Stafford Riverway Link Community Interest Company

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Outline-Feasibility Study
June 2012

Halcrow Group Limited

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Contents Amendment Record

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
1	0	Draft environmental report	Jan 12	SAC
2	1	Draft report	April 12	PAW
2	2	Final Draft	May 12	PAW
3	4	Final Report	June 12	PAW

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1 Executive Summary

This study has been carried out in order to determine the feasibility of restoring the Stafford Riverway Canal Link starting in the village of Baswich, Staffordshire at the proposed junction with the Staffordshire and Worcestershire Canal to the west of Bridge 101 and ending in Stafford town centre in the north.

In order to address this, an engineering assessment, environmental assessment and economic assessment have been carried out to determine whether any 'show-stopping' issues or constraints exist.

The objectives of the Stafford Riverway Canal Link are to promote the restoration of the historic river and canal waterway linking Stafford town with the national waterway network. Secondly, the link aims to stimulate public interest in protecting the wildlife and respecting the history of the Riverway Link.

The conclusion of this report is that this is a technically feasible project. Whilst there are some issues to address, with the appropriate work and consultation this should be achievable.

From an engineering perspective, the main issue to address is that of flood risk and water management. This will be both in terms of constructing the works without any negative impact on flood risk and also how the waterway will be managed from a flood warning perspective. At the Baswich end of the link, the 1 in 100 year flood level reaches approximately 2 metres above the existing ground level. Safe harbours for moored boats would need to be considered.

A high level desk study has also been carried out to assess the environmental constraints and opportunities of the proposed scheme. The high level desk study did not identify any major issues. However, additional detailed work will be required which will further examine potential environmental constraints.

The restored canal will help maximise the potential of key economic drivers along its route and will create new opportunities for economic growth and prosperity. Beyond the purely economic benefits (job creation, increased visitor footfall, etc), the restored canal is likely to deliver wider social benefits.

Obtaining the required capital funding to allow construction of this scheme will pose a significant challenge for the scheme promoters. With a well planned strategy and the correct partners brought in to the project team, it may be possible to secure funding using a broad range of different funders.

A sensible strategy may be to break the scheme down and reduce the initial specification required for navigation, for example going initially for a water depth of 1.2 metres with the aim of increasing at a later date to 1.6 metres. This would allow the project to move more quickly and capture public imagination as they see boats once again on the River Sow.

2 Introduction

2.1 *Study background*

Halcrow Group Ltd was commissioned in December 2011 to undertake an outline feasibility study on the restoration of the Stafford Riverway Link from Baswich to Stafford town centre

This feasibility study has been undertaken on behalf of Stafford Riverway Link Community Interest Company. Copyright for this report lies jointly between Stafford Riverway Link Community Interest Company, the Inland Waterway Association and Staffordshire County Council.

2.2 *Study aims*

The aims of this study are to determine the feasibility and cost of providing navigation from the Staffs and Worcester Canal in to the centre of Stafford and to assess what the major issues relating to this restoration may be.

This study looks at the following areas:

- Engineering feasibility including a high level cost estimate
- High level environmental assessment
- Economic assessment.

2.3 *Limits of study*

This limited study has been undertaken to determine whether this is a feasible project, rather than necessarily determining what the optimum solution for the restoration may be.

It has been based on an initial walkover and using available OS mapping. All levels are based on available information and may be subject to error. No detailed surveys or topographic surveys have been undertaken. No landowner consultation has been carried out and no formal consultation with statutory environmental bodies has taken place.

A detailed assessment of the water supply and management has not been undertaken as part of this study though a high level assessment has been made.

A number of options have been identified as part of the engineering assessment; however it has not been possible within the scope of this study to assess all possible solutions in sufficient detail to determine the optimum solution.

3 Engineering Assessment

3.1 *Background*

The original Sow Navigation was completed in 1816 and connected the Staffs and Worcester Canal at Baswich with the centre of Stafford. This is in part through new channel cut and in part through canalisation of the existing River Sow channel.

The connection at Baswich was via a single lock down from the Staffs and Worcester Canal with an aqueduct carrying the canal over the River Penk. The Sow was then canalised with some new channel cut to straighten out bends.

The navigation was privately constructed by Lord Stafford and was leased by the Staffs and Worcester Canal Company until 1927. At this point the lease was not renewed and the navigation began to fall into disuse, with parts being infilled in the 1930's and the rest of the channel continuing to decline. Much of the lock infrastructure was then finally removed in the 1970's as part of a scheme to improve flood relief of the Penk and Sow.

Plans to restore the navigation were first raised by the local canal society in 1975 and have been raised at various points since. In 2002 part of the old lock structure was found adjacent to the Staffs and Worcester Canal. The restoration is now promoted by the Stafford Riverway Link group.

3.2 *Water management*

While water management of the canal has not been fully assessed, this is expected to be a significant issue will require a full assessment.

Water supply (as opposed to management of un-wanted water) is unlikely to be a significant issue as the navigation will run along the Sow with no locks required within the channel. An assessment of water availability from the Staffs and Worcester Canal will be required for lock operation. This should not prove a critical issue as the lock will be located adjacent to an existing waste weir and the worst case would be the requirement of a back-pump around the lock.

Water management on the new navigation will require hydraulic modelling in order to assess the impact of the proposals on flood risk and the existing flood plain.

This has been assessed at a very high level. The latest flood maps of this area are available from the Environment Agency website at http://www.environment-agency.gov.uk/homeandleisure/37837.aspx

It may be possible that the navigation works can be used to reduce flood risk to Stafford. This should be discussed with the Environment Agency as part of a further study.

3.3 Route description

The route runs approximately east – west from Baswich in the east to the centre of Stafford in the west.

An illustration of this route can be seen in Figure 3.1 below.

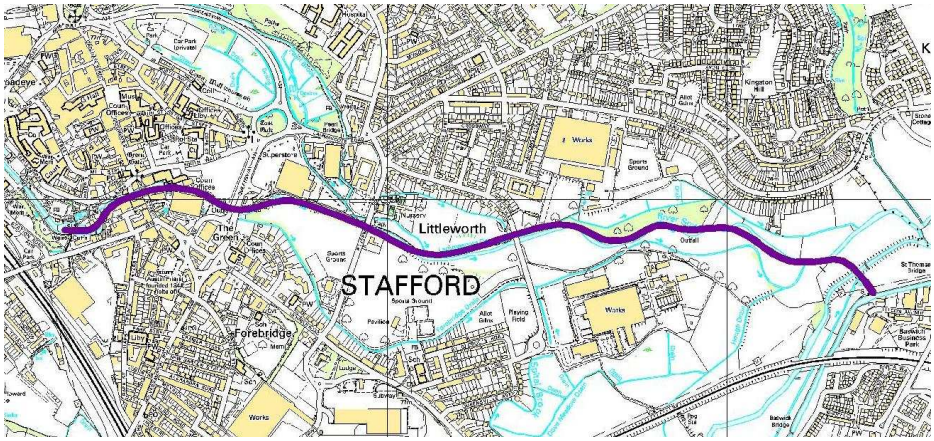


Figure 3.1 – layout of route

Along a significant length of this route, the Sow runs through a rural area with set back development. This area has remained undeveloped probably in large part due to the floodplain for the Sow.

A description of the route and various works anticipated is given in the following sections below.

- Staffs and Worcester to River Sow Junction
- River Sow Junction to Fairway Bridge
- Fairway Bridge
- Fairway Bridge to Riversway Bridge
- Riversway Bridge
- Riversway Bridge to Asda
- Asda to Queensway Bridge

- Queensway Bridge
- Queensway Bridge to Bridge Street
- Bridge Street
- Bridge Street to Victoria Park
- Victoria Park

3.3.1 *Staffs and Worcester to River Sow Junction*

The existing pound level of the Staffs and Worcester Canal at Baswich appears from OS mapping to be at a level of approximately 75m AOD.

In order to restore navigation it would be logical to fully excavate the original lock and rebuild in the original location as it is believe the original invert may be restorable. An assessment of the cills levels would be required to ensure these still suit the required water levels and if necessary this may need adjustment. If cill levels are too high, this would require construction of a new lock.

Figure 3.2 – Location of proposed junction with Staffs and Worcester Canal

The canal will then need to cross the River Penk. There are a number of options for achieving this depending upon levels and acceptance by statutory bodies. These are:

1. **Construction of an aqueduct** – this would use, as described above, the original local location on the northern side of the Penk in order to gain sufficient freeboard to ensure the aqueduct does not increase flood risk by creating a constriction in flow. At this location the water level during a large flood reaches as high as 73.6m meaning that this may not be a viable solution and will require further discussion with the Environment Agency.
2. **Construction of a siphonic culvert** carrying the Penk below the canal. This is unlikely to obtain approval from the Environment Agency, however it would have the benefit of removing construction from the flood plain and allowing the Penk to flow across in to the canal during high flows, thereby bypassing the siphonic culvert. A new lock would be required on the south of the Penk.
3. **Lock the canal down** in to the Penk and cross at the existing water level. This is likely to be simplest option; however, this will then fix the water level of the canal at that of the Penk unless the Penk is impounded through the construction of a weir downstream. Construction of a weir may increase flood risk on the Penk. This would also require a new lock on the south of the Penk.

Figure 3.3 – River Penk

The solution to the Penk crossing must be seen in context with the navigation works further towards Stafford so will be discussed further below.

Once past the Penk, a short section of new cut channel will be required to join with the River Sow.

3.3.2 *River Sow Junction to Fairway Bridge*

For this section there are two possible options; these are:

1. Canalisation of the River Sow

2. Construction of a new cut channel adjacent to the River Sow, joining the Sow further to the west.

These two options are shown on the plan below.

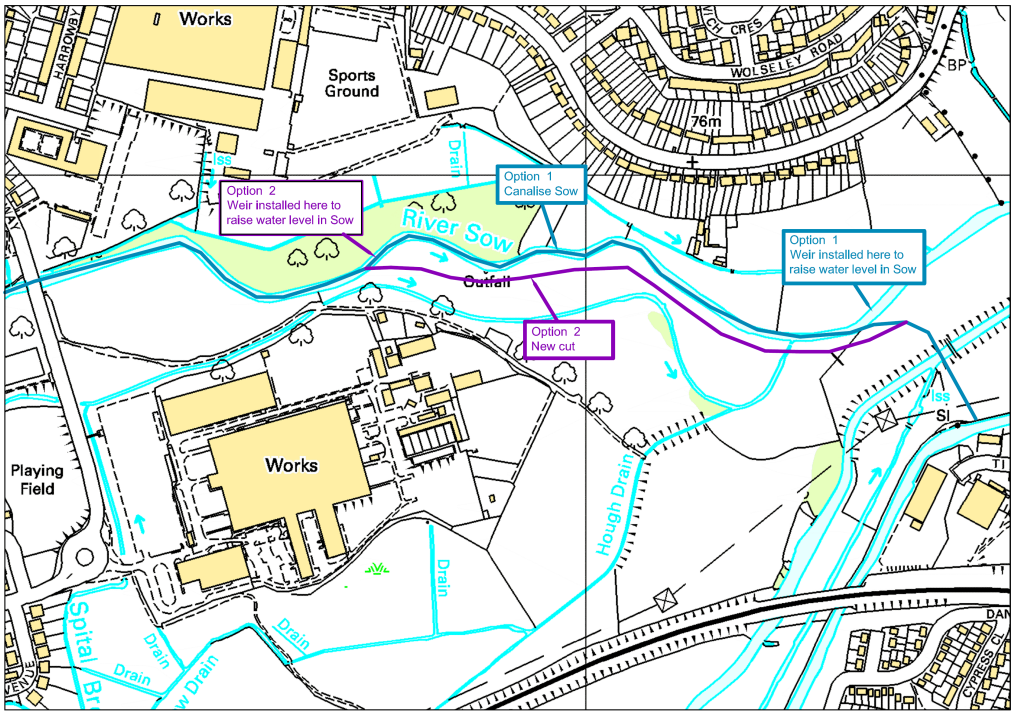


Figure 3.4 – Plan showing section between Staffs and Worcester and Fairway Bridge

Both of these options appear feasible and both have pros and cons.

Option 1

The main benefit of joining the Sow immediately is the existing hydraulic continuity between the Sow and the Penk meaning the option of crossing the Penk in section 3.3.1 above could be more straight forward. However, this benefit would be removed if a new weir is constructed across the Sow at the location indicated above in order to raise water levels. Without water levels being raised a significant amount of channel deepening would be required for the entire length of the Sow.

Figure 3.5 – River Sow

Through this section the Sow varies between 3 metres and 4 metres wide so significant widening and bank works would be required to provide a navigable width.

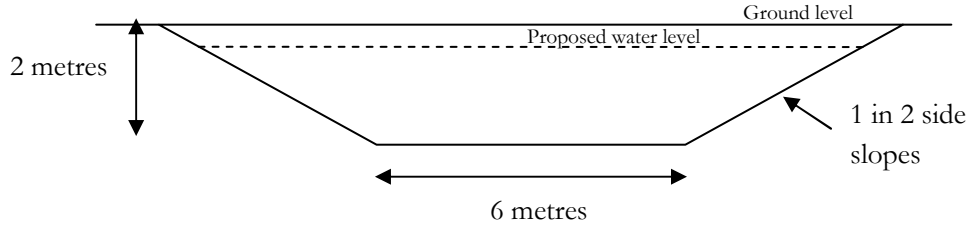
In order to provide a 6 metre wide navigation at a depth of 1.6 metres, it is estimated that approximately 6.6 m^3 per linear metre would need to be excavated from the channel. Over the length of 630 metres this would generate 4,158 m^3 of material. This is likely to be a mix of inert and non-hazardous material due to its organic content. Assuming a 70:30 split between the two classifications inert:non-haz, this could cost in the region of £275,000. However, re-use of the material somewhere nearby would be the preferred solution and opportunities for this should be investigated as it could significantly reduce this cost.

Option 2

Given the amount of work that would be required within the existing river channel in order to make this navigable, it is likely to be more straightforward to create a new cut channel adjacent to the River Sow. This would have a number of benefits:

- Make construction quicker and easier, possibly allowing work to be undertaken by volunteer groups as there is no need to deal with existing river flows, though infiltration from ground water would need to be dealt with.
- Reduce risk of pollution from construction entering the Sow from spillages
- Reduce risk of pollution from construction entering the Sow from stirring up of suspended solids
- Reduce environmental impact on Sow by leaving a large section undisturbed
- Provide possible flood storage within the new canal channel to mitigate effects upstream from construction of a weir.

The most significant issue that would need to be addressed would be the disposal of the material excavated from the channel. The new cut would be approximately 630 metre long so with an assumed a profile as shown below, this will generate 12,600 m^3 of material. This is likely to be inert material in which case disposal to tip may cost in the region of £250,000. This would be significantly higher if the material were classified as non-hazardous as landfill tax will then be payable at a higher rate. However, re-use of the material somewhere nearby would be the preferred solution and opportunities for this should be investigated as it could significantly reduce this cost.



Weir Construction

Whether the weir is located as per option 1 or 2, it is likely that it would have the same crest level. This is as the hydraulic gradient along the river between these two points is likely to be relatively flat.

At the time of writing, no flow data was available for the river so assumptions have been made in order to provide guidance on the likely size and level of the weir required. This weir will define the water level and consequently the dredging required for the navigation for most of the route. In order to assess water levels, the following assumptions have been made:

Flow over the weir is approximated by the equation: $Q = 1.75bh^{\frac{3}{2}}$

where

Q = Flow over the weir
b = width of the weir
h = depth of flow above the weir crest

Assuming a normal flow down the Sow of 3 cumecs (cubic metres per second) and weir width of 5 metres, which would fit across the existing channel, this would give a normal depth of flow over the weir crest of approximately 500mm. A drop in flow to 1 cumec would reduce this to 235mm, thereby reducing the navigable depth by 265mm.

Two different weir crest levels have been assessed. These are 71.1m which would give a normal navigation level of 71.6m AOD and 71.5m which would give a normal navigation level of 72.0m AOD.

It should be noted that if the assumptions of flow are not correct, this does not significantly alter the feasibility assessment as it is the final water level that is relevant for this and the weir would be designed to provide the correct final water level. Weir calculations are shown for info only to provide guidance on possible water level fluctuations.

The assessment of water level and dredging will be discussed in more detail below in each section where this is relevant.

From the location where Option 2 joins the Sow to Fairway Bridge, the existing channel is approximately 5 metres wide. With the water level through this section increased to 72m AOD, this should provide a navigable channel width with minimal dredging required.

It would be necessary for this weir to incorporate a fish pass.

Figure 3.6 – River Sow at Option 2 confluence location

3.3.3 *Fairway Bridge*

It is estimated that during normal flows (we have assumed normal flows on the day the site visit was undertaken – 12th January 2012) the existing air draft between water level and bridge soffit is approximately 4 metres. With a weir increasing the water level to 72m AOD, this will still leave an air draft of 3.3m which is acceptable.

Some dredging is likely to be required below the bridge to provide the required navigation depth of 1.6m. The bridge abutments are of brick construction but appear to have steel sheet pile protection with concrete infill behind. It is likely that this will be sufficient to allow the necessary dredging to be carried out, however, as-built drawings of the bridge should be obtained and checked to confirm this.

Figure 3.7 – Fairway Bridge

3.3.4 *Fairway Bridge to Riversway Bridge*

Through this section the existing channel is approximately 4 metres wide with vegetated banks on both sides. It is likely that with the weir installed to provide a water level of 72m AOD, little dredging will be required.

However works to widen the channel by approximately 2 metres will be required along the entire section. There appears to be room to do this and it is suggested that for the first 250 metres, the channel is widened on the north bank as there is a flat open bank and for the following 150 metres the south bank for a similar reason.

For the works to the north bank, the key issue will be access for plant. If this work were to be undertaken by a contractor, they may choose to access from the south bank across the playing fields. Another alternative would be to access at the location of the existing steps from Fairway Bridge. Both of these options could be difficult. Another option would be for this work to be undertaken by hand by volunteers. It is likely that approximately 750 m^3 of material will need to be excavated which would equate to around 9,000 to 10,000 wheelbarrows full.

Figure 3.8 – Area to be widened on north bank (shown in foreground)

The works to the south bank could be undertaken by machine with access over the playing fields. Discussion would need to be undertaken with the playing field owners as a temporary haul road would be needed across their land.

An alternative option would be to undertake the widening using floating plant once the weir has been constructed and can provide a navigable depth.

Bank protection would be required to prevent erosion to the river banks where excavation has been undertaken. This could be in the form of a soft bank such as hazel faggots or willow spiling or hard such as a concrete walling or steel sheet piles. This would require discussion with statutory bodies to determine their requirements.

Figure 3.9 – Area to be widened on south bank (to the left of the river as shown)

3.3.5 *Riversway Bridge*

It is estimated that during normal flows (we have assumed normal flows on the day the site visit was undertaken – 12th January 2012) the existing air draft between water level and bridge soffit is approximately 3 metres. With a weir increasing the water level to 72m AOD, this will still leave an air draft of 2.6m which while less than ideal would still be acceptable.

Some dredging is likely to be required below the bridge to provide the required navigation depth of 1.6m. As-built drawings of the bridge should be obtained and checked to confirm whether any additional protection would be required to the abutments to allow dredging.

Figure 3.10 – Riversway Bridge

3.3.6 *Riversway Bridge to Asda*

The section between Riversway Bridge and Asda appears to offer little constraint to navigation and appears wide enough to allow passage at present. The depth of water at the time of writing is unknown, though it is estimated to be approximately 600mm to 700mm. With the water level raised to 72m AOD, this depth would increase to approximately 1 metre so some dredging would be required to reach the target depth of 1.6m. The amount of dredging could be confirmed by obtaining topographic survey data for the bed of the channel. There appears to be sufficient existing freeboard that footpath raising would not be required.

No works, other than some trimming of overhanging trees, would be required in this section.

Figure 3.11 – Channel upstream of Riversway Bridge

3.3.7 *Asda to Queensway Bridge*

The section between Asda and Queensway Bridge would require some widening and dredging to provide navigation. At the location of the bend in the river adjacent to Asda the bank that has formed on the right (offside) bank would need to be excavated, as shown by the red line in figure 3.12 below, to allow navigation around the bend. From this point most of the way to Queensway Bridge the channel would then need to be widened by around 2 metres. This appears relatively easy to achieve on the towpath (north) side of the channel with good access to the channel.

This would be an ideal location to install moorings on the towpath side to allow access to the town, with a length of approximately 100 metres available. With the water level increased to 72m AOD, the water level in this location will be increased compared with normal flows at present by approximately 200 mm. This would fit well with the level of the existing bank on the towpath side upon which moorings could be directly built.

Figure 3.12 – Channel adjacent to Asda with bend to be re-aligned

Figure 3.13 – Towpath side channel upstream of Asda – possible mooring location

It is estimated that the existing channel at this location has a bed level of around 71m AOD so dredging would be required to provide the required depth of water for navigation.

3.3.8 *Queensway Bridge*

It is estimated that during normal flows (we have assumed normal flows on the day the site visit was undertaken – 12th January 2012) the existing air draft between water level and bridge soffit is approximately 4 metres. With a weir increasing the water level to 72m AOD the water level in this location is likely to be increased by only 100 – 200mm leaving an air draft of 3.8 metres.

Some dredging is likely to be required below the bridge to provide the required navigation depth of 1.6m. As-built drawings of the bridge should be obtained and checked to confirm whether any additional protection would be required to the abutments to allow this to take place.

Figure 3.14 – Queensway Bridge

3.3.9 *Queensway Bridge to Bridge Street*

It is assumed that just upstream of Queensway Bridge, the back water effect of the weir will meet the existing hydraulic gradient of the river. That is to say, the weir will no longer have an effect on the normal water level in the channel.

The existing channel between Queensway Bridge and Bridge Street appears to vary in width between around 6 metres and 8 metres. It should not therefore be necessary to undertake any channel widening in this section and indeed there would be little scope to do this without significant engineering works and therefore cost. The existing channel depth through this section is unknown but is estimated to be on average around 600 mm. To provide the desired 1.6m draft significant dredging will need to be undertaken. In order to do this it would be necessary to carry out a more detailed assessment of the existing banks and retaining wall along the river through this section, as well as a detailed topographic survey of the channel, to determine whether additional construction works would be required in order to prevent undermining and destabilisation of the walls.

Figure 3.15 – Channel between Queensway Bridge and Bridge Street

There are two footbridges through this section. Both bridges, shown in figure 3.16 and 3.17 below, have an existing air draft of approximately 3 metres so should prevent no constraint to navigation. It is likely that both are founded on bank seats set back from the channel so should present no constraint to dredging other than that identified above.

Figure 3.16 – First existing footbridge

Figure 3.17 – Second existing footbridge

Between the second footbridge and Bridge Street, a feature is visible in the bed of the channel, shown in figure 3.18 below. What is causing this feature has not been identified, however it has been suggested that it is a sewer pipe. While this is possible, it seems unlikely and would seem more likely that it is some form of relic from a redundant structure. It is suggested that further work is undertaken to identify the nature of this feature.

If it is an active sewer, this could cause a major obstacle to navigation further upstream. Space is very limited in this area so the cost of undertaking a diversion, if one is possible, could be very high as the sewer would need to be lowered by 3 to 4 metres and may well then require construction of a new pumping station.

Figure 3.18 – Feature in bed of river

3.3.10 *Bridge Street*

It is estimated that during normal flows (we have assumed normal flows on the day the site visit was undertaken 12th January 2012) the existing air draft between water level and bridge soffit is between 2.2 and 2.5 metres. The weir downstream is unlikely to have an effect by this point so this will be the air draft available for navigation. Whilst this is below the ideal amount, this should be sufficient to allow navigation for narrow boats.

It appears that works have been undertaken at some point to provide protection to the bridge abutments. It will be necessary to obtain as-built drawings of this structure if possible, in order to determine what works would be required to allow the channel below the bridge to be dredged to a navigable depth.

Figure 3.19 – Bridge Street

3.3.11 *Bridge Street to Victoria Park*

From Bridge Street up to the series of small weirs in Victoria Park, the channel is heavily engineered with brick, masonry walls or steel sheet piling on both banks for the majority of the length, shown in Figures 3.20 and 3.21 below. The existing channel appears to be approximately 5 metres wide and it estimated that the depth may be around 800 mm.

In order to provide navigation it would be necessary to dredge this section but little or no other work should be required. It should be noted however that there are two bends on the river which will be difficult to navigate a full size narrow boat through. Initial assessment suggests that while navigation for a full size (72') boat is possible two way traffic would not be possible. The track assessment can be seen in Figure 3.22 below.

Figure 3.20 – Channel upstream of Bridge Street – Plate 1

Figure 3.21 – Channel upstream of Bridge Street – Plate 2

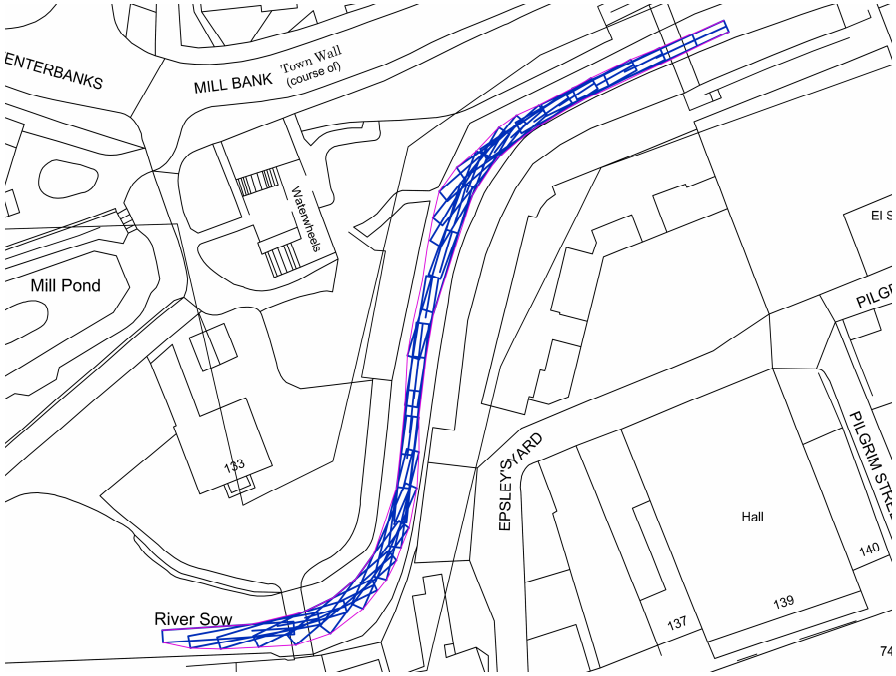


Figure 3.22 – Boat track assessment approaching Victoria Park

3.3.12 *Victoria Park*

It is suggested that the ideal terminus for navigation would be Victoria Park as this provides a wonderful setting for boaters to arrive at, as well as adding interest to the park to encourage non-boating visitors. This could also be used as a mooring location to allow boater access to the town centre.

Within the park are a series of small weirs across the channel. The original purpose of these weirs is unknown but in order to provide navigation they would need to be removed and the channel dredged.

3.4 Route Summary

There appear to be no significant engineering constraints in providing navigation between the Staffs and Worcester Canal and Asda. The significant elements of work that would be required in order to achieve this would be:

1. Excavation and refurbishment of the original lock with the existing Staffs and Worcester towpath diverted over a footbridge on the lock tailwalls
2. Dealing with the River Penk crossing
3. Construction of a new weir and fish pass at the downstream end of navigation on the Sow

4. Excavation of a new channel 650m long channel **or** widening of the existing Sow channel
5. Widening of the channel between Fairway Bridge and Riversway Bridge (this is necessary to comply with the minimum dimensions specified, however, navigation would be possible based on the existing width)
6. Dredging works
7. Optional – installation of moorings adjacent to Asda

From Asda to Victoria Park, the only possibly significant engineering obstacle appears to be the potential feature crossing the river bed. In addition to this, significantly more dredging is likely to be required through this stretch leading to an increased cost. Within Victoria Park, assessment of the impact of removal of the small weirs would be required.

One of the key issues, which will need to be assessed in greater detail through hydraulic modelling, is water management. The descriptions above assume the construction of a weir at the downstream end of the river in order to raise the water level. It is possible that construction of this weir could increase flood risk on the Sow, in which case it will not be possible. Without the construction of a weir, it would still be possible to create a navigation, but with a much larger amount of dredging required and therefore much increased cost.

3.5 Water Management

As described above, water management will be a key issue for creation of navigation.

At the time of writing, no information was available on existing water levels or flows so assumptions have been made based on information available from OS maps and other sources.

It is assumed that the ground level in the area around the Sow at Baswich is approximately 72m with a normal water level in the channel of around 70.6m. The hydraulic gradient is assumed to be relatively flat from here to the point at which it is suggested the weir will be constructed in Option 2. From here, it is assumed that the river has a hydraulic gradient of approximately 1 in 1400 with the bed level generally approximating to this gradient also.

It is assumed that at normal flows, the construction of the weir will result in a flat hydraulic gradient upstream of the weir until the new water level reaches the

original hydraulic gradient of the existing channel. With a weir setting the water level at 72m, this would be just upstream of Queensway Bridge. With a weir setting the water level at 71.6m this would be just downstream of Riversway Bridge.

At this stage of the project, a simplistic way to assess the impact of a new weir on flood risk is to calculate the volume of flood storage within the existing channel that will be lost following construction of the weir. The table below shows these volumes along with the volume of dredging required to provide a water depth of both 1.6m and 1.2m.

Option	In channel storage loss / m3	Volume of dredging in m3 required to provide	
		1.2 m depth	1.6 m depth
No weir	0	5,565	10,017
71.6m	1,500	4,095	8,505
72.0m	4,200	2,415	5,859

Options for mitigating the effect of construction of the weir would need to be investigated. This could include assessment of the improved conveyance down the river with a storage area, such as a basin or marina, created at the downstream end at Baswich. If Option 2 is used, this new cut alone could generate approximately 3,500m^3 of new storage.

3.6 Capital Costs

A cost estimate has been produced based on the descriptions above.

The following assumptions have been made:

- It is assumed all works are undertaken by contractors
- Cost estimate based on unit costs derived from previous experience.
- No cost has been included for land purchase or negotiations.
- A percentage allowance has been made for general preliminary items as would normally be included in the contract cost (sensitivity ranges included for best/worst case are 15% and 25%).

- Vertical sides of canal pounds, where stated, have been supported using L8 trench sheeting with walings and anchor piles (typical British Waterways approach)

- Costs are at April 2012 prices with no allowance for increased costs.

- All material taken off site is assumed to be inert (if much dredging of canal and river silts is required, while not contaminated, a significant amount of this material could be classed as non-hazardous rather than inert).

- No allowance has been made for contaminated land except where expressly stated.

- The risk cost included is as defined in Section 7.

It may be possible to reduce some costs by use of volunteers.

Two separate cost assessments are presented below, these are:

1 - Navigation from Baswich to Victoria Park based on a 1.6 metre depth of water

2 - Navigation from Baswich to Queensway Bridge based on a 1.2 metre depth of water

Baswich to Victoria Park 1.6m depth	Unit	Quantity	Unit Cost £k	Sum £k	Total £k	Comments
Site Clearance	ha	7.8	3.60	28.08	28.08	2.6km, 30m wide corridor
Channel Works						
Junction with Staffs and Worcs	sum	1	300.000	300.00		Inc £200k for bridge
Staffs and Worcs to Baswich Lock	m	30	1.500	45.00		Urban style - new cut
River Penk to River Sow	m	700	0.900	630.00		Rural Canal new cut
Weir to Fairway Bridge dredging	m3	145	0.100	14.50		
Fairway to Riverway dredging	m3	1013	0.100	101.30		
Fairway to Riverway widening	m3	1280	0.100	128.00		
Riverway to Queensway dredging	m3	1701	0.100	170.10		
Riverway to Queensway widening	m3	400	0.100	40.00		
Queensway to Bridge Street dredging	m3	1542	0.100	154.20		
Bridge Street to Victoria Park dredging	m3	1458	0.100	145.80	1728.90	
Structures						
Baswich Lock restoration	nr	1	300.00	300.00		
Footbridge at lock	nr	1	50.00	50.00		
Penk crossing	nr	1	300.00	300.00		
Weir across Sow	nr	1	250.00	250.00		
Headwalls to existing outfalls	nr	2	50.00	100.00		
Moorings alongside Asda	m	100	1.000	100.00		
Works to existing bridges	nr	1	100.00	100.00	1200.00	Allowance for work to Bridge Street
Miscellaneous works						
Footpath	m	1150	0.10	115.00		Assume Baswich to Fairway
Landscaping works	sum			100.00		Allowance
Ecological mitigation works	sum			100.00		Allowance
Service diversions	sum			0.00	315.00	Inc in risk
Total Measured Cost (£k)					£3,271.98	
Add Contingencies	%	30			£981.59	
Total Construction Cost (£k)					£4,253.57	
Indirect Costs						
Client/Construction Supervision, admin & management	%	10		£425.36		
Design	%	6		£425.36	£850.71	
	Total Cost (£k)				**£5,104.29**	

Baswich to Asda 1.2m depth	Unit	Quantity	Unit Cost £k	Sum £k	Total £k	Comments
Site Clearance	ha	7.8	3.60	28.08	28.08	2.6km, 30m wide corridor
Channel Works						
Junction with Staffs and Worcs	sum	1	300.000	300.00		Inc £200k for bridge
Staffs and Worcs to Baswich Lock	m	30	1.500	45.00		Urban style - new cut
River Penk to River Sow	m	700	0.900	630.00		Rural Canal new cut
Weir to Fairway Bridge dredging	m3	0	0.100	0.00		
Fairway to Riverway dredging	m3	66	0.100	6.60		
Fairway to Riverway widening	m3	960	0.100	96.00		
Riverway to Queensway dredging	m3	693	0.100	69.30		
Riverway to Queensway widening	m3	400	0.100	40.00		
Queensway to Bridge Street dredging	m3	0	0.100	0.00		
Bridge Street to Victoria Park dredging	m3	0	0.100	0.00	1186.90	
Structures						
Baswich Lock restoration	nr	1	300.00	300.00		
Footbridge at lock	nr	1	50.00	50.00		
Penk crossing	nr	1	300.00	300.00		
Weir across Sow	nr	1	250.00	250.00		
Headwalls to existing outfalls	nr	2	50.00	100.00		
Moorings alongside Asda	m	0	1.000	0		
Works to existing bridges	nr	0	100.00	0	1000.00	Allowance for work to Bridge Street
Miscellaneous works						
Footpath	m	1150	0.10	115.00		Assume Baswich to Fairway
Landscaping works	sum			100.00		Allowance
Ecological mitigation works	sum			100.00		Allowance
Service diversions	sum			0.00	315.00	Inc in risk
Total Measured Cost (£k)					£2,523.50	
Add Contingencies	%	30			£757.05	
Total Construction Cost (£k)					£3,280.55	
Indirect Costs						
Client/Construction Supervision, admin & management	%	10		£328.06		
Design	%	10		£328.06	£656.11	
	Total Cost (£k)				**£3,936.66**	

STAFFORD RIVERWAY LINK
ESTIMATE OF COST
SUMMARY

Baswich to Victoria Park
2.6 km - 1.6m water depth

Item	Cost / £
Works Items	£3,271,980
Contingency	£981,594
Indirect Costs	£850,715
Total	**£5,104,289**

Risk	**£997,722**

Grand Total inc Risk **£6,102,011**

Baswich to Asda
2.0 km - 1.2m water depth

Item	Cost / £
Works Items	£2,523,500
Contingency	£757,050
Indirect Costs	£656,110
Total	**£3,936,660**

Risk	**£767,478**

- Note - separate risk register not undertaken, pro-rata based on length used

Grand Total inc Risk **£4,704138**

3.7 *Operational Costs*

The cost of operating and maintaining the Stafford Riverway Link has been estimated at approximately £65,000 per annum.

This includes an allowance for annual maintenance, significant repairs works assessed as required every 8 years, replacement of lock gates every 25 years and replacement of structures every 120 years.

An allowance has also been made for the inclusion maintenance of a SCADA unit which may be required on the weir.

It is suggested that a this estimate in raised to £100,000 per annum for planning purposes at present until the details of the scheme are assessed in greater detail.

4 Environmental Assessment

4.1 *Introduction*

This high level environmental review identifies the key constraints and opportunities in the study area. Data has been obtained from a brief desktop study.

As this is a high level review, further detailed environmental appraisal of the key issues identified will be required at detailed feasibility stage.

4.2 *Protected Sites*

The proposed route of the canal is not sited on any sites designated for their ecological sensitivity (see Figure 4.1).

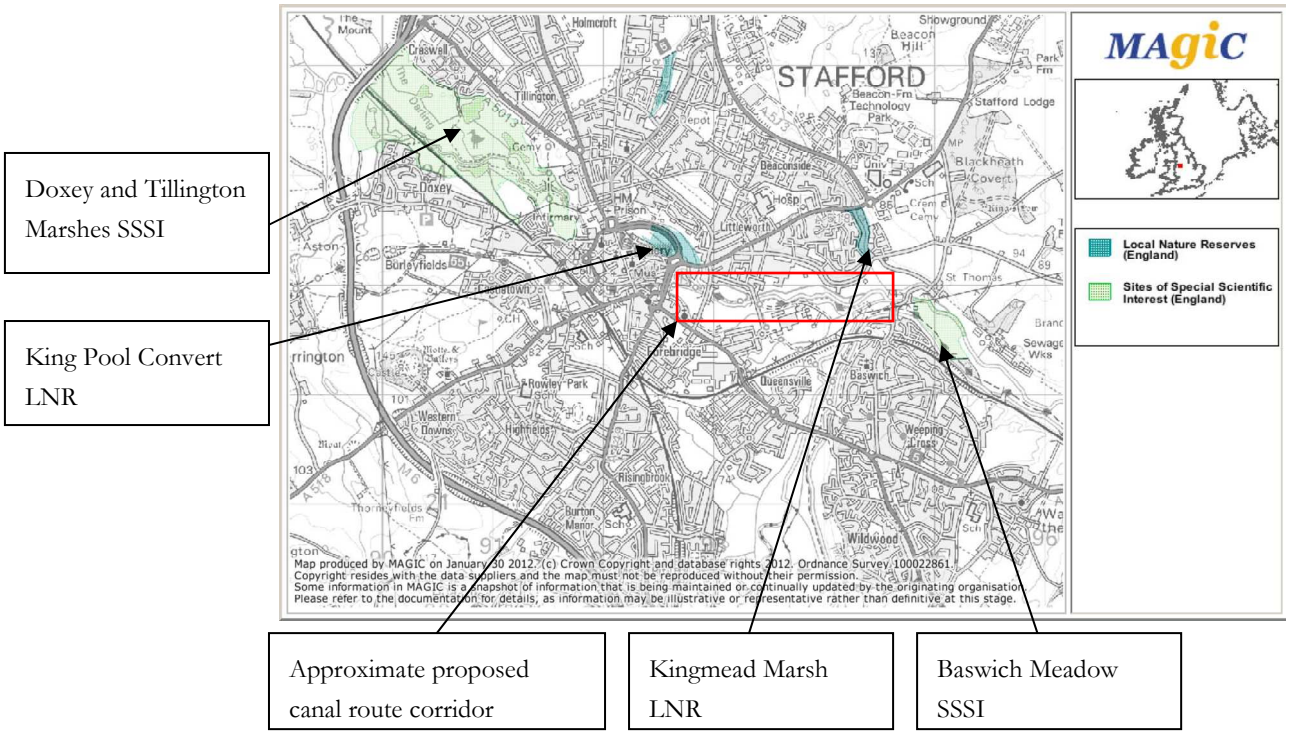


Figure 4.1 Protected Sites Plan

The closest designated site is Site Special Scientific Interest (SSSI) at Baswich Meadow (Citation 1002308) at SJ 950227, which lies approximately 500m east (downstream) of the proposed canal link . It consists of a series of agriculturally unimproved, low-lying permanent pasture in the valley of the River Sow. The SSSI

occupies a level site on river alluvium and peat with soils that remain moist for most of the year.

There is one further SSSI, Doxey and Tillington Marshes (Citation 1002253) at SJ 906245 situated approximately 500m north west and upstream of town centre terminus of the canal link. The SSSI is an extensive area (129.41ha) of low-lying damp grassland, marsh, swamp and pools in the flood plain of' the River Sow, reaching almost into the centre of Stafford. Doxey and Tillington Marshes are particularly important as a habitat for breeding and wintering birds. The site supports a diverse wintering bird community; 80 or more species are present in most winters. There are locally important concentrations of wintering snipe and lapwing.

Two local nature reserves (LNR) are situated 1 km north of the proposed route of the canal - King Pool Convert (Citation 1122965) and Kingmead Marsh (1082932). Both sites are predominately marshland, which supports a variety of flora and fauna. Operations likely to damage the special interest at both SSSIs include, but are not limited to, modification of the structure of water courses and alterations to water levels and tables. As such further investigation will be required as the scheme progresses.

4.3 Flora and Fauna

The Staffordshire Biodiversity Action Plan (SBAP) focuses conservation efforts on the areas within the county that will result in the greatest benefit for ecological networks, habitats and species. By integrating biodiversity objectives with other environmental, social and economic needs, the SBAP aims to provide a sustainable living and working environment that benefits both people and nature.

In Staffordshire, species and habitat action plans have been replaced by '14 Ecosystem Action Plans" (EAPs) and one Rivers Action Plan, the SBAP aims to prioritise conservation management at a landscape level and contribute to local, regional and national conservation targets.

Within the Stafford urban centre (where the proposed waterway is situated) the priority habitats, which are set out in the Staffordshire ecosystem action plans are: Hedgerows, Arable Field Margins, Lowland Meadow and Rivers.

4.4 *Water Quality*

The Environment Agency have assessed all rivers within the Humber River Basin Management Plan. The management plan grades the rivers for their chemical and biodiversity quality. The environmental objective is to provide rivers of 'good' quality for both ecological and chemical criteria by 2015 unless infeasible. The River Sow through the proposed canal route corridor (see Figure 4.2) is of poor quality due to the heavily modified channel, structural changes being required to provide fish passage, and the river being in a partly urbanised area. At present it is seen as being infeasible to meet the ecological and chemical objectives along this stretch of the River Sow due to the mitigation required being disproportionately expensive and technically infeasible.

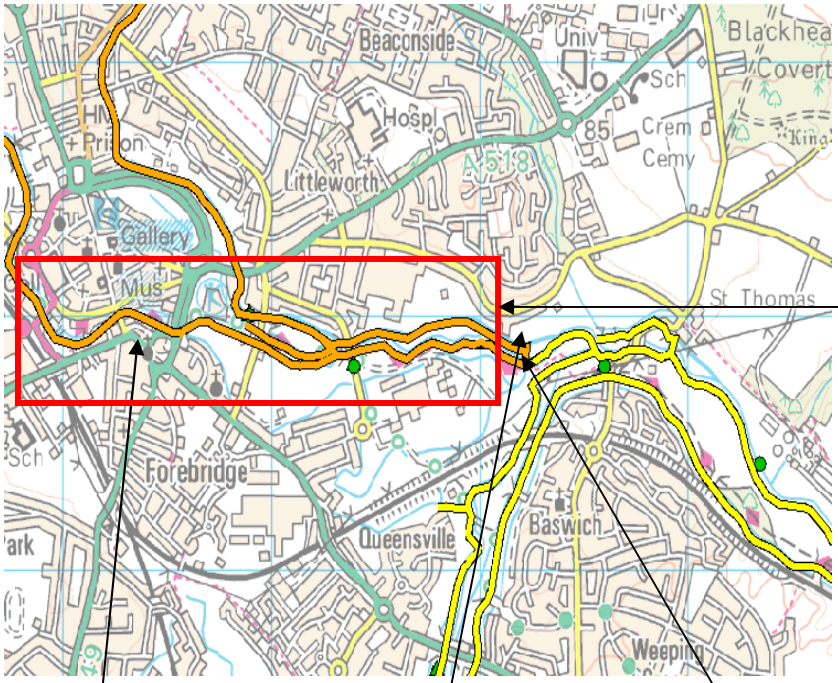


Figure 4.2 - Current Ecological Quality of the Rivers Sow and Penk

Key:

High Poor Good

Moderate Bad Not yet assessed

4.5 ***Cultural Heritage***

There are two Scheduled Monuments in close proximity to the proposed canal route:

- St Thomas Priory (monument number 1020054) at NGR SJ95052291 is approximately 300m to the east of the new route's confluence with the Staffordshire and Worcester Canal just east of the of the Sow and Penk confluence.

- East Gate

The proximity to the waterway route may cause problems depending upon the nature of the ground between the canal and the monuments.

4.6 ***Human Beings***

The canal route starts in Baswich, a small settlement on the south eastern outskirts of Stafford. On its route westward the canal route bypasses the settlements of Baswich, Littleworth and Forebridge before terminating in the centre of the town of Stafford.

4.7 ***Traffic and Transport***

The main transport links in the study area are the A34 and A518. The A34 runs parallel and south of the River Sow with the A518 running parallel to the river for a short section within Stafford town centre. The Baswich end of the study area is accessed off the A34 on the unclassified Baswich Lane.

4.8 ***Contaminated Land***

Depending on the finalised route and construction methods, contaminated land is not perceived to be an issue as the route of the canal is on previously undeveloped land. Any issues may come from the previously unknown areas of contaminated land.

4.9 Key Opportunities and Constraints

The scheme presents the opportunity to restore the canal for the benefit and use of the public with the creation of wetland habitats, and a corridor linking other areas of habitat.

Key known and potential constraints in the study area include:

- Baswich Meadow SSSI
- Doxey and Tillington Marshes SSSI
- Heritage and archaeological features
- Protected species/habitats (presence/absence to be confirmed)
- Possible water quality issues.

Key potential opportunities in the study area include:

- Extension to the Riverway access, improving local access to the river corridor
- Potential partnering to improved management of the woodland through increased species diversity and local providence. (See Figure 4.2)
- Enhancement to the river's biodiversity through restoration of the natural riverbank morphology. (See Figure 4.1)
- Removal of hard bank reinforcement / revetment, or replacement with soft engineering solutions in accordance with the EA's requirements for this stretch of river
- Creation of structures or other mechanisms to enable fish to access the waters upstream and downstream of the works which currently prevents fish migration

Many of the suggested opportunities are in line with the suggested mitigation put forward by the Environment Agency in Humber River Basin Management Plan which sets out the environmental objectives for the Humber river basin of which the Sow and Penk are part. These environmental objectives are set to meet the objectives for all rivers to be of a good ecological and chemical grade by 2015 under the Water Framework Directive. These opportunities will also help to improve the Staffordshire Biodiversity Action Plan key habitats, such as the Arable Field Margins, Lowland Meadow and Rivers.

4.10 *Recommendations*

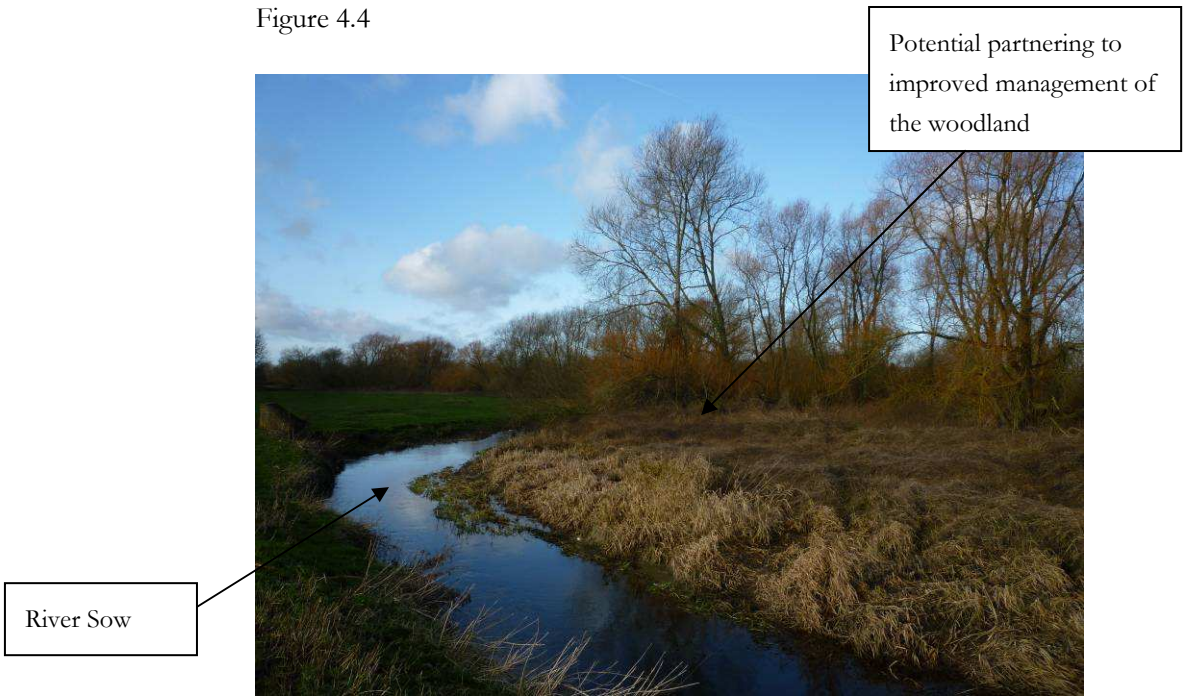
As a minimum, the following external consultees should be consulted to obtain further baseline information and to maximise potential environmental opportunities:

- Environment Agency Officers
- Relevant Local Authority Officers
- Stafford Town Council
- Staffordshire County Council
- Natural England
- Local Wildlife Trust
- English Heritage

An Extended Phase 1 Habitat Survey should also be undertaken to ascertain the need for more detailed species surveys.

Figure 4.3

Figure 4.4



5 Socio-Economic Benefits

5.1 *Introduction*

The preferred restoration option of the Stafford Riverway Link is estimated at circa £6 million of upfront capital expenditure. Historically, such scales of investments for restoration schemes that created new navigation were achieved by attracting public sector funding from sources such British Waterways and Environment Agency. Access to funding was available through avenues such as Heritage Lottery Funding, Regional Development Agencies and Homes and Communities Agency. Considering the current economic climate, there is a need to adopt a different approach to accessing finance and ensuring successful delivery of the Stafford Riverway Link Proposals.

In response, this chapter presents the findings of a desk based assessment to review investment and funding avenues currently accessible by the Community Interest Company. It is worth noting that this assessment does not include a review of the operational viability and impacts of the proposals.

5.2 *Funding Mechanisms*

The desk based research undertook an appraisal of various funding sources and investment mechanisms relevant to canal restoration. The assessment discounted sources such as Local Enterprise Partnerships and Regional Growth Fund due to economic development and job creation focus of these funding opportunities. The scale of investment required for the scheme is unlikely to generate sufficient jobs directly or provide the impetus to the local economy to justify investments from such sources.

On a similar note, the assessment dismissed Homes and Communities Agency as a direct source of funding. This was particularly because of their focus on delivery of housing and associated strategic infrastructure. Equally, the public spending cuts has significantly tightened HCA's spending and their role is increasingly considered as a development enabler. Equally, spending cuts are likely to hinder large investment from strategic local partners such as the County Council and the Local Authority.

Heritage Lottery Fund has supported numerous navigation projects in the past. However, more recently their focus had shifted towards delivery of Olympics 2012 and its legacy. The assessment suggests that HLF's appetite for waterways restoration projects with the right focus seems to be reappearing. Funding, at a local level, from the Environment Agency in the current economic climate is focussed on tackling flooding issues. Hence, HLF and the EA are considered as prime public sector funding sources, provided the objectives and outputs of Stafford Riverway Link can be aligned with those of the funding sources.

With limited opportunities to attract large scale funding from main stream public sector source, there is a need to consider other current mechanisms. The corridor along the proposed link, including parts of the town centre, is in a flood risk zone (1 – 100 years risk). Delivering the scheme would convert land resources under flood risk into potential development opportunities. Hence, the CIC could lever in a proportion of the value (land receipts) created for the development assets it will create. With regards to the town centre, the scheme will safeguard existing property assets. Furthermore, the completed navigation link with the wider network has the potential to generate additional revenue for the local businesses and associated wider benefits for the local economy. Hence, using the Enterprise Zones principles to fast track implementation of necessary infrastructure, there is some potential for seeking retention of business rates generated from currently affected areas (1 – 100 years flood risk), as a contribution towards the scheme.

The Local Authority is in the process of establishing a Community Infrastructure Levy for delivering various infrastructure items to support planned growth in Stafford. Considering the wider community benefits associated with active waterways, there is a potential to attract investment through this source as well.

In summary, based on the initial review, the following were considered as target sources for the restoration proposals of Stafford Riverway Link:

- **Land receipts** (or proportion of receipts) from development land likely to be created by the proposals
- **Business rates** associated businesses in the town centre, which currently at flood risk
- Contributions from **Community Infrastructure Levy**

- Other mainstream **public sector funding** (namely Heritage Lottery Fund and EA's Flood Defence Grant in Aid);

- **Sponsorships** from local beneficiaries of new active waterway environment e.g. potential marina operators.

Each of these potential funding mechanisms will be considered in greater detail below, with an estimate of the scale of investment available through each source provided where possible.

5.3 Land Receipts

There is currently approximately 85 hectares of land under threat from a 1 in 100 year flood event. The scheme proposals will convert some of this land into developable assets. In absence of a detailed flood modelling exercise, three different scenarios have been considered. These are based around assumptions regarding proportion of land under flood risk which will be converted in developable area after the implementation of the Stafford Riverway Link.

Table 1: Availability of Developable Land by Scenario

Scenario	Proportion of land under flood risk converted into developable area	New Developable Land Supply	Total Land Value Created by the Proposals
Total available land	100%	85 ha	-
1	15%	13 ha	£3.25 million
2	30%	25 ha	£6.25 million
3	50%	42 ha	£10.50 million

Land values in Stafford Borough are estimated at £250,000 per hectare[1]. Using this benchmark, it is estimated that the Stafford Riverway Link proposals could facilitate creation of value for existing land assets between £3.25 million and £10.50 million.

[1] Levett Ltd (2011) – 'The Economic Viability of Housing Land in Stafford Borough' states the current price of Greenfield site is estimated at £250,000 per hectare.

Based on the intelligence available in the public domain, it is estimated that 50% of this land is owned by public sector bodies. Assuming full commitment from local public sector land owners (including the Local Authority and the County Council) towards the scheme, the proposals can attract between £1.6 million and £5.2 million of the likely receipts from sale of new developable land supply facilitated by the scheme.

The remainder of the value created by the proposals is on land under private sector ownership. It is unlikely that all of the remaining receipts (£16 million up to £5.2 million) could be levered in to contribute towards the capital costs of the proposals. This is not least because private land owners and developers will argue that other infrastructure costs are equally necessary to achieve this level per hectare of residual value./ receipt. However, a tariff base agreement with private owners at an early stage would help secure some of this land value created as investment for the project. At this stage, it is difficult to estimate how much investment could be raised from private sector land owners. For the purpose of this analysis, it is assumed that 25% of the value created on the private sector land holdings could be levered in as capital investment for the project to provide some indication. This relates to an indicative investment from private sector land owners between £400,000 and £1.3 million across different scenarios.

5.4 Business Rates

Town centre businesses may benefit from the restoration of the Stafford Riverway Link in two ways. Firstly, the 1 in 100 year flood event plan (Figure 5.1) shows that some businesses in Stafford town centre are at risk of flooding. With the restoration of the Stafford Riverway Link, these businesses will no longer be at risk from 1 in 100 year flood events, meaning cheaper insurance, fewer operating days lost to flood events etc.

Secondly, it is estimated that there are 10,000 boat movements along the Staffs and Worcester Canal per annum and that up to say 50% of these may visit Stafford. The scheme could therefore lead to up to 5,000 boating trips to Stafford per year. Both of these impacts offer economic benefits for town centre businesses. Table 2 indicates that an additional £205,000 of spending at town centre businesses is estimated in Stafford each year as a result of the Stafford Riverway Link. This is likely to create additional jobs in the local economy. While not assessed here, it should also be noted that the restoration of this link may have a positive impact on the Staffs and Worcester Canal through increased interested and therefore visitor numbers. This could have a beneficial impact on the wider regional economy.

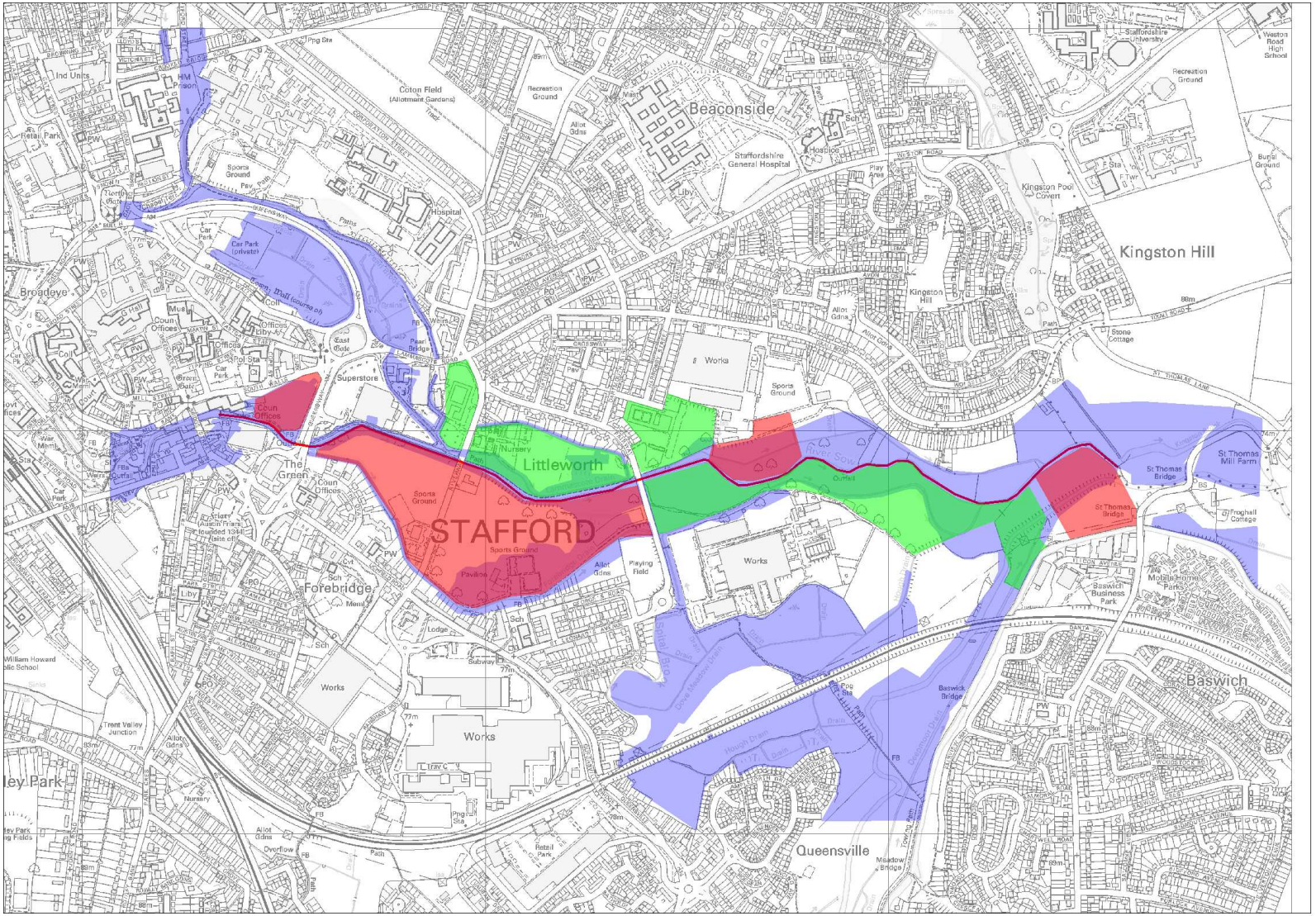

STAFFORD
Littleworth
Forebridge
Beaconside
Kingston Hill
Baswich
Queensville
The Green
Broadeye
Coton Field
Recreation Ground
Staffordshire General Hospital
Kingston Pool Covert
Superstore
Sports Ground
Works
Baswich Business Park
St Thomas Bridge
St Thomas Mill Farm
Froghall Cottage
Stone Cottage
Trent Valley Junction
Baswich Bridge
Meadow Bridge
Retail Park
Subway
Lodge
Pavilion
Playing Field
Allot Gdns
Car Park
Hospital
Staffordshire University
Weston Road High School
Burial Ground
Play Area
Nursery
Overflow
Path
Drain
River Sow
Outfall

Figure 5.1

Table 2: Stafford town centre spending by boat users

Input Data	Assumption	Source (Year)
Boating Movements into Stafford (per year)	5,000	Halcrow (2012)
Number of People per boat	2.8	Halcrow (2010)
Private Powered Boats – Spend per head per day	£14.67	Defra (2010)
Total Spend (per year)	£205,380	

The financial benefits experienced by town centre businesses as a result of these two impacts could be used as justification for diverting business rates paid by local business towards funding of the Stafford Riverway Link. Table 3 shows that more than £2.1m is raised in business rates from town centre businesses covered by the existing 1 in 100 year flood event map, each year.

Table 3: Business Rates in Stafford town centre

Address	Public Sector	Private Sector	Total
Bridge Street	£4,550	£563,200	£567,750
Mill Bank	£12,360	£101,700	£114,060
Newport Road	£87,250	£409,870	£497,120
Lichfield Road	£0	£138,650	£138,650
South Walls	£203,950	£27,300	£231,250
Riverside	£360,000	£247,750	£607,750
Total	**£668,110**	**£1,488,470**	**£2,156,580**

Almost £1.5m is paid by private sector businesses, with public sector bodies contributing the remainder. Considering the outputs of the proposed scheme for town centre businesses and the wider economy, particularly in terms of safeguarded commercial assets, reduced risk of flooding and subsequent risk of loss, reduced cost of business operation, increased turnover, increased economic output and indirect jobs created, there is potential for the Council to make a case to the Treasury for retention of up to 1 years business rates generated from areas identified in Table 5.2.

It should also be noted that part of Tesco Supermarket land on Newport Road falls within the 1 in 100 year flood event extent. Although this site has not been considered in the business rates analysis above, it contributes more than £2m per year towards business rates alone. Therefore, it is possible that the business rates funding mechanism could increase further.

5.5 Community Infrastructure Levy

Approximately 50% of the land that will be converted to developable land as a result of the restoration is owned by private companies. The development of privately-owned land could lead to financial contributions by developers, towards socio-economic infrastructure schemes. Stafford Borough Council is currently preparing a Supplementary Planning Document (SPD) that will provide details on the implementation and nature of future planning obligations.

The Local Authority is currently developing a 'charging schedule' will be created that specifies standardised costs per unit (for housing schemes) or per sq m (for commercial uses) that developments will be expected to meet as part of their Community Infrastructure Levy obligations. It is possible that the Stratford Riverway Link could seek funding through developer contributions to CIL arising from private sector development on land within close proximity of the restoration proposals.

At this stage it is difficult to estimate the scale of investment the CIC could generate through the CIL route for this scheme. This is not least because of the absence of a 'charging schedule' for Stafford Borough Council. However, it is recommended that the CIC lobby a case for inclusion of a per unit or per sq m CIL charge for future developments in Stafford, which may benefit from the delivery of the new active waterway environment. Empirical evidence from elsewhere suggests, such benefits can be achieved beyond the water frontage.

5.6 Public Sector Funding: Heritage Lottery Fund

HLF has an annual budget of approximately £375 million to invest in projects of all sizes across the country. The fund is split into ten programmes which offer different grants for different purposes. The ten programmes and associated budgets are shown in Table 4.

Table 4: HLF Programmes – Budgets and Typical Grant Size

Programme	Budget	Grant Size
Your Heritage	£26 million	£3k-£100k
Heritage Grants	£255 million	£50k plus
Young Roots	£4 million	£3k-£50k
All Our Stories	-	£3k-£10k
Townscape Heritage Initiative	£14 million	£500k-£2m
Parks for People	£24 million	£250k-£5m
Landscape Partnerships	£22 million	£250k-£2m
Skills for the Future	-	£100k-£1m
Repair Grants for Places of Worship	£30 million	£10k-£250k
Catalyst: Endowments	-	£500k-£5m

Clearly, the restoration project would not fit into some of the programmes specified by HLF (e.g. Repair Grants for Places of Worship). Nevertheless, the project could be accommodated into the Heritage Grants programme, which has the largest budget of all programmes and allows applications of any size more than £50,000. It is the main programme for grants for all kinds of heritage that relate to the national, regional and local heritage of the UK. That said the project will need clearly align with the programme objectives as part of a robust business case.

5.7 ***Public Sector Funding: EA's Flood Defence Grant in Aid***

The current FDGiA approach was adopted for the year 2012/13 and differs from previous approaches to flood management funding by guaranteeing some government funding for all flood management projects, rather than providing complete funding for a limited selection of schemes. The level of funding available via this mechanism relates directly to socio-economic benefits delivered by the scheme. The assessment of socio-economic benefits is considered against Outcome Measure Framework summarised below:

- OM1 - The ratio of the whole life present value benefits (Pvb) to the whole life present value costs (PVc) from projects in the Flood Defence Grant in Aid (FDGiA) capital investment programme.

- OM2 - Number of households moved out of any flood probability category to a lower probability category.

- OM2b - The number of households moved from the very significant or significant probability category to the moderate or low probability category.

- OM2c - The number of households in the 20 per cent most deprived areas moved out of the significant or very significant probability categories to the moderate or low probability category.

- OM3 - The number of households with reduced risk of coastal erosion.

- OM3b - The number of households protected against loss in 20 years from coastal erosion.

- OM3c - The number of households in the 20 per cent most deprived areas protected against loss in 20 years from coastal erosion.

- OM4a - Hectares of water dependent habitat created or improved to help meet the objectives of the Water Framework Directive.

- OM4b - Hectares of intertidal habitat created to help meet the objectives of the Water Framework Directive for areas protected under the EU Habitats/Birds Directive.

- OM4c - Kilometres of rivers protected under the EU Habitats/Birds Directive improved to help meet the objectives of the Water Framework Directive.

- OM5 - The proportion of households and businesses in highest risk areas that receive the Floodline Warnings Direct (FWD) service.

- OM6 - Proportion of residential units within planning decisions where the application has been refused or has been amended in line with Environment Agency advice.

It is beyond the scope of this assessment to consider the socio-economic benefits of the Stafford Riverway Link in line with the Outcome Measures Framework, so an estimate of the level of funding available from FDGiA is not possible.

Nevertheless, as the project will accrue some socio-economic benefits that fit into the framework, it is possible to assume that some funding from this source will be available. However, it is worth noting that typical local authority or local drainage board managed flood defence schemes through FDGiA on average receive up to £250,000 per project.

5.8 ***Sponsorships***

The project can also benefit from local sponsorships, which can come in different sizes. Some recent examples of sponsorships from elsewhere include:

- Ashby Canal Association: £1.28m funding for canal restoration by mining operation Minorca Open Cast for possible use of canal for transporting materials.

- Derby & Sandiacre Canal: Small scale business sponsorship of lengths of canal (£500/mile) and structures (£1k)

New commercial operations such as marinas and floating restaurants, which would benefit from a new navigable waterway, could also be potential sponsors. Equally, a community based fund raising exercise could also be undertaken. However, such an exercise would need to clearly promote the social benefits likely to be derived from the completed scheme.

5.9 ***Summary and Conclusions***

In summary, based on the initial review, the following were considered as target sources for the restoration proposals of Stafford Riverway Link:

- **Land receipts** (or proportion of receipts) from development land likely to be created by the proposals

- **Business rates** associated businesses in the town centre, which currently at flood risk

- Contributions from **Community Infrastructure Levy**

- Other mainstream **public sector funding** (namely Heritage Lottery Fund and EA's Flood Defence Grant in Aid);

- **Sponsorships** from local beneficiaries of new active waterway environment e.g. potential marina operators.

The first two sources offer an investment pool of over £8 million for the project. However, the CIC will need to act early and lobby proactively amongst potential investors to ensure that a significant proportion of this investment is levered in for the project. It is difficult to exactly estimate the scale of likely investment / funding available from the other three streams. However, the combined pool of CIL, public sector funding and sponsorships could be significant. Again, the CIC may need to dedicate resources to ensure that investment / funding from these resources is attracted in timely fashion.

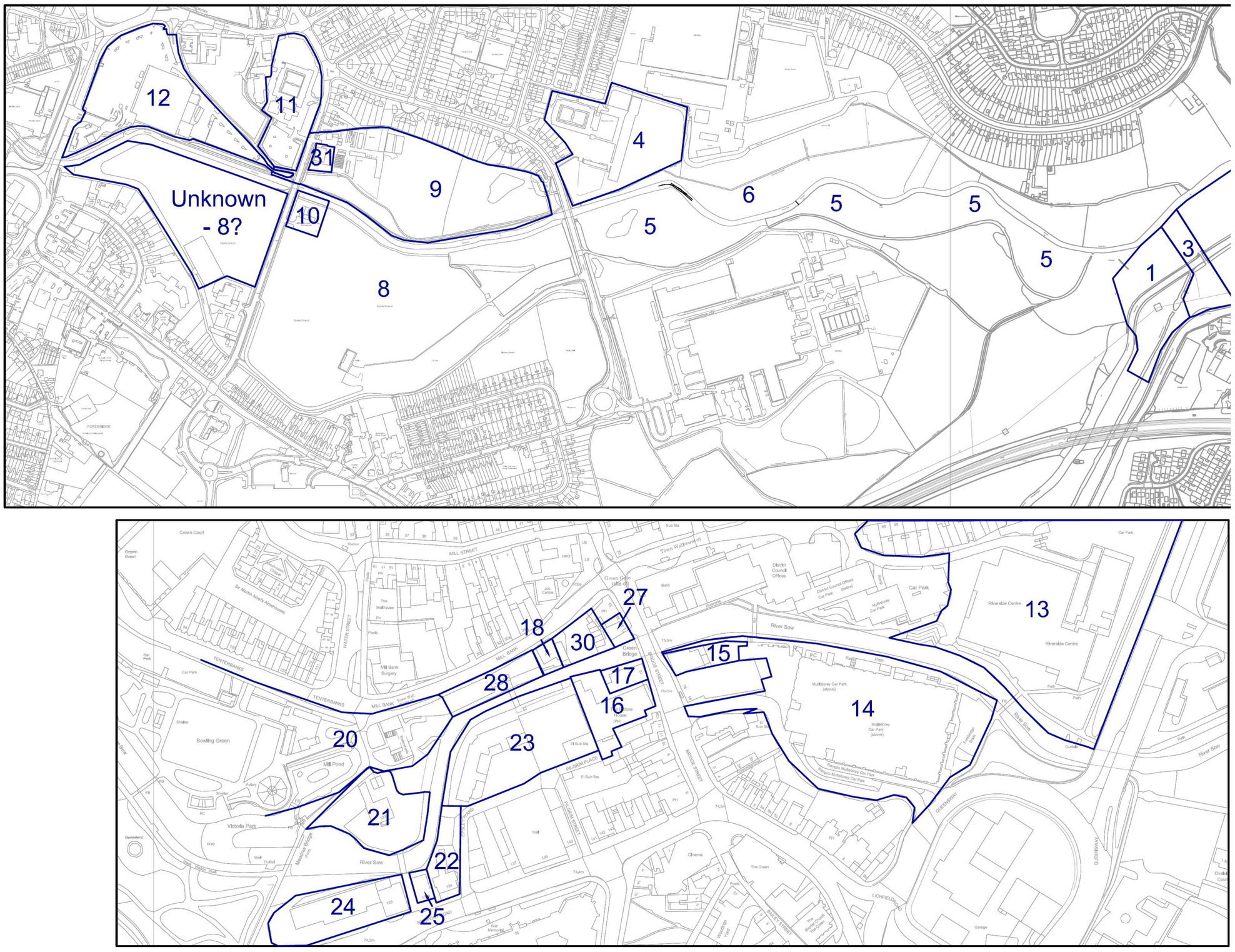
6 Land Ownership

6.1 Introduction

A search of the Land Registry has been undertaken in order to identify the land owners along the route. Results obtained are shown in the table and plans below. It should be noted that only land that has been sold in the last forty years is recorded in the Land Registry. Land ownership for land that has not been sold in this time is not easily traceable.

A copy of the titles can be seen in Appendix B.

No.	Freehold Owner	Title Plan Available?	Leasehold on the land?	Comments
1	Stafford Borough Council	Yes	No	
2	W R Finney	Yes	No	
3	Unknown	No	N/a	Land Reg shows same address as no. 2
4	Staffordshire County Council	Yes	Yes	
5	Stafford Borough Council	No	No	
6	Unknown	No	N/a	No info on Land Reg
7	Stafford Borough Council	No	No	
8	Alstom Ltd	No	No	No information provided for this area - It might also be Alstom Ltd?
9	Stafford Borough Council	Yes	Yes	
10	L Simmons & C Purdy	Yes	No	
11	Staffordshire County Council	Yes	No	
12	McLagan Investments Ltd	Yes	Yes	
13	The Woodhorse Butler Ltd Liability Partnership	Yes	Yes	
14	Stafford Borough Council	Yes	Yes	
15	MNA Properties Ltd	Yes	No	
16	K/S Stafford	Yes	Yes	
17	H J Shipley	Yes	Yes	
18	Enterprise Inns Plc	Yes	No	
19	Stafford Borough Council	Yes	No	
20	Stafford Borough Council	No	No	
21	G T Collett	Yes	No	
22	J A Huber, I Henderson & D Freeth	Yes	No	
23	Triward Holdings	Yes	No	
24	None	Yes	Yes - Peugeot Motor Company Plc	Land Reg does not have details for the Freehold owner
25	B N Sandy Ltd	Yes	No	
26	Unknown	No	No	This building appears to be the Council offices
27	Bankway Properties Ltd	Yes	Yes	
28	Stafford Borough Council	Yes	No	
29	Unknown	Yes	Yes	This is the Mills apartment building. Titles are available but there are no title plans.
30	Unknown	No	N/a	This appears to be a car parking area
31	The Scout Association Trust	Yes	Yes	
32	Dunstan Investments	Yes	No	


12
11
31
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Unknown
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16
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13
14
20
23
21
22
24
25
Crown Court
Green Court
MILL STREET
WATER STREET
TENTERBANKS
MILL BANK
Town Wall (scheduled)
Sir Martin Nowill Almshouses
The Malthouse
Mill Bank Surgery
Green Gate (site of)
Green Bridge
Bank
District Council Offices
District Council Offices (Annex)
Car Park
Multistorey Car Park
Riverside Centre
River Sow
BRIDGE STREET
Bowling Green
Mill Pond
Victoria Park
Aviary
Shelter
Weir
Outfall
Meadow Bridge
Footbridge
PILGRIM PLACE
EARLS WORD
Hall
Cinema
The Green
QUEENSWAY
LICHFIELD ROAD
BIRD STREET
Garage
Path
Car Park (above)
Ramp Multistorey Car Park
Toilets
Garage
Wardrobe Yard
The Bowler Hatte
Gas Main
Sub Sta
El Sub Sta
PC
PH
HPO
LB
CBs
Posts
Bollard
Bench
Memorial
Fence
Wall
Steps
Ramp
Kerb
Gully
Manhole
Tree
Shrub
Hedge
Grass
Path
Road
Building
Fence
Wall
Steps
Ramp
Kerb
Gully
Manhole
Tree
Shrub
Hedge
Grass
Path
Road
Building

7 Project Implementation

7.1 *Introduction*

In order for the scheme to progressed quickly as desired by the project promoters, it will important for the project promoters to plan the project out well, identifying what works are required and when. As part of this, it will be necessary to ensure that all necessary approvals and permissions are obtained. Many of these will require work to be undertaken in advance.

7.2 *Project Phasing*

The key priorities and an indicative phasing are given below, though it should be noted that the construction phase could to a degree be driven by the output of the flood risk assessment and land drainage consent.

1. Undertake ecological baseline surveys (it is recommended these are commenced immediately)
2. Contact EA regarding flood risk assessment and obtain EA model of the Sow on which to base the FRA
3. Undertake public consultation
4. Begin fund raising for development and capital works
5. Scope works required for planning application through pre-application discussion with local planners (likely to be Environmental Statement, Design and Access Statement, Landscape Plan, scheme drawings)
6. Undertake concept design for scheme to determine the optimum route
7. Discussion with landowners
8. Preparation and submission of planning application
9. Preparation and submission of land drainage consent
10. Develop procurement strategy for construction work
11. Undertake detailed design of scheme and produce contract documents for construction work
12. Refurbishment of existing Baswich Lock (volunteer project?)
13. Undertake channel works to link in to Sow
14. Construct weir across Sow
15. Construct Penk crossing
16. Undertake channel widening where required
17. Undertake dredging works
18. Construct moorings at Asda (volunteer project)

19. Complete all landscaping and footpath works
20. Undertake commissioning

7.3 Approvals and Permissions

It is likely that a number of approvals and permissions will be required. It will be necessary for these to be investigated in more detail during the development of the scheme in order to confirm whether they will be required. Likely approvals required are:

- Transport and Works Act for navigation
- Full planning permission
- Land drainage consent
- Water abstraction consent
- Discharge consent
- Natural England licenses for any protected species identified during surveys
- Consent of highway authority for works to highways/bridges
- Hedgerow/tree preservation orders
- Licence arrangements for boat users of the Navigation

Other agreements that may also be required include:

- Landowner agreements
- Utilities
- Funding agreements
- Responsibility for future management of the Navigation, its maintenance and a viable exit strategy

8 Risks

With any project of this type and at this early stage, a large number of risks are present. An initial risk register has been produced and can be seen in Appendix A. This register has been used to derive the risk budget which has been included in the cost estimate. It should be noted that this is based only on a very high level assessment of risk and much more detailed assessment of actual risks should be undertaken tor refine the register and budget.

The Risk Register has identified risks which may affect the cost, quality of delivery or programme for the scheme. The register identifies the most likely cost and the maximum cost of a particular risk and then utilises a proprietary software package to undertake a PERT statistical analysis using a normal distribution to estimate risk budgets for both cost and time.

It is recommended that this document is reviewed, updated and maintained by the project promoters as a live document in order to keep track of and work towards mitigation of the main project risks.

The risk register is coded red, amber and green with red being the largest or most critical risks.

From this risk register the key risks that the project team should work towards addressing are shown in the table below.

No.	Risk	Mitigation
1.	High cost of scheme. Difficulty in obtaining the necessary capital funding for construction.	Investigation into likely funding sources and what these funders' criteria are for making awards. Different parts of the project could then be mapped to different funders' criteria.
2.	Land ownership outside that of project promoters.	Early work required to identify land ownership along the route. A SWOT analysis of land owners should then be carried out to determine how they should be approached. Development of solutions that would be advantageous to both parties may address concerns of some landowners. Develop route options to give alternatives to potential problem areas.
3.	Services	A number of risks relate to the services present along the route. These include significant costs to move existing services and identification of unknown services. A detailed assessment of the services present, works required and costs should be carried out.
4.	Interactions with rivers and floodplain may be unacceptable to the Environment Agency.	Early discussion should be held with the EA in order to obtain their view of the project as to what studies would be required to obtain their approval.
5.	Ground conditions / geotechnical risk	A number of risks relate to ground conditions. Initially a geotechnical desk study should be undertaken with a site walkthrough by a qualified geotechnical engineer.

9 Summary

Based on this assessment, the Stafford Riverway Link is a feasible project, though with some issues to address.

The restoration of this waterway is likely to have a significant positive social and economic impact on the area as well as being of environmental benefit.

There will be issues to address regarding flood risk and it is essential that the Environment Agency are consulted to identify what work will be required in order to gain their backing for the scheme. As a minimum this is likely to be production of a flood risk assessment and further environmental assessment. It would be beneficial to be able to demonstrate an improvement in flood risk as a result of the scheme.

Funding is likely to be a significant issue. We have estimated the cost of the full scheme as specified in the brief to be approximately £5.8m, however there will be many options of how this figure could be significantly reduced through looking at changes to the specification of the work and by use of volunteers and third sector organisations. These should be further investigated by the scheme promoters. In addition to this, possible options to generate capital revenue for the project should be investigated. These could be by working with the planners and EA to create development value on sites near the waterway or by looking at the possibility of a marina development at Baswich.

Another key issue will be material management which could include disposal or reuse. Whether a new cut section or canalisation of the Sow is finally adopted, a significant amount of material will be generated. Opportunities for re-use of this material should be progressed immediately. One such option would be possible ground raising on the site of the old council offices adjacent to Queensway Bridge. Options for the reuse of dredging, such as spreading to nearby agricultural land should also be investigated.

By first addressing the key issues above and then breaking the scheme down into to a number of smaller projects, it is felt likely that this is a viable scheme which could make good progress in the short to medium term.

10 Recommendations

For the next stage of the scheme it is recommended that the following is undertaken:

- Contact EA and request use of LiDAR data free of charge (this is normally charged for by the EA so an explanation of the community nature of the project will be required)

- Review LiDAR data and undertake some targeted topographic surveys. These are likely to be bed levels, water levels, footpath levels, bridge soffits

- Undertake hydraulic modelling to test the potential impact of weirs on flood risk and possible measures for mitigation. In order to do this, it will be necessary to use the EA's existing hydraulic model, so again, fostering the cooperation of the EA will be required

- Carry out a detailed services search of the whole route, undertaking site visits with affected service owners and obtain budget estimates for any required diversions

In the slightly longer term it is likely that further studies will be required. These are likely to be:

- Environmental surveys
- Geotechnical desk study
- Concept design for the Penk crossing
- Further assessment of the canalisation versus new cut of the eastern section of the Sow
- Further economic assessment

The promoters of this project need to consider in what form they wish to drive the project forward. Who will take the lead role? It may be worth considering setting up a project partnership.

The issue of ownership and operation of the restored canal needs to be considered. The owners and operators need not necessarily be the same organisation.

Work should be carried out to identify all possible benefits and beneficiaries of the scheme. This should not be limited to large regional benefits but should also consider small scale improvements to local communities.

Public engagement/consultation should be carried out within the next year to ensure the backing of all the communities in the local area and to understand their concerns and aspirations.

There are likely to be a large range of tasks that could be undertaken by volunteers. A volunteer action plan should be produced setting out what skills are required for each task and how this should be managed. It should be noted that for any volunteers carrying out clearance or construction work on site, safe systems of work should be developed with method statements and risk assessments signed off by a competent individual.

Appendix A – Risk Register

STAFFORD RIVERWAY LINK - RISK REGISTER

Revision 1 - May 2012

COTSWOLD CANAL RESTORATION RISK REGISTER

Risk ID	Risk Description			Response Action Plan		Response Status	Post Response R		Objectives								Data for Quantitative Analysis (Cost)						
	Risk Owner	Source of Risk	Consequence	Specific Action	Action Owner		Probability (%)	Probability Scale (0,1,2,3,4)	Safety	Technical Quality	Environment	Communications	Cost	Programme	Reputation	Overall Impact (0,1,2,3,4)	RAG Risk Priority	Probability (%)	Least Cost (£)	Most Likely Cost (£)	Max Cost (£)	Binomial	@Risk Pert Distribution	Risk Value (£)
		Financial Risks																						
F1	Client	Insufficient funding secured	Project needs to be scaled down, lack of buy in from community	Devise fund raising strategies and appoint fund raising manager to oversee process	Client	Not Completed	50%	2; 40-60%	0	0	0	0	3	0	0	3	H	50%	£0	£100,000	£250,000	1	£108,333	£108,333
F2	Client	Land not in ownership of project partners	Additional cost in land purchase. Possible refusal of landowners	Identify land ownership along route. Develop a number of route options to allow areas to be avoided if required	Client / Consultant	Not Completed	50%	2; 40-60%	0	0	0	0	2	2	0	2	M	50%	£0	£100,000	£1,000,000	1	£233,333	£233,333
F3	Client	Unknown details of service diversions required	An indicative cost has been included in the cost estimate for dealing with services, however the actual cost could be considerably higher if more work is required.	Detailed assessment of the services locations and how the restoration may deal with these. Site visits undertaken with the asset owners.	Client	Not Completed	20%	0; 0-20%	0	0	0	0	1	1	0	1	L	20%	£0	£50,000	£750,000	0	£158,333	£0
F4	Client	Excavated material found to be contaminated	Additional disposal costs	Site investigations to pinpoint any problems or hotspots	Client	Not Completed	20%	0; 0-20%	0	1	0	0	3	1	0	3	M	20%	£0	£200,000	£1,000,000	0	£300,000	£0
F5	Client	Potential additional cost of material disposal	Surplus spoil needing to be taken to landfill or designated tips	Development of a project waste management plan in order to identify strategies to minimise surplus material and locations for possible disposal	Client	Not Completed	25%	1; 20-40%	0	0	0	0	3	1	0	3	M	25%	£0	£200,000	£500,000	0	£216,667	£0
F6	Client	Cost increases / inflation	Project needs to be scaled down to meet funding available	Use of engineering QS and estimator familiar with canal schemes. Further development of options for mitigating cost overruns and strategy in place to reduce scope to cover increased costs.	Consultant	Not Completed	10%	0; 0-20%	0	0	0	0	0	3	0	3	M	5%	£0	£200,000	£500,000	0	£216,667	£0
F7	Client	Income generated by waterway could not cover the operating costs	Insufficient maintenance results in deterioration of canal	Detailed economic assessment to be carried out to inform income strategy. Possible requirement for an endowment to be factored into the capital cost of the scheme	Client	Not Completed	40%	1; 20-40%	1	0	0	0	2	1	1	2	M	40%	£0	£50,000	£250,000	0	£75,000	£0
F8	Client	Operating cost higher than envisaged	Insufficient maintenance results in deterioration of the canal	Estimate of maintenance cost to seek advice from BW. Design to be as maintenance free as possible.	Consultant	Not Completed	25%	1; 20-40%	0	1	0	0	2	0	1	2	M	25%	£0	£20,000	£50,000	0	£21,667	£0
		Management / Programme Risks																						
M1	Client	Programme	Failure to monitor and update programme and complete works as scheduled.	Developed target dates for key activities. Early preparation and continuing monitoring of detailed project plan showing activities and timescales (including inter-dependencies). Ensure all parties are aware of the programme and time constraints.	Consultant	Not Completed	20%	0; 0-20%	1	1	0	0	2	3	1	3	M	20%	£0	£50,000	£250,000	0	£75,000	£0
M2	Client	Delays due to slow decisions	Delays due to lack of agreement within members of project stakeholders	Identify decision making process and key decision dates early in programme. Stick to decision making process, ensure decisions are made for the greater good of the scheme not to satisfy any one single party.	Client	Not Completed	20%	0; 0-20%	0	0	0	0	1	1	1	1	L	20%	£0	£20,000	£100,000	0	£30,000	£0
M3	Client	Staff churn	Disruption to project team, lack of continuity	Ensure succession plan in place wherever possible to minimise disruption	Client	Not Completed	20%	0; 0-20%	0	1	0	0	1	2	0	2	L	20%	£0	£20,000	£50,000	0	£21,667	£0
M4	Client	Small management team	Delay due to lack of resources, overwork	Identify key roles at various points in the programme and ensure person in place at these times. Employ full time staff during peak workload periods	Client	Not Completed	15%	0; 0-20%	1	0	0	0	0	2	0	2	L	10%	£0	£20,000	£40,000	0	£20,000	£0
		Market / 3rd Party Risks																						
P1	Client	Flood Risk Assessment	Approvals withheld.	Early discussion with the Environment Agency in order to identify what work will be required to obtain consents	Consultant	Not Completed	25%	1; 20-40%	0	0	0	0	2	3	1	3	M	25%	£0	£15,000	£50,000	0	£18,333	£0
P2	Client	Landowners / Residents	Impact of construction and use on owners and occupiers	Assess costs. Construction to be carried out during normal working hours. Ensure timely acquisition of land. Contractor to assess access to site and to plan movement of plant and materials accordingly. Agree working around roads with local Highways Authority and residents. Appropriate methods of working. Pre-contract photographic record to be taken.	Client	Not Completed	25%	1; 20-40%	1	0	0	1	2	2	2	2	M	25%	£0	£50,000	£100,000	0	£50,000	£0
P3	Client	Communications with landowners	Failure to communicate terms and conditions of entry to landowners prior to commencement	Ensure timely observance of procedures. Confirm terms and conditions in advance in writing.	Client	Not Started	20%	0; 0-20%	0	0	0	2	0	2	0	2	L	20%	£0	£20,000	£50,000	0	£21,667	£0
P4	Client	Approvals	Third Party Approvals or Actions. Highways approvals for road AIP and acceptance of bridge proposals	Allow sufficient time for consultations. Communication Plan and Action List in place. Make written file note of all consultations. Confirm understanding of significant consultations in writing. Inform third parties of named points of contact.	Consultant	Not Completed	20%	0; 0-20%	0	1	0	0	2	2	0	2	L	20%	£0	£10,000	£40,000	0	£13,333	£0
P5	Client	Approvals	EA objections to scheme on development control grounds	Allow sufficient time for consultations. Communication Plan and Action List in place. Make written file note of all consultations. Confirm understanding of significant consultations in writing. Inform third parties of named points of contact.	Consultant	Not Completed	30%	1; 20-40%	0	0	0	0	2	3	0	3	M	30%	£0	£20,000	£50,000	0	£21,667	£0
P6	Client	Land drainage consents	Approvals withheld.	Timely identification of approvals required. Due allowance for processing periods included in programme.	Consultant	Not Completed	25%	1; 20-40%	0	0	0	0	2	3	0	3	M	25%	£0	£10,000	£20,000	0	£10,000	£0
P7	Client	Communications	Poor communication or interpretation, resulting in inadequate information, misunderstanding, delays or objections to the project	Adequate consultation, frequent reviews, effectively documented and communicated, ensure full understanding of issues.	Consultant	Not Completed	10%	0; 0-20%	0	0	0	2	1	2	2	2	L	10%	£0	£10,000	£20,000	0	£10,000	£0
P8	Client	Tie in with adjacent developers	Failure to agree terms for disposal of arising from the canal	Early agreement and tie in with development timings	Consultant	Not Completed	20%	0; 0-20%	0	0	2	0	2	2	0	2	L	10%	£0	£10,000	£20,000	0	£10,000	£0
P9	Client	Planning permissions	Approvals withheld. Restrictions may add costs or increase programme.	Engage with planning department prior to submission of detailed application	Consultant	Not Completed	20%	0; 0-20%	0	0	0	0	2	3	1	3	M	20%	£0	£5,000	£50,000	0	£11,667	£0
P10	Client	Public buy in	Failure to engage the public, rejection of scheme	High level of consultation to be undertaken, high level of public and political support exists for scheme. Further public consultation, meetings, workshops etc to be undertaken.	Consultant	Not Completed	5%	0; 0-20%	0	0	0	3	0	1	2	3	M	5%	£0	£25,000	£50,000	0	£25,000	£0

		Technical Risks																										
T1	Client	Unforeseen Services	Hitting buried or overhead services during construction.	Consult all utility service providers and relevant client department. Check position of sevices in critical areas of construction.	Consultant	Not Completed		20%	0; 0-20%	3	0	0	0	2	2	0	3	M		20%	£0	£20,000	£100,000					
T2	Client	Unforeseen Ground Conditions	Inability to drive piles or install foundations due to ground conditions or planned piling method.	Appoint qualified ground specialist. SI to be undertaken along route. Use conservative design parameters to minimise effect of unforeseen conditions. Carry out condition survey of existing structures.	Consultant	Not Completed		15%	0; 0-20%	0	2	0	0	2	1	0	2	L		15%	£0	£20,000	£50,000	0	£21,667	£0		
T3	Client		Inadequate Site Investigation. Contaminated ground / instability of embankments, cuttings, retaining walls or foundations	Use of known contractor familiar with the area and requirements. Investigation specified by a geotechnical engineer. Allow suitable budget and programme flexibility.	Consultant	Not Completed		15%	0; 0-20%	2	0	0	0	2	2	0	2	L		15%	£0	£50,000	£150,000					
T4	Client		Excavated material is unsuitable for the identified re-use (e.g for canal lining) and needs to be disposed to landfill with additional material import	Appoint qualified ground specialist. SI to be undertaken along route.	Consultant	Not Completed		15%	0; 0-20%	0	0	0	0	2	2	0	2	L		15%	£0	£100,000	£200,000					
T5	Client		Ground conditions are unsuitable for the design slope gradient, requiring shallower slopes (more land take) or slope support measures	Appoint qualified ground specialist. SI to be undertaken along route.	Consultant	Not Completed		15%	0; 0-20%	0	1	0	1	2	2	0	2	L		15%	£0	£20,000	£100,000	0	£30,000	£0		
T6	Client	Physical condition	Adverse weather conditions (eg high intensity rain fall or others) causing poor site conditions.	Appropriate references in contract specifications. Select appropriate construction periods and working sequences to optimise summer good weather windows.	Consultant	Not Completed		20%	0; 0-20%	1	0	0	0	2	2	0	2	L		20%	£0	£25,000	£75,000	0	£29,167	£0		
T7	Client		Adverse water levels in rivers, wind and other climatic conditions	Construction excavation works are programmed to go ahead during the summer months where ever possible. Check adequacies of temporary works. EA flood warning programme. Make contractor aware of condition of existing weir, flows and levels.	Client	Not Completed		20%	0; 0-20%	2	0	0	0	2	2	0	2	L		20%	£0	£20,000	£100,000	0	£30,000	£0		
T8	Client		Excessive groundwater gathering in excavations	Appoint appropriate ground specialist, assume conservative condition,s, contingency planning to obtain discharge conditions	Consultant	Not Completed		20%	0; 0-20%	1	0	0	0	1	1	0	1	L		5%	£0	£20,000	£50,000	0	£21,667	£0		
T9	Client	Changes in Scheme	Engineering and design changes during detailed design process	Early warning, appropriate design, assess likely impacts. Feasibility study complete and preferred option identified.	Consultant	Not Completed		20%	0; 0-20%	0	2	0	0	2	2	0	2	L		20%	£0	£50,000	£100,000	0	£50,000	£0		
T10	Client		Construction stage variations to cover site conditions	Use of standard designs where appropriate to minimise changes. Assess adequate contingency.	Consultant	Not Completed		20%	0; 0-20%	1	1	0	0	2	2	0	2	L		20%	£0	£50,000	£100,000	0	£50,000	£0		
T11	Client		Additional works in relation to water management	Early detailed design	Consultant	Not Completed		25%	1; 20-40%	0	0	0	0	1	1	0	1	L		25%	£0	£20,000	£100,000	0	£30,000	£0		
		Environmental Risks																										
E1	Client	Environmental Impact	Non-compliance with environmental legislation, sustainability policy, strategy or plans (client & External)	Timely consideration of environmental requirements and identification in EAP. Use accredited EIA consultants.	Consultant	Not Completed		5%	0; 0-20%	0	0	3	0	2	2	2	3	M		5%	£0	£10,000	£20,000					
E2	Client		Consultant or contractor failure to meet and deliver environmental specification	Clear and timely communication of requirements. Contractor to plan to suit. Review contractor compliance, audit environmental performance.	Consultant	Not Completed		5%	0; 0-20%	0	0	2	0	2	2	2	2	L		5%	£0	£10,000	£50,000	0	£15,000	£0		
E3	Client		Unexpected Environmental Impacts or sensitivities e.g. new designation	Adequate andvance environmetal surveys to identify problems.	Client	Not Completed		10%	0; 0-20%	0	0	2	0	2	2	0	2	L		10%	£0	£10,000	£50,000	0	£15,000	£0		
E4	Client		Environmental matter stopping the project	Reporting procedure. Works designed / planned to minimise such risk - contngency arrangements considered.	Client	Not Completed		10%	0; 0-20%	0	0	0	0	3	3	0	3	M		10%	£0	£10,000	£50,000	0	£15,000	£0		
E5	Client		Discovery of buried (unknown) archaeological site	Carry out further archaeological investigations before work commences	Consultant	Not Completed		5%	0; 0-20%	0	0	0	0	3	3	0	3	M		5%	£0	£10,000	£50,000	0	£15,000	£0		
E7	Client		Protected species found or move onto site	Carry out protected species surveys at the appropriate time of year, and repeat before construction.	Consultant	Not Completed		10%	0; 0-20%	0	0	1	0	2	2	0	2	L		10%	£0	£10,000	£20,000					
E8	Client		Requirement for detailed hydrological studies	Scope up hydrological studies required	Consultant	Not Completed		20%	0; 0-20%	0	0	0	0	1	1	0	1	L		20%	£0	£10,000	£20,000					
E9	Client		Further surveys and research required into impact on aquatic ecology (eg fish and crayfish)	Carry out further studies on aquatic ecology	Consultant	Not Completed		10%	0; 0-20%	0	0	0	0	1	1	0	1	L		10%	£0	£10,000	£20,000	0	£10,000	£0		
E10	Client		Unable to meet Water Framework Directive requirements/ objectives	Consider implications of Water Framework Directive	Consultant	Not Completed		20%	0; 0-20%	0	0	2	0	2	1	1	2	L		20%	£0	£10,000	£20,000	0	£10,000	£0		
E11	Client		Timing of environmental processes, approvals and work periods not appropriate	Adequate advance planning / identification of programme interface and timely preparation of environmental documents and tree works.	Consultant	Not Completed		10%	0; 0-20%	0	0	0	0	1	2	0	2	L		10%	£0	£10,000	£20,000	0	£10,000	£0		
E12	Client		Project not considered sustainable, additional measures to improve sustainability	Carry out and implement Sustainability Assessment/Appraisal	Client	Not Completed		10%	0; 0-20%	0	0	0	0	2	1	0	2	L		10%	£0	£10,000	£50,000	0	£15,000	£0		
		Landscape Risks																										
L1	Client	Acceptance of Asset by Client	Failure to meet demands for landscaping works	Ensure early buy in and develop proposals in conjunction with local stakeholders	Consultant	Not Completed		20%	0; 0-20%	0	0	1	0	1	1	2	2	L		20%	£0	£20,000	£100,000	0	£30,000	£0		
L2	Client	Inability to deliver exemplar landscape design	Poor perception from public	Ensure early buy in and develop proposals in conjunction with stakeholderst and the public to identify requirements, design competition in local schools and colleges. Appoint landscape architect with proven track	Client	Not Completed		10%	0; 0-20%	0	0	0	0	1	1	0	2	2	L		10%	£0	£20,000	£50,000	0	£21,667	£0		
		Health and Safety Risks																										
H1	Client	Health and Safety	Accidents - Trips & Falls, Fall from height (scaffoldings), working close to rivers and public highways, working with potentially contaminated land, see also Designer's Risk Assessment.	Health and safety at Work Act 1974. Construction Design and Management Regulations 2007. Team awareness of duties under the above and all other health and safety legislation relevant to the project. Regular health and safety reviews.	Consultant	Not Completed		10%	0; 0-20%	2	0	0	0	1	1	2	2	L		10%	£0	£10,000	£20,000	0	£10,000	£0		
H2	Client	Security and Vandalism	Location of site presents possible theft & vandalism of works and equipment during construction.	Site is close to residential areas. Ensure design incorporates measures to minimise acts of vandalism. Ensure appropriate security measures are in place during the Construction period.	Contractor	Not Completed		10%	0; 0-20%	2	0	0	0	1	1	2	2	L		10%	£0	£10,000	£15,000	0	£9,167	£0		

Current Month		All Risks Financial
Summary box of financial results of last run of @Risk for users without access to software	50%tile	£442,318
	95%tile	£997,722

Appendix B – Land Registry Titles