is a surface water outfall running under the proposed location for the east foundation. Due to the limited width for landing the bridge, it may not be possible to avoid it. Building over the outfall may be permitted, subject to discussion with Anglian Water. However, as piled foundations would likely be needed, costly diversionary works or accommodation works could be required.

• Whilst the Riverside Park is generally an open area and access would be possible via the car park, the south abutment would be situated on an island which extends underneath the west abutment of the existing road bridge. A small concrete structure currently carries the path over the watercourse that flows west of the river near the existing road bridge, but its capacity is not known. A temporary structure may need to be installed to span over this watercourse to provide access to construction plant. This complication could add significantly to the cost due to the weight of construction plant that would be anticipated to require access (eg crane, piling rig, etc).

• Whilst a new structure at this location gives direct access to the Market Square and Market Place, users then need to ride through the Market Place to access the busy High Street for travel beyond this destination. For travel to such destinations, a new structure north of the river would be of greater benefit.

• For users travelling eastwards, visibility at the junction with River Terrace initially, then at the junction with Market Place, is limited. Whilst the volume and speed of vehicular traffic here is expected to be low, some modifications to the existing layout may be required to improve visibility.
6.0 Bridge Options

This section of the report considers the potential materials available for the various elements of a new bridge and the construction forms available for both the main span and the ramps. Thought is then given to the long-term maintenance and durability aspects of any new structure.

The structural form will be highly dependent upon the preferred location for a new structure. Because of this, this section looks at options for Locations 1 and 2 in the first instance. These have a similar span and similar constraints, with the exception of the presence of the river wall and Priory Centre in the case of Location 2, and therefore structural options are considered together.

For Location 4, as the span is significantly shorter and more representative of typical foot/cycle bridge structures that would be provided over dual carriageways, etc, different superstructure forms would be applicable.

Finally, if widening of the existing structure was to be carried out or a new structure connected alongside the existing, an entirely different type of structure would be considered.

6.1 Locations 1 & 2 – Structure Type Options

6.1.1 Main span superstructure

A single span superstructure with no intermediate supports would comprise the most onerous scenario at Locations 1 and 2 with regards structure type. To accommodate the 60m+ span over the river, typical standard types of construction such as box girders, half-through girder or through or half-through trusses, with a construction depth in the order of 2m or greater would be required. Such structures would preferably be made from steel, as a concrete alternative would be prohibitively heavy to lift and would need to rely on more advanced methods of construction such as incremental launching or balanced cantilever construction, which would be overly onerous and costly for such a scheme.

There are several possibilities that would enable a lighter, less imposing structure to be achieved, generally by relying on the provision of intermediate supports. The main limitations of providing intermediate supports are the navigation requirements on the river and the visual impact on the surrounding area. Provision of intermediate supports can be achieved by different means, either providing piers in the river or additional structural elements above the deck such as stay cables.

The key differences affecting the choice of structural type between Locations 1 and 2 is the amount of space for construction on the east side of the river and the uncertainty regarding the river wall and the foundations to the adjacent buildings. Given the limited amount of space available to construct a ramp of the requisite gradient at Location 2, the key consideration would be to limit the height difference between the foot/cycleway surface over the bridge and the existing pavement level. This would be facilitated by using a through or half-through main span superstructure where structural resistance is provided by members above the footway level.

Minimising the depth of section for a structure at Location 1 is less of a factor given the additional space available on the east side for ramp construction. Hence, more deck types and structural forms could be accommodated at this location if for any other reason they are preferred. Regardless of the space available however, minimising the depth of the bridge is beneficial as it reduces the length of the ramps and the weight of the structure hence generally decreases its cost. There is a trade-off, as a long slender structure can be more lively and susceptible to vibrations being induced by pedestrians or wind walking or blowing at certain frequencies, which then requires the installation of dampers or the addition of stiffeners.
6.1.2 Approach ramp superstructure

As indicated above and earlier, there is sufficient space on both banks at Location 1 to provide straight ramps, the advantage being that the direction of travel is not interrupted. Furthermore, this makes the design and construction of the ramps easier as torsion effects that occur in curved structures are not present. A simple steel beam structure could be used, constructed from standard rolled steel beams or hollow sections readily available. Introducing a plan curvature in the ramps would allow the approach to tie in closer with the existing footpaths and desire line in Regatta Meadow. If this is the case, larger box elements would need to be used instead of rolled steel beams to support the ramp in order to provide more torsional rigidity. So long as standard sections can be used, the cost would be similar to that for a straight ramp; however, if this isn’t the case and fabricated box sections are required, this could make a significant difference to the cost of the ramp.

On the east bank at Location 1, the ground slopes favourably upward away from the river’s edge, such that the ramp would meet the rising ground at a convenient point.

At Location 2, the distance from the retaining wall along the river’s east bank to the east elevation of the Priory Centre (Priory Lane) is approximately 23m. Adjacent to the retaining wall, there is a gated access to the terrace in front of the Priory Centre. To fit a ramp of standard gradient (minimum 1 in 20) and provide headroom clearance for navigation of 3m, it is very likely that this access would be blocked by the structure. Stairs could be provided from the ramp to maintain the access.

A turning head is present at the end of Priory Lane, immediately south of the Priory Centre. A straight ramp from the bridge would take up this space and the turning head would be lost. A “scissor” ramp, comprising a series of straight ramps with landings where the ramp turns 180 degrees on itself, would mitigate this. However, the tight turns of such a ramp would be difficult for cyclists to negotiate, potentially even forcing them to dismount. It would decrease user visibility and increase the potential for pedestrian and cyclist conflicts. This option would not be recommended unless it was absolutely necessary to maintain the aforementioned turning head.

The approach ramps could extend the form of the main span superstructure or use a simpler form of construction, for example, simple beams or earthworks. For both locations, the choice of ramp will be guided by whether the intention is to provide visual continuity with the main span or whether the intention is to draw attention to the main span and minimise the approach spans visually. Given that the main span and the approach ramps are similar in length, at least from the point of view of structural length. Both options are possible.

6.1.3 Option 1 – Cable stayed structure

Option 1 for both locations comprises a cable stayed structure with the main tower located along the west bank of the River Ouse, supporting a 124m-long steel deck (ie 62m spans either side of the tower). This would provide a landmark structure, with the tower becoming the focus of its own place of interest within Regatta Meadow. The stay tower would be formed of two concrete-filled steel columns and would stand approximately 20m tall above the surrounding ground. Steel stay cables would support the deck at approximately 12m intervals, which would allow the steel superstructure’s depth to be reduced to approximately 400mm.

Figure 5.9 – Indicative elevation of cable stayed structure option
The east approach ramp for this option would comprise simply supported spans of a similar depth and form of construction as the stayed steel superstructure, continuous over supports and spanning approximately 16m. Short lengths of earth embankments would be constructed behind the abutments to tie in with ground level.

![Indicative plan of cable stayed structure option](image)

Figure 5.10 – Indicative plan of cable stayed structure option

![Examples of single tower cable stayed foot/cycle bridges](image)

Figure 5.11 – Examples of single tower cable stayed foot/cycle bridges

A variation on Option 1 above would see the introduction of horizontal curvature in the superstructure and the change from a twin tower to a single pylon on the inside of the curve. To accommodate the greater stay forces, a taller tower would be required, standing some 30m above the ground. There would be the option to incline the tower towards the centre of the radius of curvature to reduce bending effects in the tower itself.

Because of the single support and curvature, stay cables would only support the superstructure on the inside of the curve. This would result in eccentric loading and twist effects, which would need to be accommodated by a deeper and stiffer torsion box beam on that side. However, the curvature itself, if sufficient, helps stabilise the structure, which effectively self-anchors.
6.1.4 Option 2 – Steel arch

Option 2 comprises a steel arch with steel bars hanging from the arch members to support the steel deck. Again, this structure helps minimise the construction depth beneath the finished walking/riding surface.

The inspiration for the superstructure comes from Willow Bridge, which is a similar form of construction but with a span approximately half the length. A similar span-to-rise ratio is used here as was used for Willow Bridge. Owing to the greater span, a significantly taller arch results and the outcome looks markedly different, emphasising the importance of the arch as the structural form. A different colour scheme could also be used to further highlight the arch members.

The remaining structure would look very similar to Willow Bridge, comprising steel rectangular hollow sections and a steel deck. It would still have a markedly different feel as the approach ramps would be significantly shorter here than at Willow Bridge.

Figure 5.12 – Indicative elevation of steel arch structure option

One complication with an arch structure is that large horizontal thrust forces can be generated at the base of the arch and need to be resisted. Willow Bridge was a thrust arch where horizontal forces were resisted by large concrete abutments on inclined or raking piles. Constructing such large foundations may be problematic here due to the presence of the gas main at Location 1 or due to the existing river wall and nearby buildings at Location 2.

Furthermore, because of the arch profile, a certain loss of headroom clearance would take place near the banks of the river. This would need to be agreed with river users and the Environment Agency. As this can be mitigated better at Location 1 than 2, the form would lend itself better there.

As an alternative, a tied arch could be used, where the superstructure’s deck ties the ends of the arch and resist horizontal thrust effects (hence the name bowstring, as the deck acts like a string to the arch’s bow). Various modifications could be done to the proposal, generally regarding the points of support of the arch and the position where the deck intersects and ties the arch. The easiest to achieve would see the deck tie the arch at the abutments, but this would also result in the tallest structure, which would then dominate its surrounding and look out of place. If the arch became really tall, the option should be abandoned.
6.1.5 Option 3 – Half-through Vierendeel Truss

The third option for Location 1 or 2 is to use a large Vierendeel Truss for the main span. Contrary to other types of trusses, which generally resist loads by tension and compression only in the members, members of Vierendeel Trusses also carry bending effects. This often results in the members having to be larger. However, such a structure can accommodate parapet infill more neatly as the truss bays are all rectangular, resulting in cleaner lines than an equivalent span truss with diagonal members.

The truss would be tall enough so that people could look out from the bridge underneath the top chord. A height of approximately 2.4m would achieve this, and would ensure that the truss is stable against pedestrian-induced vibration. Glazed parapet infill panels would be provided to ensure an open appearance, with a balustrade allowing users to rest whilst looking out from the bridge.

The indicative sketch in Figure 5.13 shown a horizontal truss layout. A camber could be applied to the structure to provide a smoother transition with the approach ramps.

Approach ramps for this option would be as for Option 2, ie similar in form to the structure used at Willow Bridge, continuous over supports with spans of 18m. The parapet design would be simplified to vertical steel posts with steel railings and tensioned steel wire mesh infill.
6.2 Location 3 – Structure Type Options

Modifications to the existing road bridge need to be evaluated carefully. Key constraints are discussed in an earlier section. From these, it has been established that the most practicable option for widening the structure would be to provide a cantilevering steel structure on the outside of the existing bridge. This structure would have a clear width of 1.8m if installed on the north side of the bridge, or 2.0m if installed on the south side. It would be designed to cater for pedestrians only. The existing parapets would be retained and cyclists would be directed to use the existing footway, which would then form the cycling side of a segregated path.

Whilst a clear width of 1.8m is less than the preferred minimum, it allows sufficient space between the outside of the structure and the Bridge House such that access is maintained around the building, particularly for emergency exit in case of fire. The resulting walkway would be as wide as the existing provision and wider than the minimum width permitted by LTN 1/12 for that side of a shared path. It would allow wheelchair or pushchairs users to pass each other, albeit not as comfortably as if the path was at least 2m wide.

Theoretically, the maximum span required between supports would be equal to the distance between the existing river bridge piers. This would occur assuming that the supports for the new structure are cantilevered from the existing supports for the road bridge. If the cantilever supports were to be fixed into the existing deck, the number of supports and their associated fixing/strengthening costs could be balanced economically in relation to the length of the clear spans. The depth of section for this option would not be much of a concern either given that it would certainly be less than that of the existing road bridge.

In terms of construction, Location 3, as mentioned earlier, presents a far greater challenge than any other option. Considering the existing bridge, the primary concerns are the capacity of the existing foundations and the edge cantilever. If the additional load generated by a new structure on the foundations is within ten percent of the existing load, it can generally be assumed that the foundations will be adequate. To ensure that the increase in load on the foundations resulting from the widening remains within this limit, a steel structure is required, as carrying out the same extent of widening on the outside of the deck using concrete would significantly increase the self-weight of the structure. Using concrete would also require more extensive temporary works, both for anchoring the new concrete into the existing structure, but also to support falsework and formwork whilst the new concrete would be cast.

The proposal would be for new steel supports to be anchored into the side of the main span of the existing bridge and at the end of the pier capping beams on the approach spans. Once this is done, steel structures would be lifted in sections and installed onto these supports. Diagonal struts or additional columns may be required underneath the steel structure’s support to provide additional strength to adequately support the new structure when fully loaded without undergoing excessive deformation.
Figure 5.15 – Indicative cantilevering structure option for main span and approach spans

The steel superstructure sections could be lifted into position during night time closures of St Neots Road. This would mean having to divert traffic through Paxton Mill or via Eynesbury and the A428. However, it would avoid having to clear a path to construct a haul road and a crane platform in the woodlands to the north of the bridge on the south side of the river.

If, as explained earlier, anchoring the widened section supports into the side of the existing approach spans proved unachievable, new foundations could be provided to support it, as shown below.

Figure 5.16 – Alternative showing independent foundations for approach spans

This option could be combined with kerb realignment on the opposite side of the road, widening the footway on that side to a 3.0m shared use path.

This option is not without major risks, both during construction and in the permanent situation. As the existing bridge parapets do not comply with current standards, heavy vehicles erring off course and colliding against them may not be contained fully and could end up on the cantilevered structure. It may not be possible to construct the supports to this structure with sufficient capacity to resist such loading, and this would mean that, in this scenario, the new structure could potentially collapse. There is no documented evidence of serious vehicle impact against the parapets on this structure, but the consequence of it occurring once the new structure is installed may be extremely serious.
6.3 Location 4 – Structure Type Options

There are a number of alternative approaches that can be adopted for a structure at Location 4. Because of the wide island that forms what is generally viewed as the west river bank, three main layouts are possible to cross the river:

- A single-span simply-supported structure spanning over the main river only;
- A longer structure spanning over the river, the island and the small channel of water; or
- A two-span structure continuous over a main pier located on the island.

For all of these, a simpler ramp structure continuing to ground level in the Riverside Park would be required, which would most likely be continuous over a number of piers.

The use of a longer structure spanning over the island and the small watercourse within the park could overcome access constraints posed by the watercourse itself. However, it results in a main span in the order of 90m in length, which would exacerbate structural properties such as construction depth highlighted as critical for Locations 1 and 2. This negates any cost savings that could be realised by using a shorter span structure and is probably prohibitive, leaving two options.

A single-span option over the river, approximately 33m in length, makes the scheme similar to a typical footbridge over a dual carriageway road and therefore more standard type structures are possible. For example, a half-through truss would minimise the structural depth beneath the walking or cycling surface and reduce the length of ramps required. Various types of trusses are possible, using either parallel chords or chords of varying radius and with varying arrangements of vertical and diagonal members. In some cases, decorative features are added within the elevation of the truss. Existing smaller footbridges within the Riverside Park in St Neots are examples of a Long Truss (or ‘X’ Truss) with ring details added as a feature inside the truss members. With careful detailing, the addition of infill members within the truss can also provide fall protection and avoid the need for adding a parapet on the inside of the structure, as this can often ruin the appearance of an otherwise streamlined truss.

Two possible main span truss variations are shown below:
The approach ramps can either also be formed from truss members, as was done at Coneygeare bridge, or be a simpler beam-type construction, similar to Willow Bridge. The first approach give more visual continuity between the main span and its ramps, whereas the second makes a visual distinction between the two and will tend to draw the eye to the more imposing main span. However, if the main span is such that the truss depth is near to the height of the parapets on the approaches spans, the combination of the two different forms of construction adjacent each other can sometimes look odd, with the ramp appearing a bit like an afterthought even though it may represent a significantly greater proportion of the total length of the structure. Careful detailing needs to be considered for both the main span and the ramp, ensuring that the appearance of the whole structure fits within its surroundings.

As an alternative to a truss, a half-trough girder bridge could be used. These are derived from historical railway bridge where trains would run between two deep steel girders. On footbridges, the girders then also form part of the parapets, sometimes requiring extensions to provide the necessary protection height, sometimes using extra high girders for this purpose. This form of construction, in its purest form, can look somewhat functional and out of place outside of the railway environment, and provide a “less-than-inviting” environment. However, there have been a number of examples successfully implemented recently and, done right, it is a relatively inexpensive way to minimise the depth below the walking or riding surface.

A cable stayed structure with a single tower in the island on the west side of the river and spanning symmetrically 45-50m over the river on one side and over the watercourse on the other would be feasible here as well, although its need would be dictated more by desire than necessity. It could be a way to provide a feature within this section of the Riverside Park. The cable supports could also be designed such that the reactions at the abutment are reduced, which would minimise works to be carried out at the east end of the structure. The cost of such a structure may well exceed that of a similar structure at Locations 1 and 2, due to the added access complication posed by the presence of the watercourse. It is therefore not considered further in this report for this reason.

To terminate the structure on the east side, earth ramps could be constructed in the land available behind the abutment. Checks would need to be made to ensure the existing river wall can withstand the additional surcharge resulting from this. This would eliminate the need to maintain a structure in a constrained site.
7.0 Cost Estimates, Programmes and Risks

7.1 Cost Estimates

The following options have been considered:

- **Location 1**
  - Option A – Cable-stayed structure with steel box deck
  - Option B – Steel arch with steel hanging deck and steel approach ramps

- **Location 2**
  - Option C – Vierendeel Truss with steel approach ramps

- **Location 3**
  - Steel cantilevered structure to full length of bridge with kerb realignment on opposite side of carriageway

- **Location 4**
  - Half-through truss with ramps, 35m span

Other structures have not been considered.

It has been assumed that the bridge could be built in 2020, with historic rates adjusted by construction inflation at 3% per year. A detailed breakdown of the costs and other assumptions made is provided in Appendix F.

Whole life costing has not been considered at this stage, neither have legal costs or costs associated with land negotiations or land purchases.

For Location 1, both the twin-tower cable stay option and the steel arch option are estimated at between £3.5 and £4m. If a single eccentric pylon was used instead, with a deck curved in plan, it could reasonably be expected to cost a further £500k due to the added complexity of design and construction. Steelwork fabrication costs would likely be greater in the case of the cable stayed structure as the main structure extends over the full length. On the other hand, the number of supports is reduced compared to the short spans of the approach ramp in the case of the arch option.

For Location 2, similar costs are anticipated due to the heavier superstructure resulting in a more complex installation. Due to the weight of the superstructure, installation using self-propelled modular transporters on heavy duty pontoons in the river or installation by launching from the Regatta Meadow may be required. This would add to the cost.

For Location 3, costs are more difficult to estimate. The costs for procuring and fabricating the new 200m-long steelwork structure alone are likely to be in the order of £500-600k. The extensive temporary works, fiddly nature of the connection of cantilevering supports and timescale would push the cost to between £2 and £2.5m overall.

For Location 4, a cost estimate of between £2.5 and £3m has been made. This is highly dependent upon ground conditions and the cost of constructing a temporary crossing over the watercourse between the river and the Riverside Park car park. It has been assumed that the existing concrete slab structure would not be suitable and that simple temporary structure would be needed. However, no further allowance has been made for complications in the design or construction of that temporary structure.
7.2 Programme

Options at Locations 1 and 2 are expected to take approximately 32-36 weeks to construct. This assumes that both structure options at Location 1 can be installed in segments and connected to the stay cables or hangers without the full structure needing to be installed at the same time. This isn’t the case for the truss structure proposed for Location 2, where the superstructure must be installed in a single operation. The works at Location 2 are expected to take slightly longer because of the need for additional precautions when piling and working behind the existing river wall and adjacent existing buildings. This assumes that suitable investigations are carried out in advance of the works.

Whilst the structure at Location 4 could be expected to be constructed faster, an allowance for extra time has been made in order to construct the temporary structure needed to reach the west side of the river. If construction can be planned such that smaller construction plant can be used and the existing concrete structure over the watercourse can be used, then the programme could be reduced by approximately 4 weeks.

The outline programme for the widening option at Location 3 is difficult to establish, as a detailed scope of work is not available and will not be available unless a detailed breakdown of operations to be carried out is investigated, which is beyond the scope of the present study. However, an initial outline programme for such works suggests a duration of approximately 26 weeks for the works. This assumes that no additional foundations are required. If there was a need to undertake piling or work to the existing foundations, an additional allowance for approximately 4-6 weeks should be made.

The above durations are for works durations only and exclude consultations, planning and design periods at this stage.

7.3 Project Risks

In terms of risks, a certain allowance has been made for the effects of high winds, unforeseen ground conditions, flooding and difficulties in obtaining required navigation closures or road closures necessary for some options. Greater detail on the assumptions for these risks is given in Appendix C.

There are also non-construction related risks, which include:

- Land availability, in particular with regards privately owned land and the potential for protracted land negotiations;
- Amount of and availability/timing of funding;
- Political approval;
- Obtaining planning permission;
- Public consultation and public opinion on the scheme;
- Procurement issues;
- Construction inflation;
- Uncertainty with regards extraordinary currency fluctuation and possible trade tariffs due the UK’s withdrawal from the European Union and/or the European Single Market;
- Availability of construction plant and materials, in particular given the local demand for such with major schemes being constructed concurrently in the region;
- Third party issues. In particular, the scheme has the potential to have a major impact on river users and on the availability of parts of the Riverside Park, which could draw objection from some stakeholders.

Forecasting the impact on cost or programme for the above risks not related directly to construction works is fraught. However, it could reasonably be expected that the predicted costs would increase by a figure in the order of 3% for each year by which construction is delayed.
8.0 Discussion

8.1 The Need for a New Crossing

A new bridge in the vicinity of St Neots Road Bridge would appear likely to attract considerable usage. Road traffic data gathered by CCC between in 2010 and 2015 showed that there are approximately 12700 motor vehicles crossing St Neots River Bridge daily. Considering how busy the road is, the bridge is neither suitable nor desirable for cycling. The road traffic data also showed 1578 pedestrians and 407 cyclists crossing the structure on average, every day, during the same period. The underlying data shows a generally increasing trend, suggesting these numbers will continue to increase, particularly given the recent and planned residential developments in St Neots. This further justifies the need to do something.

Having previously determined that a “do nothing” option was not acceptable, all options considered in this report improve the conditions for pedestrians and cyclists who are currently using the existing route. Improved infrastructure for pedestrians and cyclists could also encourage changes in transport modes thus relieving some congestion on the road bridge.

Figure 8.1 – Extracted figure from Sustrans Design Manual Chapter 4

8.2 Suitability of Locations and Potential Destinations

For pedestrians the existing road bridge provides a direct route from west of the river to the town centre. Providing a new bridge further to the north may not attract users away from the existing bridge if their main purpose is purely to reach the town centre unless it is at least equally convenient for them to do so. From this point of view, pedestrians originating from the estates on the north of Eaton Ford will find a new bridge at Locations 1 or 2 an attractive proposition. However, for pedestrians from Eaton Socon or for those who may be using the Riverside Car Park to park their vehicles before walking into town, the existing bridge, improved as described by Location 3, or a bridge at Location 4 better suits their desire line.

It must be noted that the existing bridge is a rather busy and noisy place for someone standing on the footway, so a new structure away from St Neots Road would provide a much quieter, friendlier, peaceful environment. A new bridge at Locations 1 or 2 in particular would have a sense of place of its own, which pedestrians could enjoy rather than simply being a section of the journey to the town centre. This could draw some users to make the change, in particular casual or leisure users.

Furthermore, for pedestrians, convenience to reach destinations beyond the town centre on the north side of St Neots without using the busy existing bridge or walking along the busy High Street would be a definite advantage. Structures at Locations 1 and 2 would achieve this.
Providing an off-carriageway route for cyclists is an even greater driver for a new bridge and could be likely to attract an even greater number of users, particularly those who feel less confident or more vulnerable on the road on the existing bridge or simply riding along the busy High Street. For destination-oriented cyclists a new route to the north, as provided by a new structure at Locations 1 or 2, provides several benefits. In particular, access to the train station would be improved for residents of Eaton Ford and those in the north of Eaton Socon, who would be able to avoid the busy, narrow roads and traffic lights through the town centre. A route to the north would also provide a more desirable crossing for Longsands Academy pupils as the catchment area extends across the river to include Eaton Ford. In addition, a better, off-carriageway link between the town centre and the Riverside Park may encourage more flow across, whether that is purely users wanting to join the Ouse Valley Way for leisure or people wanting to escape the town centre and enjoy the Riverside Park during lunch time.

Overall, whilst widening the existing bridge at Location 3 improves the safety of users along the existing route and serves the current desire line well, a new structure at Location 4 does this and also enhances the experience to a certain point. This ends when the user reaches the Market Place, which is relatively busy and is used as a through road to reach Eynesbury.

A new bridge at Location 2 is slightly off the current desire line on the east side, but does still serve the town centre well, particularly when considering that cycle parking facilities are generally located at the back of the High Street shops. It provides a much improved route to destinations north east of the centre, such as the Railway Station, Longsands Academy, and other community or leisure facilities. Location 1 is the furthest from the centre but best serves destinations north-west of the centre. It still gives relatively good access to the town centre, as it leads directly to the Waitrose car park.

Route suitability will be best assessed once usage forecasts have been carried out. In the meantime, it would appear that Location 1, whilst being furthest away from the town centre, would give the best opportunity for generating new trips and encouraging modal shift.

8.3 General Bridge Details

Three of the proposed options comply with the minimum requirements given in published guidance documents or codes of practice. The widening option to the existing St Neots Road Bridge doesn't quite comply with the preferred clear width requirement but achieves the best balance between improving current provisions and the need to maintain access to the adjacent building, particularly in case of emergency.

The three new-build options would comply with current standards and would have a design life of 120 years. All would be designed and detailed with a view to minimise the need for future maintenance. Due to its more complex form of construction, the cable stayed option for Location 1 could be slightly more costly to maintain, but it is not anticipated that it would require any more maintenance than the other options. In fact, as it would have longer spans, it would have less of the elements that typically require more regular maintenance, such as bearings.

The cantilevered structure at Location 3 would likely have the greatest number of elements requiring more frequent inspection and maintenance as it would have to be broken into a greater number of components to facilitate its installation.

8.4 Construction Access

All locations would require some form of temporary access road during construction to enable plant and materials to be taken to the site. Construction access for Locations 1 and 2 is relatively similar and considerably simpler than Locations 3 and 4. Both would be easily accessible from the west through Regatta Meadow. Location 1 could be accessed from a gate north of the existing small drainage ditch, with a haul road built through the meadow to the site. This would leave the current path free to remain in use throughout construction. For Location 2, a temporary haul road could either be built south of the current path or the current path could be upgraded to cater for construction vehicles, and a temporary path constructed for the duration of the works. In both cases, accesses over the haul road would be provided to enable members of the public to cross safely.
Access from the east would be restricted by the narrower streets to the north of the town centre. However, access should be easily manageable in the case of Location 1, and, as long as reasonably small plant is used, similarly so for Location 2. Space for construction of the foundations for Location 2 would be limited by the proximity of the Priory Centre and the access ramp down to the temporary moorings, unless this latter is relocated.

Location 3 has more difficult access, particularly if widening to the north is proposed, as the work needs to be done at height over relatively soft ground, adjacent overgrown areas and over water. However, for the majority of the works, limited size plant could be used making access more manageable. Construction vehicles could reach the site via a similar but slightly longer haul road to that used for Location 2 if widening to the north was preferred. Access to the south side is easier as long as permission to use the Riverside Park car park is granted. Whilst access for installation of the new steel structure could be gained from the road above the bridge, this would require a number of intermittent road closures and lane restrictions or closures, which would cause disruption to the public.

Location 4 is relatively easily accessible from the Riverside Park car park. However, the load-bearing capacity of the existing concrete structure spanning the watercourse within the park, west of the river, is unknown and it therefore has to be assumed, at this stage, that a new structure would be required for access during construction. Whilst access to this side can be easily gained, there would be some impact upon the existing Riverside car park, which would need careful management. If permission to access the site via the car park was refused, a separate haul road through the Riverside Park would be long and could cause significant disruption to users of the park. The east side is easily accessible via the Market Place; however, as for Location 2, working space is considerably limited, and there would be little space for vehicles to park or turn around.

Overall, Location 1 is considered to be the most easily accessible for construction and would generate the least disruption to the general public.

8.5 Aesthetics and Visual Impact

A steel structure cantilevered off the existing road bridge would have a significant impact on the appearance of the existing road bridge. However, it would not affect the landscape away from the bridge, and views from it would be preserved.

A new structure at Location 3 would significantly impact the adjacent residences. However, it would minimise the impact on the panoramic views of Regatta Meadow and the north east river bank. A landmark structure could be provided at Location 3 and would make a striking addition to the area, but it would likely be the most expensive of all options and has therefore not been considered as part of this study.

A structure at Location 1 or 2 would arguably have the most impact upon the setting but would also provide the greatest opportunity for a more striking structure, which could become a landmark feature of the area, enhancing it rather than detracting from it. For this to occur, the design needs to be carefully considered and the opportunity to seek architectural input from specialists should be considered. Realistic photomontages could be assembled to show what such a structure would look like in its setting. Seeking this input at an early stage and providing stakeholders with better representations of the what the scheme would look like may help them engage with the project more, reducing the potential for objections later on.

8.6 Health and Safety

All options improve safety. Locations 1 and 2 provide new routes taking users away from the busy High Street and Market Square area, which is not only a safer route for them, but also helps reduce non-motorised user congestion in the area. The level of air pollution generated by vehicle exhaust on the new route would be lower than on the existing bridge and on the High Street, which is beneficial. Furthermore, a new bridge at this location would better promote the use of the park and meadow as a leisure destination.
Widening the existing bridge would improve safety over the bridge itself, but the potential for conflict at the ends of the bridge, where users would be redirected onto the existing facility, would remain. Furthermore, users would still be required to travel in a relatively polluted environment, particularly at peak times when vehicles are queuing on the bridge and on the High Street.

A new bridge at Location 4 would direct users along Market Place rather than the High Street, which, although still busy, is quieter than the High Street. However, they would need to cross the High Street for travel beyond it to other destinations to the north. Visibility on the approach to River Terrace and to the Market Place for users coming from the west is limited; however, some streetscape modifications could improve this.
8.7 Risks

There are a number of risks that are common to all options. For example, all options would disrupt parts of the Riverside Park.

Amongst those risks that only apply to certain structures/locations, there are significant construction risks relating to the condition of the river wall on the east side of the river and to the proximity of existing buildings that apply to all options except for the bridge at Location 1. Furthermore, for Locations 3 and 4, there are significant risks associated with the availability of the land necessary for construction, or of drawing objections to the scheme due to the proximity of private residences.

Apart from the presence of a buried gas main in its vicinity, Location 1 appears to have fewer risks associated with it. As there is flexibility in the final position of the structure, it is anticipated that the structure could be located far enough from this utility such that the risk is minimised.

8.8 Cost/Programme Estimates

The main span options can be summarised as seen below in Table 3:

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
<th>Construction Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable stayed steel bridge at Location 1</td>
<td>£3.5 - £4.0 million with risk allowance of £0.5m</td>
<td>32 weeks</td>
</tr>
<tr>
<td>Steel arch bridge at Location 1 with associated steel ramps</td>
<td>£3.5 - £4.0 million with risk allowance of £0.5m</td>
<td>36 weeks</td>
</tr>
<tr>
<td>Steel Vierendeel Truss at Location 2 with associated steel ramps</td>
<td>£3.5 - £4.0 million with risk allowance of £0.6m</td>
<td>32 weeks</td>
</tr>
<tr>
<td>Steel cantilevering structure at Location 3 (ie widening of existing road bridge)</td>
<td>£2.0 - £2.5 million with risk allowance of £0.5m</td>
<td>26 weeks</td>
</tr>
<tr>
<td>Steel truss at Location 4 with associated ramps</td>
<td>£2.5 - £3 million with risk allowance of £0.7m</td>
<td>32 weeks</td>
</tr>
</tbody>
</table>

These costs and programme are indicative only at this stage and should be considered for comparison only rather than for budgeting purposes. If estimates are required for budgeting purposes, further design development followed by a breakdown of activities and specialist costings should be carried out.

8.9 Favoured Option

Overall, providing a new structure at Location 1 would offer the best return on the cost of the scheme by improving safety of existing users at the road bridge whilst also providing a new route and encouraging new cyclists to use it either for commuting or for leisure.

This location provides the easiest access and space for construction. Without the constraints on space imposed by the other options, this would enable the most functional structure to be constructed for the end user whilst also minimising disruption and allowing the greatest degree in flexibility for the design of the structure itself.

It is considered that the most aesthetically pleasing structure option would be a cable-stayed structure. This results in the shallowest deck structure, making it least visible in the surrounding environment.

The cost of the recommended option is estimated at approximately £3.5 million, with a worst-case construction risk of a further £500,000.
9.0 Conclusions

A preliminary assessment of usage data compared to the existing conditions confirms that improved provisions are required for pedestrians and cyclists wanting to cross the River Great Ouse in the vicinity of St Neots town centre.

A number of options have been investigated and compared. The likely usage and other benefits suggest that a new foot/cycle bridge would be a valuable future asset at this location.

The recommended location for a new river crossing would take users from Regatta Meadow to St Anselm Place, north of St Neots Rowing Club. The new bridge would carry a 4.0m clear width shared use foot/cycle path. This takes account of the requirements of current design standards, available space, the location of other nearby river crossings, user desire lines, third party implications, aesthetics, safety and future maintenance.

Access to the site would be predominantly from the west of the river via the B1048 Crosshall Road, through Regatta Meadow. Given the amount of open space and lack of disruption to traffic, it is likely that the site compound would be situated in Riverside Park adjacent to the proposed bridge location. Access for construction of the foundations on the east would be via the B1041/New Street and Tan Yard/St Anselm Place.

A new bridge at this location offers the most flexibility in the design of the structure as there are less special constraints. A cable stayed structure at this location would enable a relatively shallow steel deck construction and unobtrusive appearance whilst providing a landmark within the meadow and giving the structure a sense of place. This would enhance, rather than detract from, the setting of the meadow and of the riverside. The structure would span much of the parkland until it reaches the west abutment, minimising the number of piers required in the meadow, which would otherwise potentially form obstacles to the flow of water in case of flood events.

The preferred structure would rest on piled concrete foundations and would come at a cost of approximately £3.5-4.0 million, inclusive of likely risk. A worst-case construction risk allowance of a further £500,000 should be allowed for. A more striking asymmetric single pylon structure with a curved deck could be built for approximately £500,000 more.

The usual construction risks, including weather and unknown ground conditions, apply but there are also other potential risks from funding, planning, acquiring necessary rights, public consultation, procurement, third parties and impacts on costs and availability of resources due to Brexit.

The above conclusion is made using assumptions relating to origin-destination trips and the location of trip generators other than exclusively within St Neots town centre. Such assumptions should be validated by conducting surveys and a usage forecast study should be completed to confirm this before revisiting the conclusion to the present report. At that stage, it is recommended that public consultation should take place.
10.0 Recommendations

A new river crossing should be constructed to link Regatta Meadow to St Anselm Place, north of St Neots Rowing Club. This would provide the best opportunity to address current safety concerns for non-motorised users, cyclists in particular, at St Neots Road Bridge who wish to reach the town centre from the west. It would also providing a new convenient route for users who wish to travel to destinations beyond this such as the Railway Station, Longsands Academy, other community facilities or simply for leisure.

This is based on existing usage information, a preliminary assessment of potential trip generators in the vicinity and presumed origin-destination data. Surveys should be carried out to seek input from the public and inform a more formal usage assessment to confirm these assumptions, after which the conclusion to this report should be reviewed and revised if necessary.

A single-tower cable stayed structure is recommended as a suitable option for the new river crossing. This would support a 4.0m clear width steel deck. Whilst more costly than other options considered, it would provide a recognisable landmark, giving it a sense of place, whilst remaining relatively simple and visually unobtrusive. It would enhance the local setting of the open space of Regatta Meadow in contrast to the distinct heritage character of the town centre.

Assuming the conclusions to this report are confirmed by the usage assessment, the following activities should be instigated to help further define the scope of the project and minimise and quantify project risks:

- Further visualisation of the various options to provide realistic illustrations of the design before undertaking public consultation on the scheme;
- Confirmation of land ownership, acquiring rights and any restrictive covenants or leases;
- Liaison with stakeholders and other third parties, in particular both town and district councils, local residents and businesses, local cycling groups, St Neots Rowing Club and any local river users group or association, and the Environment Agency, amongst others;
- Investigating any further improvements to link other cycling infrastructure in the vicinity of the proposed new bridge.

At that stage, it should be possible to confirm the public engagement with the preferred option and proceed with the design and planning phase of the scheme, which would entail the following:

- Identification of funding and procurement options;
- Ecological surveys;
- Ground investigation works;
- Positive confirmation of the location of utility services;
- Topographical survey;
- Statutory planning processes;
- Design and safety auditing.
# Appendix B – Drawings

<table>
<thead>
<tr>
<th>Drawing No</th>
<th>Drawing Title</th>
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<tbody>
<tr>
<td>5040390/BR/FS/100</td>
<td>Potential New Bridge Locations</td>
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<tr>
<td>5040390/BR/FS/101</td>
<td>Location 1 – Option A – Cable Stayed Structure</td>
</tr>
<tr>
<td>5040390/BR/FS/102</td>
<td>Location 1 – Option B – Steel Arch</td>
</tr>
<tr>
<td>5040390/BR/FS/103</td>
<td>Location 2 – Option A – Steel Truss</td>
</tr>
<tr>
<td>5040390/BR/FS/104</td>
<td>Location 3 – Cantilevered Structure</td>
</tr>
<tr>
<td>5040390/BR/FS/105</td>
<td>Location 4 – Option A – Warren Truss</td>
</tr>
<tr>
<td>5040390/BR/FS/106</td>
<td>Location 4 – Option B – Long Truss</td>
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