Altrincham Town Centre Cycle Link: Cycle Bridge

Options Selection Report

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Contents

1. Summary

- This report investigates the options for a new, low-budget cycle route scheme for Trafford City Council (TCC) to improve cyclist access from the Bridgewater Way to Altrincham town centre. Amey is now in partnership with TCC, but for the purposes of this scheme TCC is effectively in the 'Client' role and Amey Belfast in 'Designer' role.
- The proposed route consists of three principal elements: 1) a short-span bridge (approx. 20m) with access ramps, located approximately halfway between the A56/Manchester Rd to the southwest and a railway bridge to the northeast; 2) a quiet cycle route from Wharf Road to Altrincham Town Centre, primarily on low-traffic residential roads; 3) installation of new cycle path along the south of the canal from the bridge to Wharf Road (design/construction by the Canal Company).
- This Options Selection report focuses on the bridge, as it is the key element for the whole scheme. Without the bridge there will be no cycle link. Planning permission will be required for the bridge.
- Design is to be to Eurocodes, and in general accordance with DMRB, taking into consideration guidance in the Transport for Greater Manchester Cycle Design Guide and (where necessary) Sustrans guidance documentation.

2. Background and Constraints: Bridge and Ramps

2.1. Disused railway viaduct

- Railway built in 1875 (according to Trafford Council)
- Use narrow crossing point to keep the span (and hence costs) to a minimum.
- Use old railway embankment to south to reduce fill requirements for approach ramp.
- South abutment may need to be founded partly on top of former viaduct foundations – preconsolidated ground unlikely to need piles (TBC by GI results), though there may be complications with brick abutment footings.

2.2. Availability of land

- Keep bridge/ramps on TCC land, and aim to minimise land take as far as practicable; liaise with Canal Company for aspects that affect canal and towpath, and avoid loading/surcharging the canal wall. Canal is likely to be around 1.5m deep (based on typical sketch provided).
- Land to north (playing fields and vegetated area) is owned by TCC.

- Disused railway embankment to south, also vegetated, is owned by TCC.
- Canal Company owns towpath along north side of canal and strip of land immediately adjacent to canal along south side.
- No access from canal through former depot to Bridgewater Road: land has recently been sold to a property developer.
- In a meeting on site (14 Jan 2015) attended by TCC and Canal Company, the Canal Company generally indicated they were supportive of the scheme (bridge with ramps, cycle route connecting to BWW and to residential roads).
- See Land Ownership plan in Appendix B.

2.3. Canal constraints

- Canal built in 1764 (according to Trafford Council)
- No archive records/drawings available for this area. Indicative typical cross-section sketch provided by the Canal Company – see Appendix F.
- Horizontal clearance: Minimum towpath width (as advised by Canal Company) is 1.8m, plus 0.6m wall. For design purposes assume min 2.5m clearance required from front (water) edge of wall to back of towpath.
- Vertical clearance: 4m to soffit from water level would be best height to work to, with 3.5m as a minimum (this was confirmed by Canal Company). Site visit in September 2015 indicated towpath level is approx. 0.5m above water level, so for option/feasibility purposes bridge deck surface is assumed to be 3.5m above towpath level.

2.4. Construction access

- Good access to north abutment for construction vehicles and materials.
- Limited access to south abutment (max 1 tonne plant permitted along tow path) unless arrangements can be made with local landowners.

2.5. Effect on local residents

- Residents to south (Lampton Close) will be affected by vegetation clearance – may complain.
- Visual intrusion of bridge and ramps on residents to south (Lampton Close) – potential reduction to privacy – pedestrians on bridge/ramps may be able to look into gardens.
- Little effect on residents to north. Workshops in arches on Viaduct Road unlikely to be affected significantly, though in future more cyclists may use Viaduct Road to access the bridge.

2.6. Other

- Ground conditions and water table not known. South abutment area likely to be sound and pre-consolidated by former railway viaduct/embankment. Potential for industrial pollution from previous use of the land. Assume that most of excavated arrisings will be suitable for re-use on site. All the above TBC by GI results.
- Based on their experience, Trafford Council recommends off-the-shelf steel truss bridge and earth embankments (gabions), with 1:15 ramps and no stairs.
- Trafford Council instructed no lighting or CCTV is to be provided (if it were provided, it would set precedence for rest of canal).

3. Options Considered for Bridge and approaches

3.1. Bridge deck

3.1.1. Basic geometry:

- 20m overall length should provide adequate clear span (TBC by topographical survey)
- Absolute min width of bridge is 2.0m between handrails; assume 2.5m min in design.
- Parapet height 1.4m above deck surface level.

3.1.2. Steel Bridge:

- Steel preferred by Trafford Council due to low maintenance, long design life, economy of off-the-shelf solution
- Transportation and installation as one element
- Aesthetically pleasing Vierendeel trusses available on the market at reasonable cost
- Slip-resistant finish can be installed in shop

3.1.3. Timber Bridge

- Uses natural products (wood)
- Likely to be aesthetically pleasing
- Initial capital spend potentially lower if standard 20m design is available off-the-shelf, but preliminary research indicates this length may not be readily available.
- Design life shorter than steel bridge

3.2. Bridge abutments

3.2.1. Reinforced concrete L-shape/C-shape (in plan) cantilever retaining wall solution considered most appropriate, with heel beneath retained fill and small toe protruding towards canal. Other options not considered.

3.2.2. North abutment is assumed to require piling, but at the south abutment a pad foundation may suffice. TBC during design and with results of GI.

3.2.3. Abutment seat/bearing shelf will require careful detailing.

3.3. Ramps

3.3.1. Basic geometry:

- Ramp slope must not be steeper than 1:12, and ideally (for cyclists) should be shallower than 1:20. If 1:20 or steeper, ramps require min 2m landing for each 650mm rise. Min length of ramp for 1:21 gradient would be 73.5m; length of ramp for 1:15 gradient would be 62.5m.
- Min radius for a cycle path is 4m, or 2m where two cycle paths intersect.
- Absolute min width of ramp is 2.5m; assume 3.0m min in design.
- Handrails required, 1.4m high above ramp surface
- Consider doubling-back the ramp so that cyclists/pedestrians are returned to the towpath (rather than increase overall route length). This introduces a 180 degree bend in the route (not ideal for cyclists). Weigh the disadvantage of the bend against the advantage of minimising land take and (on the south side) keeping ramps as far from residential properties as possible
- Avoid creating concealed 'hiding areas' as they could result in security issues and encourage vandalism

3.3.2. Materials:

- Steel – not preferred by TCC due to required maintenance (based on Trafford Council's experience); steel ramps tend to be visually intrusive; less likely to be available off-the-shelf
- Timber – not considered in any detail. 20m span fairly large for timber footbridge, less likely to find inexpensive off-the-shelf solutions. Design life much lower than steel.
- Earth – preferred by Trafford Council as economical, practical solution with lower maintenance requirements. Potential for re-use of excavated material within the ramp (if contamination levels permit).
    - Natural slope – supports slope angle max 45 degrees, hence requires considerable land take. Grassed finish.

- Greenslope – supports slope angle of up to 70 degrees. Grassed finish. Establishing and maintaining long-term vegetation growth on the slope can be difficult, in Trafford Council's experience.
- Gabions – supports near-vertical slope angle. Potential safety issues with children climbing. Requires ongoing minor maintenance.

3.3.3. North ramp configuration:

- Ramp orientation may vary (TBC by Canal Company for options closer to canal) as TCC owns all land immediately to north, up to wall of former viaduct – see sketches in Appendix.
- Configuration may vary – two straight legs, one long straight leg, curved or circular/elliptical options with gradient shallower than 1:20. See sketches in Appendix

3.3.4. South ramp configuration:

- Land owned by TCC is limited. Orientation and configuration of ramp should be adjusted to fit within this land if possible.
- Use former railway embankment to scheme advantage: route may be able to use the side of the embankment to descend to towpath level, thus minimising fill required.
- Sketch of Option 1 in Appendix C shows the option that best fits within Trafford Council land.

4. Discussion

4.1. Bridge deck

Option	Steel	Timber
Cost	Economical.	Potentially reasonable if available off –the-shelf
Visual impact in green canal-side setting	Potentially pleasing depending on supplier	Pleasing
Other advantages	Slip-resistant finish can be installed in shop. Preferred by Trafford, based on experience.	Uses natural products.
Other disadvantages		Design life shorter than steel.

4.2. Bridge abutments

4.2.1. Reinforced concrete abutments considered most appropriate solution, based on experience.

4.3. Ramps

Option	Steel	Earth: natural slope	Earth: greenslope	Earth: gabions
Cost	Not investigated	Higher cost as requires extensive imported fill	Moderate cost as requires less imported fill for ramp	Low cost based on excavated fill being used for much of the fill inside gabion ramp. Cost of gabions comparable to green slope.
Land take	Minimal	Extensive	Moderate (face sloped at 20 degrees to vertical)	Moderate (gabion face sloped at 6-8 degrees to vertical)
Visual impact in green canal-side setting	Incongruous, less attractive	Attractive but potentially bulky	Attractive	Moderately attractive, improving with vegetation
Other advantages	Potential for prefabrication off-site	Easy to maintain	Easy to maintain, in theory	Relatively easy to maintain. Preferred by Trafford.
Other disadvantages	Not preferred by Trafford due to maintenance required		Difficult to establish long-term vegetation growth.	Potentially vulnerable to vandalism

5. Summary of Costs

- A high-level construction cost summary is included in Appendix E, as an approximate estimate only, for a) gabion ramps and b) greenslope ramps. This has been discussed with Trafford Council and comments incorporated as far as possible for the feasibility stage of the project.

6. Recommendations

- Recommended solution is supplier-designed off-the-shelf steel Vierendeel truss, with reinforced concrete abutments and wing walls in the form of cantilever retaining walls, piled if necessary. Ramps to comprise gabions, using as much excavated material as possible as inner fill.
- Recommended bridge location and ramp configuration is approximately as shown in Option 1 in Appendix C, as it minimises both land take and the number of bends for cyclists, and is located as far from residential property as possible (within Trafford Council land) whilst also minimising the span of the bridge deck to keep costs down.

Appendix A

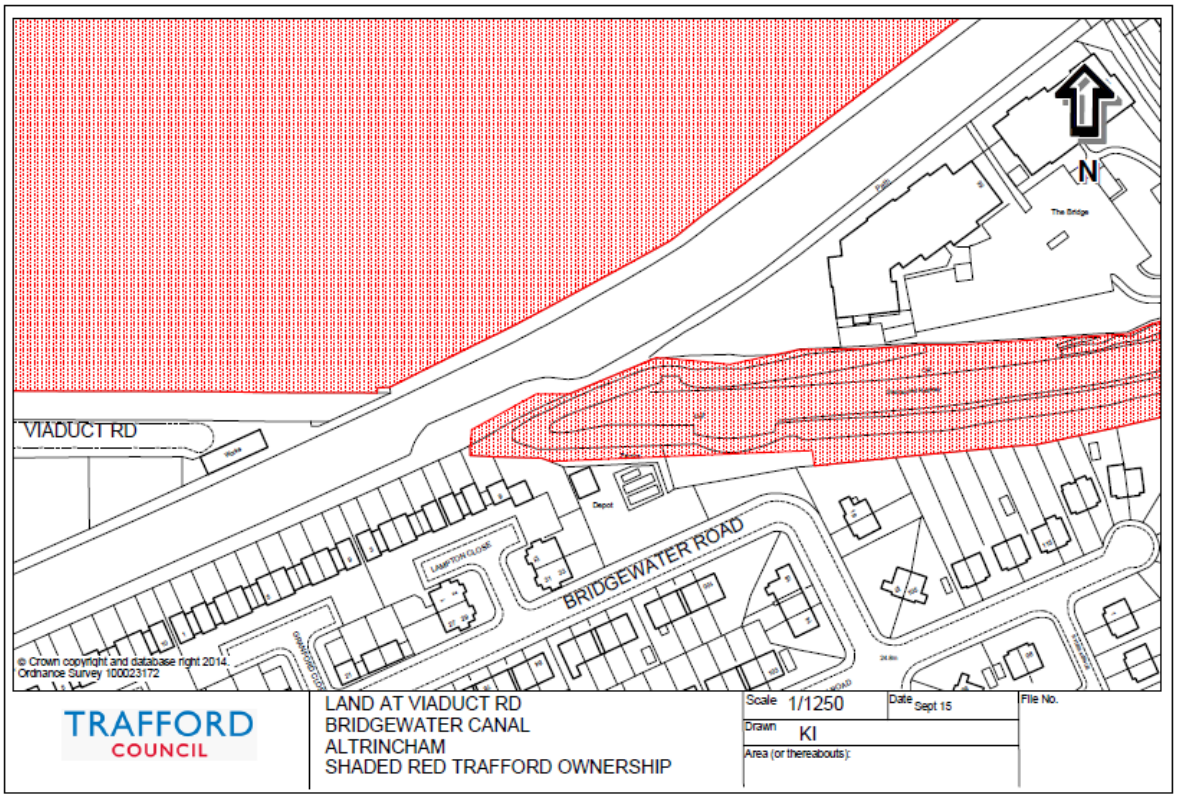
Location Plan


Eccles
M602
Manchester
A6010
A5063
A57
M60
A34
A57
A56
A5103
A6
Urmston
Stretford
Carrington
A5103
Sale
A34
M60
M60
A560
Dunham Massey
Altrincham
M56
Cheadle
Cheadle Hulme
Hale Barns
Heald Green


A56
Balfour Rd
Church Hill Rd
Canal Rd
Bridgewater Way
Viaduct Rd
Halfords
Broadheath Central JFC
Halfords Autocentre
Bridgewater Way
Brunswick Rd

Appendix B

Land ownership layout

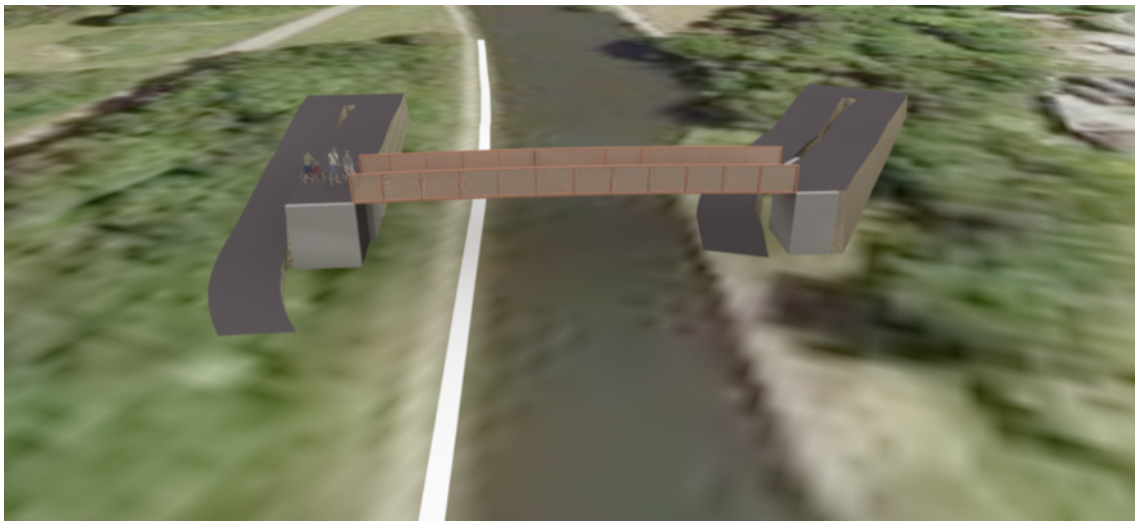

N
VIADUCT RD
BRIDGEWATER ROAD
LAMPTON CLOSE
Depot
The Bridge
© Crown copyright and database right 2014.
Ordnance Survey 100023172
TRAFFORD
COUNCIL
LAND AT VIADUCT RD
BRIDGEWATER CANAL
ALTRINCHAM
SHADED RED TRAFFORD OWNERSHIP
Scale 1/1250
Date Dept 15
File No.
Drawn KI
Area (or thereabouts):

Appendix C

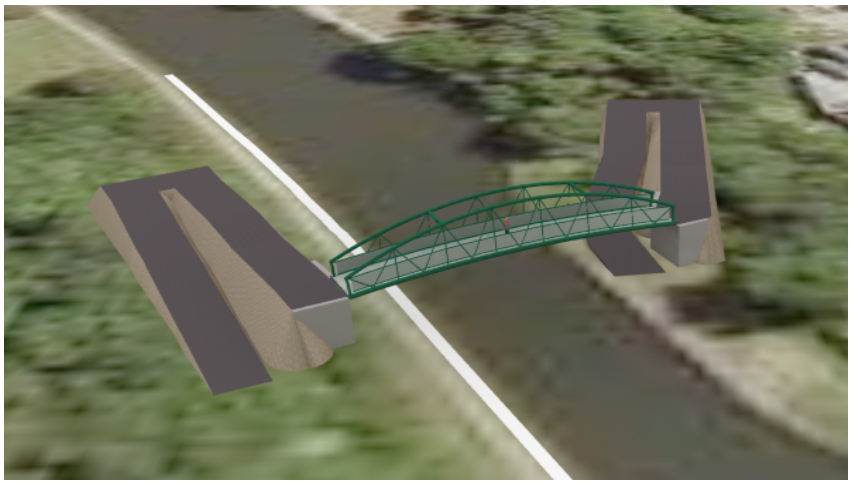
Sketches of ramp configuration options

Option 1 (recommended)

With gabion ramps:

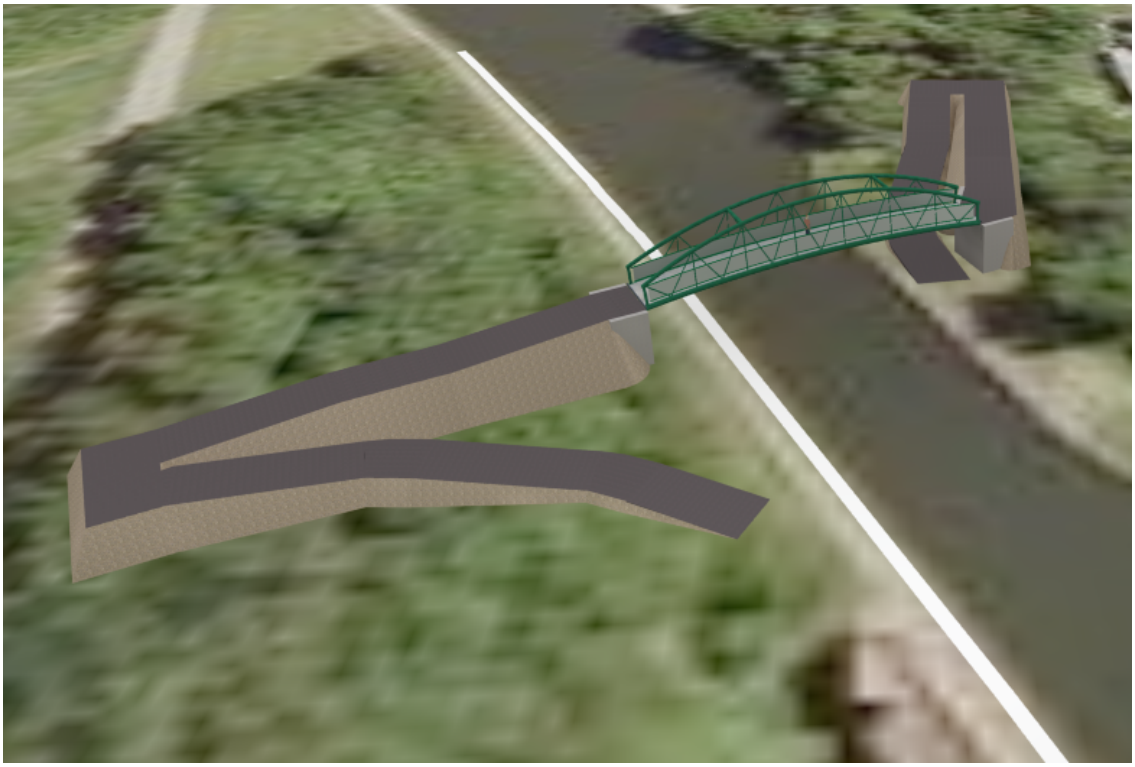


With greenslope ramps:



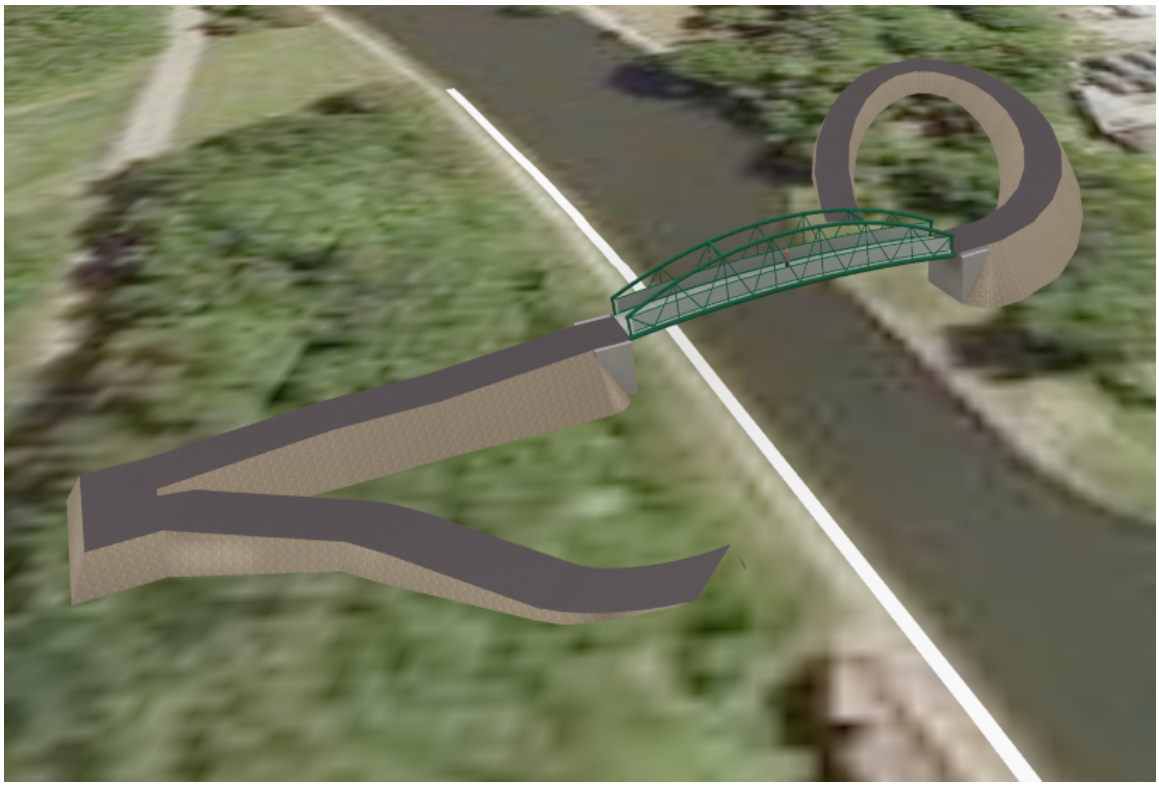
Option 2

Explores potential for different ramp position on north side of canal. Less efficient use of land for little gain. Options shown are interchangeable north/south.



Option 3

Explores potential for a shallower ramp on south side of canal, removing sharp bends (undesirable for cyclists) and the need for intermediate landings. Options shown are interchangeable north/south. Extensive, inefficient land take.



Appendix D

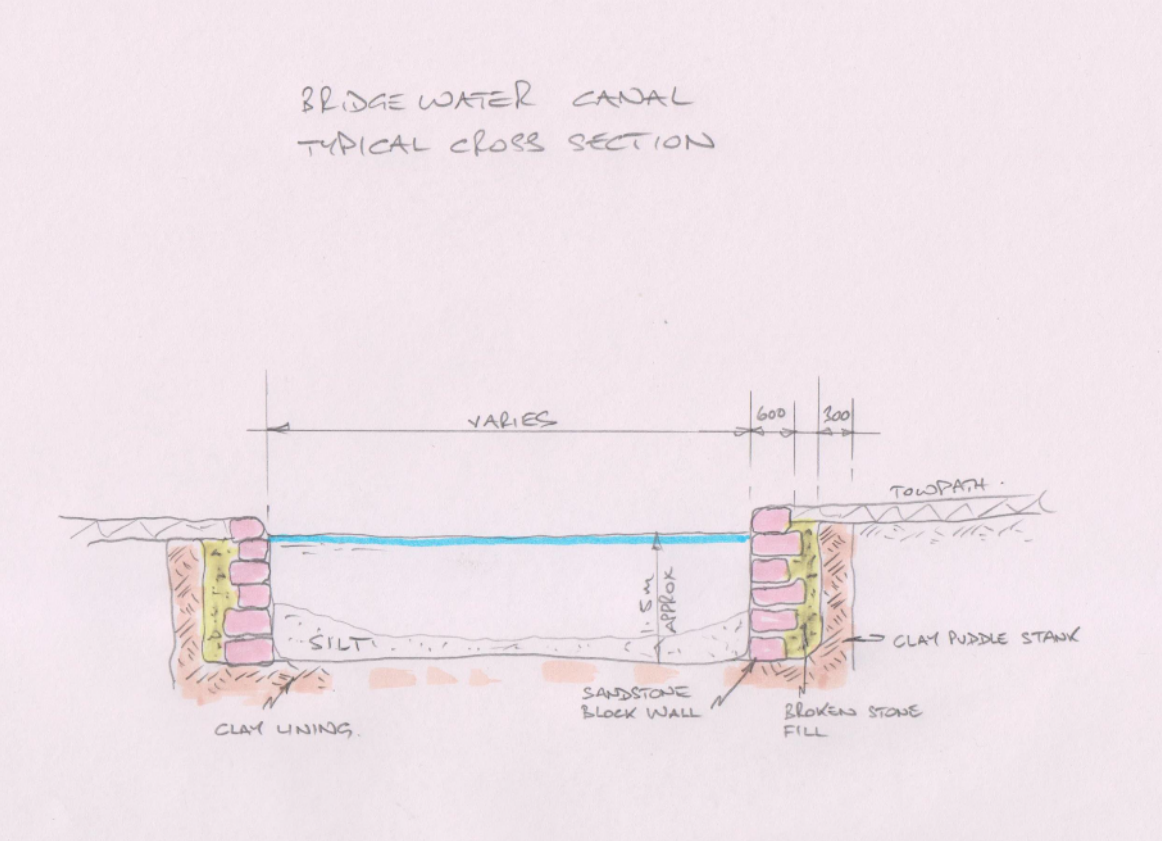
Original Business Case

Appendix E

High-Level Construction Cost

Appendix F

Indicative typical Canal Cross-section (provided by Canal Company)


BRIDGE WATER CANAL
TYPICAL CROSS SECTION
VARIES
600
300
TOWPATH
1.5M APPROX
SILT
CLAY PUDDLE STANK
SANDSTONE BLOCK WALL
BROKEN STONE FILL
CLAY LINING

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