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The intention of the follow design key aspects is to establish a set of ‘principles’ that underpin the decisions would be made to shape the design.

* Holistic architectural and structural approach to provide a simple, attractive and elegant design which fits the site.

* Enhance the beauty of the place, avoiding intrusive solutions that will block views of the setting.

* Design should be clearly legible for observers from key viewpoints.

* The design should be easily identified and remarkable.

* Consider its scale according to adjacent elements; such as trees or buildings ridge.

* Minimize the impact (physical and visual) at the east bank, given its built environment and constrained character.

* Create an enjoyable crossing experience by ensuring users views all along the bridge.

* Avoid structure depth below walking surface to minimise length of ramps.

* Assess the structural feasibility and buildability of the proposed solutions, as well as the cost.
1. Site Analysis | Constraints and Opportunities
1.1 Wider Analysis of the Site

St Neots, Cambridge

St Neots is a town and civil parish in the non-metropolitan county of Cambridgeshire, within the Hungeringdonshire district and located 24 km west of Cambridge. It had a population of approximately 40,000 in 2014.

It is comprised of a number of ancient settlements situated both sides of the River Great Ouse. The four historic settlements that form the modern town are St Neots, Eynesbury, Eaton Socon an Eaton Ford.

The focus of the town and its component historical settlement centres is an ancient river crossing. The largest of these settlements, St Neots, lies on the east bank of the crossing and gives the name to the modern town. Its origins lie in a Saxon monastic foundation and later market.

Alternative Crossings

1. Samuel Jones Catwalk (1.5 miles to Road Bridge)
2. St Neots Road Bridge
3. Coneygeare Footbridge (0.5 miles to Road Bridge)
Potential Desire Lines

The bridge will be located just north of the road town bridge, linking Regatta Meadow to Priory Lane.

**Destinations** Trip generators

* Longsands Academy is a secondary school and sixth form (age 11-18) > students from Eaton Ford.
* St Neots train station
* St Neots town centre

1. Town Centre St. Neots
2. Cinemas and Restaurants
3. Eat N Bowl
4. Priory Park
5. Longsands Academy Secondary School
6. Riverside Park
7. Great Ouse Valley Way
8. St. Neots train station

- Lines of desired movements
- Key trip generators
St Neots History

The Significance of its Past

St Neots is a town with an ancient market (chartered 1130) in association with an abbey founded in Saxon times (c. 975).

The wealth of the place was built on trade, particularly upon the opening up of the navigation on the Great Ouse in 1639.

Until the 17th century all the settlements were mainly agricultural. During the course of the 17th and 18th centuries the balance of the economy moved in favour of trade and transport, reflecting the settlements’ geographical location.

The railway opened at St. Neots on 1850. The coming of the railway saw the diminution of both long distance road and river traffic. It also opened up the possibility of new markets and commercial opportunities.

By the 1880’s there were extensive industries in the District, including brewing, corn milling, engineering, a gas works, paper mill and brick and tile manufacturers.

New housing was built for the workers as well as more spacious housing for the better off.

Late 19th and early 20th century expansion to the original settlement lay to the North and East of the medieval core. These neighbourhoods are typified by regular, rectangular street patterns laid out within earlier town enclosures.
St Neots Historic Character

Heritage and Conservation

St Neots is the largest town in the county after Cambridge and plays a significant role in the local economy, with several large established employment areas. Retailing is centred on St Neots High Street on the east side of the River Great Ouse.

The area has significant heritage assets, and the entire St Neots town centre has been designated as a conservation area.

St Neot has two Scheduled Ancient Monuments: the site of the Priory and the Maltings.

There are 97 buildings on the National List, of which one (the parish Church of St Mary) is Grade 1.
St Neots sign (popular benchmark)

Malthouse (Kiln is Scheduled Ancient Monument)

View of St Neots town centre

The bridge and the Church tower

United Reforme Church of St Neots

St Mary’s Parish Church

*Anglican church, it is referred to as the Cathedral of Huntingdonshire

*The church as we see it today was rebuilt in its present form in the 15th century and has an impressive 130ft (40m) tower with a peal of 8 bells, and inside there are many interesting carvings on the roof timbers.
Aerial analysis of the Site

Building Character of the area

At the **West side** of the river, the river frontage of Eaton Ford is a significant and accessible meadowland. Then beyond Crosshall Rd, a modern housing development follows a regular pattern with a low-density.

At the **East bank**, the St Neots market square (*) and riverfront are memorable images of the town. In general lines, the historic architecture is on the scale of the market towns and demonstrates St Neots’s relevance as a trading and commercial centre from 17th century onwards. It could be considered as the core settlement area.

It comprises of a dense built-up area, showing a wide range of building types; mainly low-rise commercial and residential.

Island Common and Priory Park were both significant elements within the rural economy, reflecting the importance of the agriculture until middle of the 20th century.
St Neots

Significant Points in the town centre

The bridge will be located just north of the road town bridge, linking Regatta Meadow to Priory Lane. It will create a new link for pedestrian and cyclist coming from Crosshall Road to the town centre.

The new link leads pedestrian and cyclist directly into the town centre, landing at the end of Priory Lane that is less busy than High street and does not accommodate much traffic.

1. Regatta Meadow
2. Cavendish Court (retirement housing)
3. Priory Centre and Town Council Offices
4. Priory House
5. St Neots Library
6. Malthouse (Kiln is Scheduled Ancient Monument)
7. Rowing Club
8. The Bridge House
9. Market Square

- Grade II Listed Buildings
- Cycle Routes

Location Plan St Neots
Flood Plain of River Great Ouse

St Neots lies within the valley of the River Great Ouse, on either side of the river. The valley floor is flat and open, and is liable to flooding, particularly on the west side.

The section reflects the difference between the flood clearance, the river channel, the navigable width established by EA and the navigation envelope to be explored.
Architectural Analysis of the Site

1. Character and Scale
Exploring the general characteristics of both banks layout.
The contrast between the natural and open west side to the built-up and confined east bank.

2. Visual aspect - ‘View of’
The visual analysis of the site from different key viewpoints is essential.
The far view from the existing road bridge is one of the best vantage points. Then the low-level views from the meadow footpaths will allow a closer experience of the structure.

3. Crossing Experience - ‘View from’
Interaction of users with the surrounding elements and with the structure itself.

Plan Diagram empty and full spaces
Plan Diagram Visual Range from the bridge
Plan Diagram Visual Range of the bridge / Views
Plan Diagram Visual Range from the bridge
1.2 Character and Scale

* Contrast between Natural and Built Environment

The following diagram represents the difference in character between both sides of the river.

At the west bank, the meadow represents a natural, open green space. Mature trees also create a green and spacious effect. It results in what could be considered as a soft edge.

By contrast, the east bank comprises a hard and built limit to the river Ouse. This represents the entrance to the town centre of St. Neots.
1.2 Character and Scale

* Contrast between the Open and Constrained character of both banks.

The plan diagram shows the empty and full spaces at both ends. It highlights the contrast between the openness that characterizes the meadow at west side and the constrained character of the space in the built-up area at east side.

A. View of the meadow at west landing

B. View of east built-up landing

Site Plan St Neots showing the empty / full spaces
1.3 Visual Aspect ‘View of’

* Contrast between the crossing and viewing envelope

Looking north from the existing road bridge, the crossing envelope does not match the viewing corridor created by the trees at both banks of the river.

Looking south both envelopes match.
1.3 Visual Aspect ‘View of’

* Key viewpoints

The analysis of relevant bridge viewpoints has the goal to ensure the design addresses the varied views of the bridge.

The perception of the bridge from the east landing could be considered as a ‘framed view’.

In the low-level views from the meadow footpaths, it is important to explore the visibility of the road bridge behind the footbridge. From closer views, the interaction with the structure should be considered.

3. View from East landing looking to the bridge

4. View from Regatta Meadow looking south
1.4 Crossing Experience

The experience of the crossing is related to the interaction of the user with the elements surrounding both the landings, as well as the river crossing itself.

From the East landing, the journey starts in a constrained space, where the buildings and hedge are very close to the users. The space seems to shrink at this point and a potential congestion of users should be avoided here.

Over the river, the users would be able to enjoy an open view to the North, becoming a new vantage point. In the view to South, the proximity to the existing bridge should be considered.

At the West end, the user will be at the river edge at more than 3m over the ground plane, and surrounded by trees on one side. The experience along the approaching ramps should also be carefully studied.

**East Landing**

**West Landing**
1.5 Main constraints

* Hydraulic constraint 3 m over +13.70 AOD water level > envelope height +16.70 AOD (flood level provided +100Q is below navigation clearance)
* At West landing, the ground level is at +14.00 AOD > need 56.10 m ramps @ 1:20
* At East landing, the ground level is at +16.00 AOD > need 17.36 m ramps @ 1:20
* Total length of approaching ramps of approximately 73.5 m. Length of crossing 62.15 m. Total of 135.60 m of crossing experience.
* Height of trees at West bank of maximum +25.00
* Height of trees at West bank of maximum +22.00 and Priory centre ridge at +28.70

* Visual envelope from existing road bridge is approximately 30 m wide.
1.6 Question the navigable width at the bridge location

A closer study of the location for the crossing, not just in elevation but in plan as well, reflects its proximity to the narrowing of the River Ouse.

The vertical clearance (3m over water level) should be respected for the deck arrangement. However, the reconsideration of the navigable width and the possibility of an intermediate support in the river should be studied based on the following reasons;

* River traffic trajectory

The narrowing down of the river channel in the proximity of the bridge (waterlogged piece of land) draws a functional navigation line could allow the placement of an intermediate support in the watercourse.

* Flood / River profile

West bank is only approximately 300mm higher than normal retained water level and due to shallower water, taller boats cannot reach the bank at this point.

* Span length

The shortening of the bridge span dramatically benefits the design. It results in a clear rise in the number of options more suitable for the site. It would be needed to study:

  - Constructibility
  - Cost (approaching section Vs. bridging length)
  - Visual Impact > structural height and possible arrangements have been explored to check their suitability to the site.
The objective of this study is to determine how the span length would influence various structural typologies above deck.
The solutions have been assessed against the design aspirations and conclusions from the site analysis to determine its potential and suitability to the site.

- **Arch | longer span**

- **Asymmetric Arch | shorter span**

- **Vierendel Truss | longer span**
Option Appraisal | Summary 2/3

Fits the site
Enhance the beauty of the place
Visually legible
Appropriate scale
Elegance
Responds to site different character
Minimize the impact at east bank
Positive user experience

Cable Stayed | longer span

Cable Stayed | shorter span

Suspension | longer span
Option Appraisal | Summary 3/3

Fits the site  
Enhance the beauty of the place  
Visually legible  
Appropriate scale  
Elegance  
Responds to site different character  
Minimize the impact at east bank  
Positive user experience

Suspension | shorter span
3. Options | Developed Schemes
3.1 Asymmetric Arch | shorter span

- Fits the site
- Enhance the beauty of the place
- Visually legible
- Appropriate scale
- Elegance
- Responds to site different character
- Minimize the impact at east bank
- Positive user experience

* Respond to the asymmetry of the location balancing out the overall composition.

Sketch View from existing road bridge
3.2 Cable Stayed | longer span

- Fits the site: 
  - [x] Yes
  - [x] No

- Enhance the beauty of the place: 
  - [x] No
  - [x] Yes

- Visually legible: 
  - [x] No
  - [x] Yes

- Appropriate scale: 
  - [x] No
  - [x] Yes

- Elegance: 
  - [x] No
  - [x] Yes

- Responds to site different character: 
  - [x] No
  - [x] Yes

- Minimize the impact at east bank: 
  - [x] No
  - [x] Yes

- Positive user experience: 
  - [x] No
  - [x] Yes

- * Excessive tower height is completely out of scale and disregards the relevance of adjoining and significant high elements (kiln, church’s tower).

- * Overstated presence of the tower in the setting provides a negative visual impact.

- * Visual cluttered arrangement of cables in closer views of the bridge.

Sketch View from existing road bridge
**3.3 Suspension | longer span**

- Fits the site
- Enhance the beauty of the place
- Visually legible
- Appropriate scale
- Elegance
- Responds to site different character
- Minimize the impact at east bank
- Positive user experience

* The visual and physical impact of the structure at the east end is reduced to the minimum.

* Create a progressive sense of threshold at east landing and an enjoyable crossing experience.

* Enhance the beauty of the setting and fit very nicely in the site.

Sketch View from existing road bridge
3.4 Vierendeel Truss | longer span

- Fits the site
- Enhance the beauty of the place
- Visually legible
- Appropriate scale
- Elegance
- Responds to site different character
- Minimize the impact at east bank
- Positive user experience

- Visually heavy appearance, it obstructs far views of the meadow and surrounding.
- Experience of the crossing is unpleasant since the structure blocks the users views from the bridge.
- The transitions at both ends are too sharp, unattractive for the users.

Sketch View from existing road bridge
Asymmetric Arch

**Pro’s**
- It uses less steel than the truss and the arch solution so has less impact from use of raw materials
- Future Inspection is relatively straightforward.
- There would be no bearings that require replacement in the future reducing the maintenance liability.
- Main arches could be lifted in separate and could be used to support temporary platforms making the work needed over water and at height safer.
- The bridge fits the site well and responds to the asymmetry of the location.
- It is visually legible and its scale is appropriate in the setting.
- It offers a positive user experience
- It responds well to the character of the site.
- Arch bridges are reassuring and well received for the public.

**Con’s**
- The design would need to include more extensive flood modelling and mitigation.
- Uses more steel than the other options.
- The pier in the river will require additional flood mitigation which could impact on other areas of the watercourse or park affecting the local environment.
- Requirement to construct and remove a cofferdam in the watercourse would increase the duration of the works and increases the construction complexity, hazards and risks to be managed.
- The foundations at the East side would need to be larger adjacent to the priory centre.

Suspension

**Pro’s**
- Fits the site well
- Enhances the beauty of the place
- Minimises visual impact on the East bank
- Provides a positive user experience
- Is elegant and responds to the character of the site.

**Con’s**
- The need to anchor the suspension cables makes the design of the foundations or the deck itself more complex.
- Dynamic effects would need to be modelled. The foundations on the East side will require large anchor blocks and more piles set back from the river either temporary or permanent.
- The construction of the deck would need to be sequential.
- It would require more work to be carried out over the watercourse and at relatively increased height making the construction more hazardous.
- If larger foundations are required on the East side more risk of affecting utilities.
- Will require specialist inspection of tower, cables, hangers and connections in the future.
- Replacement of hangers or other elements in the future would require significant work.

Cable Stayed

**Pro’s**
- Design is relatively simple in comparison.
- The foundations on the East side would not need to be as large.
- Smaller elements to be lifted during construction
- It is the least expensive option.
- It uses less steel than the truss and the arch solution so has less impact from use of raw materials

**Con’s**
- Dynamic effects would need to be modelled and could increase costs.
- The construction of the deck would need to be sequential to balance the forces which increases the duration of the works.
- Due to the method of construction more work at height and above the watercourse would make the construction more hazardous.
- The form of construction does not fit the site because of its inappropriate scale or enhance the beauty of the place.
- Overstated presence of the tower in the setting provides a negative visual impact.
- It is not considered and elegant solution and does not enhance the beauty of the place. Not respond well to the character of the site.
- It doesn’t offer a positive user experience due to the overwhelming presence of the high tower and the potential visual cluttered arrangement of cables in closer views of the bridge.
- Will require specialist inspection of tower, cables and connections.
- Replacement of cables would need significant work if required in the future.
- An understated design has a ‘cheap appearance’. Architecturally challenging.
- Significant cost escalation when trying to add identity to the design.

Vierendeel Truss

**Pro’s**
- Design is relatively simple in comparison.
- The truss can be constructed in the riverside park and lifted in one piece.
- Slightly shorter construction programme than other options.
- Lifting the bridge in one piece from the riverside park limits the amount of construction work that would need to be carried out above the water and/or at height.
- Future inspection is relatively straightforward.

**Con’s**
- Foundations on the East side will be relatively large.
- A relatively large Crane will be required needing a larger crane pad/foundation
- Uses more steel than other options
- Larger crane pad will require more excavation, material and re-instatement.
- There is a larger area of steelwork that will need cyclic repainting.
- Bearings would need to be replaced in the future.
- It doesn’t fit the site or respond to the asymmetric character of the site.
- It doesn’t enhance the beauty of the location, is visually intrusive and is not elegant in appearance.
- The visual impact at the East bank is significant
- It doesn’t offer a positive user experience
- The lack of a clear architectural identity makes the design more susceptible to be replaced by a more standard solution.
- Architectural details required to make appearance acceptable, likely to add cost.
4. Viable Options | Selection for Public Consultation
Option 1 | Asymmetric Arch Bridge
View from existing road bridge looking North
View from regatta meadow looking South
St Neots Foot and Cycle Bridge

View from West landing
St Neots Foot and Cycle Bridge

Aerial view of the scheme
General Definition
Option 2 | Cable Stayed Bridge

Elevation view

Plan view
View from existing road bridge looking North
View from regatta meadow looking South
St Neots Foot and Cycle Bridge

Cross Section

View from East landing
St Neots Foot and Cycle Bridge

View from East landing
Option 3 | Suspension Bridge

Elevation view

Plan view
View from existing road bridge looking North
St Neots Foot and Cycle Bridge

View from regatta meadow looking South
St Neots Foot and Cycle Bridge

View from West landing
Aerial view of the scheme
Cross Section AA'

Main Cable
Suspenders Cables

Elevation 1:300

Plan 1:300

General Definition