4.0 Route Options

This section gives a description of each route and proposal. The route options are shown in Figure 2 (page 7). Aspects considered include physical constraints, regulation, environmental issues, facilities, benefits, any variations on route and outline cost. More detailed cost breakdowns for each option are included in Appendix 7.

The civil engineering works assumed for the routes can only be considered indicative at this stage. Detailed site investigation and design studies would be necessary to progress the design and determine the appropriate solution in each case.

4.1 ROUTE 1

Route 1 involves the restoration of the historic Barnfields Canal Aqueduct and construction of a new canal channel westwards through the southern edge of Hughes Concrete towards the existing service road off Sunnyhills Road leading to Ladderedge Country Park. The basin is located to the east of the service road on land currently occupied by Hughes Concrete

An alternative line using country park land closer to the river was considered but later discounted as the site is designated as protected flood plain and as a Special Landscape Area and has significant wildlife value as a Local Nature Reserve. Staffordshire Moorlands District Council has also expressed concerns that a basin at this location would occupy a significant part of the country park north of the river.

4.1.1 Physical Constraints

Physical constraints include: current land ownership and land uses, engineering and utilities.

The basin would be located to the east of the service road to the car park on land currently occupied by Hughes Concrete, the manufacturer of pre-cast concrete components, which are stored in the large yard. At the existing aqueduct, located within Ladderedge Country Park, the proposed canal extension would be Staffordshire Moorlands District Council land ownership for a short distance then into Hughes yard. There appears to be vacant space next to the north east corner of the yard which might take the displaced stockpiled elements.

It is understood that the land was raised by backfilling when the Barnfield Industrial Estate was built in the 1960's. The nature of the infill is not known, but it may contain contaminants. Dealing with contaminants is a risky task. A new Landfill Directive has just come into effect and it is untested. Hazardous waste must be treated in a different manner to other waste. Testing will be necessary to determine appropriate action.

The Park is at a lower level than the canal. The route through the concrete works may not be as low as the Park but it would be prudent to make some allowance for embankments or locks until topographical data is available. An overflow would be required to deal with the volume of water should locks be necessary.

It has been assumed that generally the canal and basin construction will be anchored trench sheet piles for the walls and a 600mm thick clay invert on a firm sub-base. Any soft areas will have to be removed and replaced by granular material or the ground treated. It is possible that the ground will be contaminated and treatment/replacement may be necessary. Borehole information from the British Geological Survey suggests that at Barnfield Industrial Estate the soil profile could be 2 to 3 metres of fill, over peat and clay above medium dense

hard sandstone at 5 to 10 metres below existing ground level. Rock may be found at higher levels, since an outcrop is visible near the existing aqueduct.

The existing aqueduct will need to be re-commissioned and this is not without risk. The bridge inspection report prepared by Staffordshire County Council dated November 1995 does not mention any significant adverse structural conditions but reports that the original waterproofing is defective. Work on the aqueduct will have to be carried out in a carefully controlled manner. Comprehensive desk and site surveys should be carried out to determine the current condition. The infill may be contaminated and require special handling.

There does not appear to be any significant physical difficulties with construction access. Working at and near to the existing aqueduct will be more difficult because of the steep slopes.

Severn Trent Water records issued in May 2004 indicate a 750mm diameter public combined gravity sewer and a 600mm diameter public surface water gravity sewer in the area. It is likely that the canal could bridge over these pipes on concrete aprons so as not to surcharge the pipes. Details will depend on more detailed investigation including ground type and levels.

Severn Trent Water has recently undertaken sewer improvements in the vicinity of the Leek Arm of the Caldon Canal which may have an impact on route 1. As part of Severn Trent's works a pump station has been located at Sunnyhills Road close to the possible location of the canal basin. If this route option is to be considered, detailed topographical and site investigation will be required to determine the exact position of services.

A copy of known services information is included in Appendix 8.

Note: Drawings issued in January 2005 by Severn Trent Water (included in appendix 8) show location of new water main and pumping station.

4.1.2 Regulation

The local plan shows this area adjacent to "Protected Floodplain & Special Landscape Area". The text mentions that development within existing groups of buildings will be given sympathetic consideration.

Planning permission would be required. Conservation area consent and listed building consent would be required for works associated with the historic aqueduct and parts of the site within the Caldon Canal Conservation Area . Environment Agency consent would be required for any additional discharges into the River Churnet. A commercial agreement or Compulsory Purchase Order (CPO) would be required for the Hughes Concrete land. Connection and maintenance agreements would be required by British Waterways.

4.1.3 Environmental Considerations

Aspects considered include the built heritage, nature conservation/biodiversity, landscape impact, water quality and resources and flood management.

Restoration of the listed grade II Barnfields Canal Aqueduct would make a positive contribution to the built environment.

The use of Hughes Concrete land offers opportunities for enhancements and connections to Ladderedge Country Park, designated as a Local Nature Reserve.

There are thought to be no major nature conservation issues associated with having the basin within the hard surfaced storage yard. Existing planting to the southern edge of the industrial estate located within the country park should be retained where possible.

Environment Agency records indicate sightings of water vole in the Caldon Canal and signal crayfish in the River Churnet and further detailed ecological survey work will be required. Any works to the aqueduct should look to retain wall flora, removing only woody vegetation which maybe causing damage to the structure. Areas of invasive Japanese Knotweed adjacent to the aqueduct will require removal to prevent further growth. Extensive emergent fringe vegetation has developed at the canal edges near the aqueduct and will require further assessment and monitoring before and during any dredging works.

A basin at this location should aim to maximise views south towards Ladderedge Country Park and the wider rural setting to the southern edge of Leek. Increased land take may be required to ensure space for adequate landscape treatment and screening of the industrial estate and particularly Hughes Concrete Works. Native plant species should be used to link with Country Park and existing planting should be retained wherever possible.

This proposal does not affect the Rudyard feed, providing that no locks are required. British Waterways would require provision of stop planks at the Aqueduct for emergency protection of the existing network.

The Hughes Concrete land is outside the protected floodplain. Restoration of the aqueduct presents the opportunity to carry out flood defence engineering at this “bottleneck” if required.

4.1.4 Facilities

There is good vehicle access for visitors and for maintenance from Sunnyhills Road which links to Newcastle Road (A53). A bus route into Leek town centre operates along the A53 and there is a bus stop near Wall Bridge. Car parking could be created for visitors to the canal basin and for canal users. This parking could be shared with country park users as there are currently only 8 spaces available.

The route is bounded to the north by industrial sites where significant boundary treatments will be required. Secure areas can therefore be created on this side of the basin. If public access is kept to the southern edge, a footbridge will be required, possibly at the aqueduct to connect to the existing towpath.

It is estimated that a basin and facilities area of 6400 m2 could be accommodated in this area using land owned by Hughes Concrete

4.1.5 Benefits

This route creates good connections with Ladderedge Country Park and existing local routes and trails that pass through the park. It also restores and safeguards the listed aqueduct.

4.1.6 Outline Cost

The cost for the construction of option 1 is estimated to be **£5.3 million**. A more detailed breakdown of the outline costing is included in Appendix 7.

View north from Ladderedge Country Park car park towards Barnfields Road. Possible location for basin to right of access road.

View south west from Ladderedge Country Park car park across Country Park

View south west from Ladderedge Country Park towards A53

View north from Country Park towards Hughes Concrete

View towards Hughes Concrete from aqueduct

View towards aqueduct and current terminus of the Leek Arm

Figure 7 - Route Option 1 – Existing Images

4.2 ROUTE 2

Route Option 2 involves the restoration of the Barnfields Canal Aqueduct as per route 1, but then to construct a new channel eastwards, probably through the existing scrapyard and across the end of Barnfield Road to a new basin constructed alongside the disused railway. This new basin could utilise part of the concrete works' land or may possibly be contained within a smaller area of currently vacant land in separate ownership.

Variant 2a proposes access to this basin via a new aqueduct directly across the river from the existing canal.

4.2.1 Physical Constraints

Physical constraints include, current land ownership and land uses, engineering and utilities.

The basin is located just to the west of the dismantled railway. The current land use is mixed as the basin is in three sites, namely Hughes Concrete east storage yard, Bestwick's scrap yard and a vacant plot owned by Mr A. J Cantrell.

At the existing aqueduct, the canal would be in Staffordshire Moorlands District Council land ownership for a short distance then into Hughes' yard. The turning area would need to be arranged such that the canal route would clear Hughes' building. The alignment would probably straddle Hughes' yard and the scrap yard. Ideally it should be kept back from the valley edge to reduce the need for retaining structures and to avoid possible bank erosion and undercutting by the River Churnet.

The existing ground level seems to be at canal level and away from the valley edge. The canal construction is assumed to be anchored trench sheet piles for the walls and a 600mm thick clay invert on a firm sub-base. Any soft areas will have to be removed and replaced by granular material or the ground treated. It is possible that the ground will be contaminated and treatment/replacement may be necessary. Borehole information from the British Geological Survey suggests that in the Barnfields Industrial Estate the soil profile could be 2 to 3 metres of fill, over peat and clay above medium dense hard sandstone at 5 to 10 metres below existing ground level. Rock may be found at higher levels, since an outcrop is visible near the existing aqueduct.

The proximity of the east side of the basin to the railway embankment will influence the form of basin construction. If the edge of the basin could affect the stability of the embankment, sheet piles or another form of retaining structure will be necessary. This structure may also have to resist surcharge forces from trains, if the railway line is re-opened.

The existing aqueduct will need to be re-commissioned and is not without risk. The bridge inspection report prepared by Staffordshire County Council dated November 1995 does not mention any significant adverse structural conditions but reports that the original waterproofing is defective. Work on the aqueduct will have to be carried out in a carefully controlled manner. Comprehensive desk and site surveys should be carried out to determine the current condition. The infill may be contaminated and require special handling.

There does not appear to be any significant physical difficulties with construction access. Working at and near to the existing aqueduct will be more difficult because of the steep slopes.

Severn Trent records indicate a 750mm diameter east/west public combined gravity sewer and two 300mm diameter north/south 600mm diameter public foul sewers in the area of the

proposed canal route. It is likely that the canal could bridge over these pipes on concrete aprons so as not to surcharge the pipes. Details will depend on ground type and levels. Where the canal is running almost parallel with the 750mm diameter sewer, a separation of 5 metres is required to minimize any affect the proposed Works may have on the sewer.

There is also a 450mm diameter public foul sewer on the west side of the railway embankment. Again the east edge of the basin should be kept 5 metres away from the sewer to minimize any adverse affects.

Severn Trent Water has recently undertaken sewer improvements in the vicinity of the Leek Arm of the Caldon Canal which may have an impact on route 2 and 2a. If this route option is to be considered detailed topographical and site investigation will be required to determine the exact position of services.

A copy of known services information is included in Appendix 8.

Central Networks records show 240/415 volt underground cables going west from the Barnfield turning circle. This equipment may need to be diverted. Extra high voltage equipment is indicated next to the railway embankment. The basin layout must keep clear of this equipment.

Note: Drawings issued in January 2005 by Severn Trent Water (included in appendix 8) show location of new water main and pumping station. New main water impacts on canal route option 2 and 2a and basin location.

4.2.2 Regulation

The proposals are likely to satisfy the requirements of the Staffordshire Moorlands District Council Local Plan. The Works would need to be compatible with any proposal for the reopening of the disused Churnet Valley Railway and planning permission will be required.

Conservation area consent and listed building consent will be required for works associated with the historic aqueduct and parts of the site within the Caldon Canal Conservation Area. Environment Agency consent will be required for any additional discharges into the River Churnet. A commercial agreement or CPO will be required for the entire route. Connection and maintenance agreements will be required by British Waterways.

The area of Barnfields Industrial Estate is allocated to Employment Uses within the Council's Local Plan. Route 2 would result in the relocation of at least one business (Bestwicks Scrap Yard) and impacts on others including Hughes Concrete.

4.2.3 Environmental Considerations

Aspects considered include the built heritage, nature conservation/biodiversity, landscape impact, water quality and resources and flood management.

Restoration of the listed grade II Barnfields Canal Aqueduct would make a positive contribution to the built environment.

Environment Agency records indicate sightings of water vole in the Caldon Canal and signal crayfish in the River Churnet and further detailed ecological survey work will be required. Any works to the aqueduct should look to retain wall flora, but removing any which maybe causing damage to the structure. Areas of invasive Japanese Knotweed adjacent to the aqueduct will require removal to prevent further growth. Extensive emergent fringe

vegetation has developed at the canal edges near the aqueduct and will require further assessment and monitoring before and during any dredging works.

Checks should be made with Staffordshire Moorlands District Council regarding trees affected by Tree Preservation Orders in this area during the detailed design stage.
There appears to be no significant ecological impact if a mooring basin is sited to the north of the footpath and within Hughes' yard. To the south of their yard is a patch of scrubby woodland that falls away steeply into the river valley and bounds the disused Churnet Valley Railway embankment. These types of habitat usually have high wildlife potential.

The landscape has an enclosed character. There are limited views to the outlying rural area to the south and views are screened by mature broadleaf trees lining the river banks. Only a narrow belt of land exists between Hughes Concrete and the river to accommodate an extension to the canal and sufficient boat turning east from the aqueduct. The land available needs to be wide enough to ensure space for boat manoeuvring, sufficient screening and improved boundary treatment to Hughes Concrete. Current vehicular access approach is visually poor along Barnfield Road and landscape treatment including boundary enhancements to existing industrial units will be required.

The basin location would sit in an enclosed position and needs to be set back far enough from the river bank to avoid possible bank erosion and undercutting.

This proposal does not affect the Rudyard feed. British Waterways would require provision of stop planks at the Aqueduct for emergency protection of the existing network.

There is not thought to be any impact on the floodplain unless the basin infills the small "inlet" off the River Churnet. Restoration of the Aqueduct presents the opportunity to carry out flood defence engineering at this "bottleneck" if required.

4.2.4 Facilities

Without using Hughes Concrete land, the basin and facilities area will be constrained to a maximum of 1600m^2. Using Hughes Concrete yard, the area could be extended to 4480m^2.
If public access across the Park is kept to the southern edge, a footbridge will be required, possibly at the aqueduct to connect to the existing canal towpath.

4.2.5 Benefits

This route would provide links into the existing footpath towards the town centre and the proposed restoration of the railway and regeneration of the Cornhill area of Leek encompassing the cattle market. Other benefits would be the restoration and the safeguarding of the historic aqueduct and an improvement to the view from the existing canal towards the southern edge of Barnfields Industrial Estate.

4.2.6 ROUTE 2a - Variant route

Constructing a new aqueduct straight across the river flood plain to the basin site would:

- create a landmark structure with potentially attractive, elevated views across the Churnet Valley. The suspended towpath could be 6 metres above the ground and screening around the sewage works may be necessary.
- avoid restoration of the old aqueduct (this avoids some costs and engineering difficulties but also loses the opportunity to restore the structure as a "wetted" feature)
- avoid disruption to Hughes Concrete and reduce impact on the existing scrapyard.
- require commercial agreement or CPO with the agricultural landowner – Mr Clewes of Wall Grange Farm.

- require EA consent for the new aqueduct, which may need to be designed to have no footprint in the floodplain.
- minimise the number of landowners affected and hence reduce the complications associated with dealing with developed sites.
- facilitate a smaller terminus basin as additional permanent moorings would be installed on the “arm” of the Canal which would be left between the new and historic aqueducts.

There are fewer constraints due to services. Severn Trent records indicate a 750mm diameter public combined sewer. It is likely that the canal could bridge over this pipe but details will depend on more detailed investigation including ground type and levels.

The Works would be in the “Protected floodplain and Special Landscape Area” and hence early approval in principle from Staffordshire Moorlands District Council Planning Department would be essential. In this regard an architecturally pleasing structure should be considered. The new aqueduct would reduce the cross section of the flood plain locally. A flood analysis will therefore be necessary to check that the impact of the proposal is acceptable.

Borehole information from the British Geological Survey suggests that in the Barnfields Industrial Estate the soil profile could be 2 to 3 metres of fill, over peat and clay above medium dense hard sandstone at 5 to 10 metres below existing ground level. In the flood plain, a borehole just south east of West Bridge (no.9) indicates soil, peat and clay to 1.5 metres below ground, then sand over red sandstone at a depth of 4 metres. Rock may be found at higher levels, since an outcrop is visible near the existing aqueduct.

4.2.7 Outline cost

The cost for the construction of option 2 is estimated to be **£4.2 million**. Construction of route option 2a is estimated at **£4.0 million**. A more detailed breakdown of the outline costings is included in Appendix 7.

View west towards aqueduct. Narrow track between River Churnet and boundary with Hughes Concrete.

View east towards Barnfield Road. Narrow track between Hughes Concrete and Scrap Yard.

View east from southern end of Barnfield Road towards disused railway line and possible location for basin.

View showing possible location for canal basin. Hughes Concrete and scrap yard existing boundary fences are visible.

Existing terminus of Leek Arm at aqueduct.

View south towards River Churnet at top of slope. Scrap yard is visible in distance.

Figure 8 - Route Option 2 – Existing Images

4.3 ROUTE 3

Route 3 involves the construction of a navigable channel following the line of the existing canal feeder westwards from the aqueduct to a new basin near the A53. The basin layout would need to allow for possible future westward extension of the canal.

4.3.1 Physical Constraints

Physical constraints include, current land ownership and land uses, engineering and utilities. The route is across open and sloping, grazing land owned by Mr S. Clewes of Wall Grange Farm. The existing Caldon canal feeder channel, owned by British Waterways runs from the A53 in the west to the existing aqueduct, with a crossing point for the farm access road.

The basin is proposed to be sited below the row of houses next to the A53, with improved road and car parking access off this main artery. It is suggested that any parking provided would be shared by visitors to Ladderedge Country Park. However, Staffordshire County Council Highways Department has indicated that any increase in vehicle use at this junction would be resisted by the Department. Furthermore the council is unlikely to approve a road crossing at grade, to enable the canal to be extended at some future date westward across the A53. There are also many services in this road which would make any form of crossing a significant undertaking.

The constructed form of any scheme east of the A53 would need to have the canal cut into the hillside in places. The feeder canal is currently piped over the middle section of its route. The downhill side of the canal could be embankment of imported granular fill. A reinforced earth element should be considered to provide permanent track access. Appropriate selection of facing material should give a sustainable and aesthetically pleasing engineering solution.

In the flood plain, a borehole just south east of West Bridge (no.9), indicates soil, peat and clay to 1.5 metres below ground, then sand over red sandstone at a depth of 4 metres. Rock may be found at higher levels, since an outcrop is visible near the existing aqueduct.

A swing or lifting bridge would be required to enable the canal to cross the farm access road near the proposed basin. There appears to be telephone equipment in this area which will probably have to be re-located.

As the works will interfere with flow in the feeder channel, temporary over-pumping or a diversion will be necessary.

4.3.2 Regulation

The proposed Works are in the ’Special Landscape Area’ and in the Green Belt and therefore early consultation with the planners will be essential.

Planning permission will be required. A commercial agreement or Compulsory purchase order will be required with Mr Clewes. Connection and maintenance agreements will be required by British Waterways.

4.3.3 Environmental Considerations

Aspects considered include the built heritage, nature conservation/biodiversity, landscape impact, water quality and resources and flood management.

Restoration of the Barnfields Canal Aqueduct would not be necessary. Although the feeder has some non-designated heritage interest, the proposal affects only 400m of its 4km length and part of that is already in culvert.

The mooring basin is likely to occupy an area of sheep grazed pasture with low ecological value. The widening of the feeder would need further survey and investigation particularly for aquatic macrophytes, freshwater invertebrates and white-clawed crayfish. Environment Agency records indicate sightings of water vole in the Caldon Canal and signal crayfish in the River Churnet and further detailed ecological survey work will be required. There would inevitably be some loss of habitat value in the feeder channel which would need to be compensated for in the design of the enlarged, navigable, channel.

The proposed basin is located in a 'Special Landscape Area' so careful consideration is required regarding its siting. Views from the site extend south to housing along Newcastle Road. A basin at this location would be overlooked by the housing. Mature broadleaf woodland lines banks of River Churnet and obscures views to Leek town centre. Vehicular access at this location would need to be shared with owner of Wall Grange Farm. Robust screen planting may be required to help screen the basin from the nearby housing.

As long as the works do not extend north of the existing canal and feeder line, they will not impinge on the protected floodplain.

4.3.4 Facilities

There is already a vehicle access from the A53 at this location, serving Wall Grange Farm. Staffordshire County Council Highways department, however, has indicated that any proposal to increase vehicle use would be resisted.

The existing Deep Hayes Walk right of way would need to be incorporated into a scheme at this location. The local walk runs from Newcastle Road and follows the access road to Wall Grange Farm for a short distance and then follows the canal feeder towards the aqueduct.

A newly contained site of a maximum size of 4200 m2 would be created with public access on the northern edge and secure areas on the southern and western edges.

4.3.5 Benefits

This route would provide a canal terminus close to the A53 with bus routes into Leek close at hand. The route and terminus would have no impact on Barnfields Industrial Estate. The canal extended towards the A53 would mean that it would improve canal accessibility and make it visible from the main road for the first time. The golf course and local and regional walking routes are easily accessible from this location. The site would be easy to secure as it would be located on private offside land.

4.3.6 Outline Cost

The cost for the construction of option 3 is estimated to be **£4.8 million**. A more detailed breakdown of the outline costing is included in Appendix 7.

A53 towards Leek town centre. Area for proposed basin is located to right.

View west along existing access road to Wall Grange Farm towards A53. Views extend south west towards housing on

Canal feeder and culvert

Canal feeder.

View east along canal feeder towards aqueduct

River Churnet viewed from aqueduct.

Figure 9 - Route Option 3 – Existing Images

4.4 ROUTE 4

Route 4 involves the widening of the canal south of Barnfields Canal Aqueduct to allow boats to turn , reinstatement of the historic aqueduct and construction of a new channel through Barnfields Industrial Estate following the historic line of the canal terminating in a basin close to the basin's original location (now Focus DIY).

4.4.1 Physical Constraints

Physical constraints include current land ownership and land uses, engineering and utilities. Barnfields industrial estate is in multiple ownership with most operators owning their own sites. The estate is a major employer in Leek. Hughes Concrete and Kerrygold are the two largest operators on the estate and both would be affected by proposals listed under this option. Significant changes to current land uses would be required. As a corridor through operational plots, there may need to be diversions of private services, modifications to process lines and plant and vehicle crossings provided. The exact requirements would have to be determined based on detailed discussions with the individual site owners/operators.

Borehole information received from the British Geological Society suggests that in the Barnfields Industrial Estate the soil profile could be 2 to 3 metres of fill over peat and clay above medium dense hard sandstone at 5 to 10 metres below existing ground level. Excavation is anticipated and the spoil may be contaminated.

Barnfields Industrial Estate has been built on fill material and it is probable that more material will need to be imported, because the towpath could be about 1 metre above existing ground level. A reinforced concrete trough has been considered for this stretch. It is essential that such construction is on a firm sub-base and any soft areas or layers will need to be removed and replaced by well compacted granular material or the ground treated. The alignment should avoid being too close to existing building foundations. Longitudinal drains and transverse drains will be necessary to drain the hard surfaces each side of the canal.

The existing aqueduct will need to be re-commissioned and this is not without risk. The bridge inspection report prepared by Staffordshire County Council dated November 1995 does not mention any significant adverse structural conditions but reports that the original waterproofing is defective. Work on the bridge will have to be carried out in a carefully controlled manner. Comprehensive desk and site surveys should be carried out to determine the current condition. The infill may be contaminated and require special handling.

There are numerous services in the area. The 750mm diameter east/west public combined gravity sewer immediately on the north side of the river should be able to be crossed The line of the canal should be offset at least 5 metres from the line of the existing 300mm diameter north/south public foul sewer. The canal should also keep clear of the public surface water gravity sewer on the north side of Sunnyhills Road. There is a highway drain in this road which will need to be diverted, possibly into the canal.

Severn Trent Water has recently undertaken sewer improvements in the vicinity of the Leek Arm of the Caldon Canal which may have an impact on route 4. As part of Severn Trent's works a rising main has been installed. Preliminary level information provided by Severn Trent Water indicated that there may be sufficient clearance to bridge across the rising main. If this route option is to be considered detailed topographical and site investigation will be required to determine the exact position of services.

Note: Drawings issued in January 2005 by Severn Trent Water (included in appendix 8) show location of new water main and pumping station. Route 4 would be unlikely to be affected by the new main.

There is extensive buried electrical equipment and some is Extra High Voltage. The canal alignment should minimize the number of crossing points, but diversions are likely to be necessary.
There is gas equipment, water mains and telephone equipment in Sunnyhills Road and Barnfield Road. This plant will need to be diverted.

A copy of known services information is included in Appendix 8.

4.4.2 Regulation

Planning permission, Environment Agency consent and listed building consent and conservation area consent will all be required. British Waterways maintenance and connection agreements will be needed. Significant commercial or CPO arrangements would be required with land owners.

4.4.3 Environmental Considerations

Aspects considered include the built heritage, nature conservation/biodiversity, landscape impact, water quality and resources and flood management.

Restoration of the listed grade II Barnfields Canal Aqueduct would make a positive contribution to the built environment as part of this route.

Environment Agency records indicate sightings of water vole in the Caldon Canal and signal crayfish in the River Churnet and further detailed ecological survey work will be required. Any works to the aqueduct should look to retain wall flora, removing only vegetation which maybe causing damage to the structure. Areas of invasive Japanese Knotweed adjacent to the aqueduct will require removal to prevent further growth. Extensive emergent fringe vegetation has developed at the canal edges near the aqueduct and will require further assessment and monitoring before and during any dredging works.

There is the opportunity to create a “green corridor” through the existing industrial estate.

This route would have a significant landscape impact. A number of units within the industrial estate would be affected if the historic line of the canal was to be restored. Sufficient land take would be required to create an attractive edge treatment to the new channel including a landscape buffer to partially screen existing industrial units.

This proposal does not affect the Rudyard feed. British Waterways would require provision of stop planks at the Aqueduct for emergency protection of the existing network. If new locks were required to raise the new channel then backpumping would be necessary.

Route 4 does not impact on the protected washland. Restoration of the existing aqueduct provides an opportunity to re-engineer the “bottleneck” at this location if required.

4.4.4 Facilities

The estimated area available for the basin and related development opportunities is 5400m2. There would be good vehicle access to the basin as it would be close to the A53 and good “all ability” pedestrian access to the canal. If public access across the Park is kept to the southern edge, a footbridge will be required, possibly at the aqueduct to connect to the existing canal towpath.

The basin location offers the opportunity for mixed-use development with on-site security.

4.4.5 Benefits

This option would bring the canal closest to Leek town centre and would provide opportunities for high-value mixed-use redevelopment around the basin and in the new canal corridor.

4.4.6 Outline Costs

The cost for the construction of option 4 is estimated to be **£8.6 million**. A more detailed breakdown of the outline costing is included in Appendix 7. Estimated land acquisition costs have not been included within the outline cost provided due to the complexities of the route through Barnfields Industrial Estate and potential impact on the various industrial units. Without detailed site investigation works, it is also difficult to ascertain whether excavation of the former line of the canal would be possible.

Barnfields Industrial Estate. View south.
Croder to left of picture.

Barnfields Industrial Estate. View north.
Croder to right of picture.

Barnfields Industrial Estate.
View west towards Focus.

Barnfields Industrial Estate.
View north towards Morrisons.

Former Churnet Valley Public House.
Viewed across IAE's yard.

Former Churnet Valley Public House.
Possible location for canal basin close to location of the original basin.

Figure 10 Route Option 4 – Existing Images

4.5 ROUTE 5

Route 5 involves the widening of the approaches to the aqueduct partially as an essential component of most of the options but for option 5 as a possible terminus and turning area.

4.5.1 Physical Constraints

Physical constraints include, current land ownership and land uses, engineering and utilities. British Waterways owns the current line of the canal. Mr S Clewes of Wall Grange Farm owns adjacent farmland which is used as grazing land. Staffordshire Moorlands District Council owns the aqueduct. The proposed widening to the south of the canal is in open and sloping farm land. There is no existing public vehicle access to the site.

It is proposed to cut into the sloping ground on the south side of the canal. Permanent retaining structures will be necessary and should be made aesthetically acceptable and access for construction plant will have to be provided.

Borehole information from the British Geological Survey undertaken just south of West Bridge (no.9) indicates soil, peat and clay to 1.5 metres below ground then sand over red sandstone at a depth of 4 metres. Rock may be found at higher levels since an outcrop is visible near the aqueduct. Further investigation of the rock head at this location would be needed as rock excavation is expensive.

The existing aqueduct will need to be recommissioned to provide space for boat turning and this is not without risk. The bridge inspection report prepared by Staffordshire County Council dated November 1995 does not mention any significant adverse structural conditions but reports that the original waterproofing is defective. Work on the aqueduct will have to be carried out in a carefully controlled manner. Comprehensive desk and site surveys should be carried out to determine the current condition. The infill may be contaminated and require special handling.

There are no known services in this area.

4.5.2 Regulation

The Staffordshire Moorlands District Council Local Plan shows this area adjacent to the aqueduct as Protected Floodplain and as a ‘Special Landscape Area’ and, therefore, planning permission will be required.

Conservation area consent and listed building consent will be required for works associated with the historic aqueduct and parts of the site within the Caldon Canal Conservation Area. A commercial agreement or CPO will be required for land owned by Mr Clewes of Wall Grange Farm. Maintenance agreements will be required by British Waterways.

4.5.3 Environmental Considerations

Restoration of the listed grade II Barnfields Canal Aqueduct would make a positive contribution to the built environment.

The widening of this section of the canal would need further investigation particularly for aquatic macrophytes, white clawed crayfish, water voles and amphibians. Environment Agency records indicate sightings of water vole in the Caldon Canal and signal crayfish in the River Churnet. Signal crayfish have also been identified further upstream on the Dane feeder. Widening could cause some loss of bank side habitat and this should be replaced with appropriate new retaining structures.

There is limited opportunity for a new basin at this location due to the constraints of the existing landform. Land rises steeply south of the canal across existing grazing land. Widening the existing access between the scrap yard and Hughes Concrete would provide vehicular access to a new facilities block. The enhanced access track should incorporate boundary improvements to soften the visual impact of neighbouring businesses.

This proposal would be for online moorings linked to the existing feeder and canal network. As long as the works do not extend north of the existing canal/ feeder line, they will not impinge on the protected floodplain.

4.5.4 Facilities

Existing vehicle access is by a narrow track (signposted public footpath) from Barnfields Road to the north side of the aqueduct. This is not ideal and would need to be upgraded. The main public access from the Country Park car park would remain, but has 'All Ability' access along only part of its length.

This is a more isolated location than any of the others considered and it may be difficult to have secure moorings, unless these were linear along the south side of the canal. Access to the moorings would need to be created via land owned by Mr Clewes.

A sanitary station may be possible near the aqueduct, including at the site of former canal buildings on the towpath just east of the aqueduct. However the feasibility of connecting into existing sewers and mains would need to be investigated.

A historic photograph provided by the Caldon and Uttoxeter Canals Trust shows where the canal buildings would have been.

Figure 11 Former canal buildings near aqueduct – Date unknown (photo supplied by Caldon & Uttoxeter Canal Trust).

4.5.5 Benefits

This option would provide an enhanced turning and mooring area for approximately 8 boaters wishing to visit Leek. As space and access is limited any space provided for car parking will be kept to a minimum.

4.5.6 Outline Cost

The cost for the construction of option 5 is estimated to be **£2.4 million**. A more detailed breakdown of the outline costing is included in Appendix 7.

Current terminus of Leek Arm at Barnfields Aqueduct.

View east along canal from aqueduct.

View from feeder to Barnfields Aqueduct.

View west along canal to Barnfields Aqueduct and feeder.

View from canal feeder towards aqueduct and existing canal terminus

Barnfields Aqueduct

Figure 12 - Route Option 5 – Existing Images

4.6 Route Options Cost Summary

Route 1	Over existing aqueduct and west towards Wall Bridge	£5.3 million
Route 2	Over existing aqueduct and east towards disused Churnet Valley Railway	£4.2 million
Route 2a	Creation of new aqueduct from canal across River Churnet towards disused Churnet Valley Railway	£4.0 million
Route 3	Enlarge feeder channel to terminus at A53	£4.8 million
Route 4	Restoration of original line of the canal with creation of terminus closer to town centre	£8.6 million
Route 5	Widening approaches of aqueduct to provide enhanced turning and mooring area near Barnfields Aqueduct. (Note: this option does not include the provision of service facilities).	£2.4 million