



Danelaw Multi-User Path Feasibility Study

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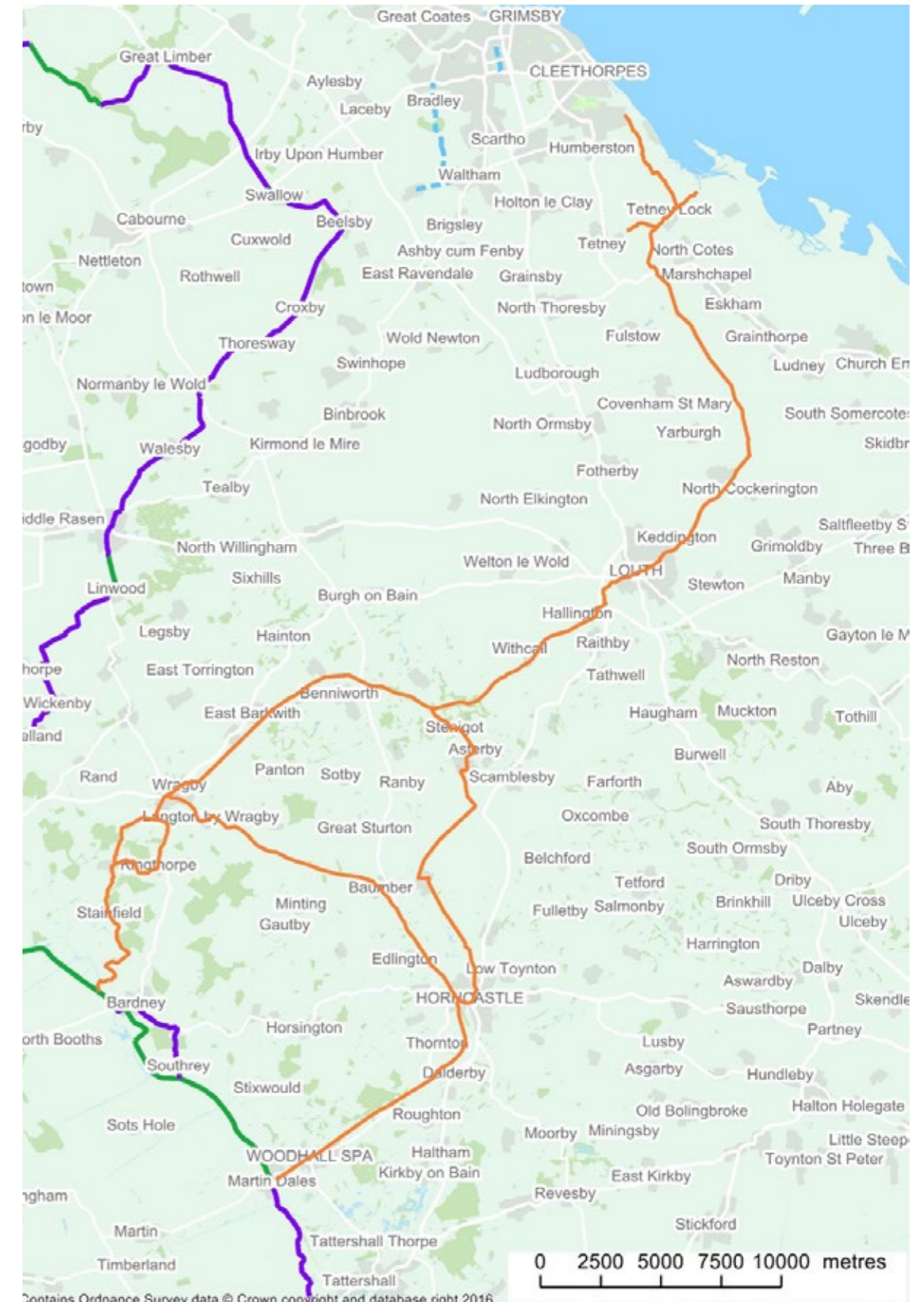
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Routes considered for this project (shown in orange)



1 Executive Summary

The path would extend from the East Lindsey coastline along the Louth Navigation and then connect with the Water Rail Way (NCN1) Multi User Path providing access for pedestrians, cyclists, equestrians and disabled users bringing economic, social and environmental benefits to local residents and visitors to the area.

The proposal is an element of the East Lindsey Economic Action Plan and has the potential to create multiple economic, social and environmental opportunities for local residents/businesses and visitors to the area.

The consultation ran from December to January seeking views, ideas and local knowledge from all residents including cyclists, horse riding groups and other potential users. This helped Sustrans to get a better understanding of people's transport needs from Tetney Lock via Louth, Wragby, Horncastle, Woodhall Spa and linking up to the Water Rail Way Cycle path.

Essentially, the 'Danelaw' concept has been identified as a lever to open up opportunities linked to the development of the visitor segment interested in the UK's Viking heritage and provides us (and other stakeholders/businesses) with an opportunity to develop this historic attractor/product once again (the inland element will cross the Viking Way).

If the MUP is viable, ELDC will need to maximise any return on investment by providing as much linked opportunity for local businesses to develop, create jobs etc. and as such the name of the MUP has to act as a catalyst for this potential and resonate at a national (if not wider) level.

2 Background

East Lindsey District Council (ELDC) invited Sustrans to through tendering process to undertake feasibility work and business case development to support the delivery of a Multi User Path (MUP) which extends from the East Lindsey coastline (linking with the emerging coastal path at Tetney Haven) along the Louth Navigation and then connects with the Water Rail Way MUP (potentially via the disused GNR Louth to Bardney railway line), providing access for pedestrian, cycle, equestrian and disabled users and brings multiple economic, social and environmental benefits to local residents and visitors.

Discussions between East Lindsey District Council (ELDC) and the Louth Navigation Trust (www.louthcanal.org.uk) took place to establish how ELDC could support the Trust to realise their ambition to develop a MUP along the length of the Louth Navigation. It was informally agreed that ELDC would contribute towards this initiative by procuring MUP feasibility work and business case development which would act as the precursor to a physical build.

A route for the Navigation element of the MUP has already been identified and ELDC officers have collected land ownership information relating to the established path. The route is currently designated as a public right of way (footpath) and comprises of a mixture of natural/grassed pathway (maintained by landowners, ELDC, Lincolnshire County Council and the Navigation Trust either by mowing or grazing) and limited sections of hard surfacing (particularly at the western end of the path as it approaches Louth).

Concurrently, ELDC wanted to explore the potential of a formalised MUP link between Louth and the 'Water Rail Way' (<https://www.lincolnshire.gov.uk/download/66199>) which extends between Lincoln and Boston, and incorporates a short stretch along the East Lindsey boundary. This would deliver a MUP which traverses the Lincolnshire Wolds AONB.

Although the Navigation element of the MUP is already clearly defined – ELDC does not have a preferred connecting route to the Water Rail Way. There is the potential for the inland route to link via the disused GNR Louth to Bardney railway line – either in its entirety or partially (connecting with the Spa Trail MUP which runs from Horncastle to Woodhall Spa, which then connects to the Water Rail Way).

The westerly section of the Louth to Bardney disused railway line is outside of the East Lindsey boundary and at the start of the project has not yet been discussed with West Lindsey District Council to establish their appetite for the project. As part of the consultation process Sustrans will have an open discuss with West Lindsey Council Tourism Department.

3 Project Brief

The brief for this piece of work was to undertake an 'overview' audit of two specific highway corridors in Lincolnshire giving guidance and advice leading to interventions that could be implemented to provide two new cycle links.

To investigate the feasibility of a dedicated multi-user path along the Louth Canal and the possibility of other coastal links. Secondly, a connection from Louth town centre to Water Rail Way and to put forward a recommendation for the preferred infrastructure / measures, taking into consideration the type of cyclists using this route; local commuter cyclists and those considering cycling.

Sustrans' Research and Monitoring unit (RMU) will undertake analysis to provide an evidence base to strengthen East Lindsey District Council's business case to fund the preferred path option. Current path usage and projected route usage counts will be calculated to extrapolate likely usage and we will provide a projected annual income into the local economy once the multi-user path route is well established.

4 The Feasibility Study

A desk study was undertaken initially to look at existing cycle infrastructure in Louth, assessed the Louth Canal and old railway line to understand how the current network performs and how it serves trip generators from a tourism, leisure and commuters route.

Four site visits were undertaken to look at both corridors in more detail along with the surrounding interconnecting routes to Louth Town Centre, Water Rail Way and links to other known cycle projects. The findings of this detailed site investigation are split into two sections "Louth Canal" & "Inland". This are set out in Route Audit section below.

The following set of tables and images identifies the current state of the Louth Canal and highway infrastructure through Louth and illustrates interventions that could be realistically implemented to provide a safe and convenient cycle link between the two stations.

The design philosophy used to identify possible interventions was to provide routes that are safe and convenient to encourage the new and less confident to cycle for more of their everyday journeys whilst providing improved facility for those already using the routes.

5 Route Audit

5.1 Louth Canal - From Tetney Lock to Louth - total length approx. 20km

1 Humber Estuary access

The Louth Navigation Canal which runs almost parallel to the Lud dates back to 1765. Teams of Irish “Navies” dug the eleven miles from the sea-lock at Tetney to Louth with only hand tools. Two years into the project, funds ran low and a further £14,000 had to be raised for the canal to be completed. It was opened on May 20th 1770. Sadly the canal fell into disrepair after the Louth Flood of 1920 but a unique feature is still visible near Alvingham, this is one of the seven “Bell Chambered” locks, designed as was the entire canal by John Grundy. This was the first canal to use this type of lock.



Note:

Drainage Board – Disabled access parking only.

Natural England – barrier to stop unauthorised access.

Preferred Design

Provide a 3 disabled car parking bays. Agree land ownership with xxxx. Provide interpretation boards, seating and cycle storage and way marker posts, signing people to Humber Fifties and existing Public Rights of Way (PRoW).

2 Humber Estuary to Tetney Lock

Current path is Public Footpath RoW only. No signs of Water Voles during the site visits, however it was clear that the route is well used by walkers and wildlife enthusiasts taking photographs and bird watching.



Note:

Drainage Board – Use Western side on bank on upper level. Water Voles inhabit the Canal

Conoco – pipelines along the route. (Seek advice when it comes to build phase).

Preferred Design

Amend current gate arrangement at Tetney Lock to provide farm and stock control access with side gate and separate cycle access with cattle grid.

New 3m wide path construction to mitigate against water vole activity using cellular construction process (Cellweb / Netpave or similar) which requires little or no excavation.

Path to constructed along upper levels to mitigate against flood risk.

Provide bench / seating area and consider facilities for bird watchers (hide / information boards).

3/4 Tetney Lock Road section

Currently, the PRoW merges with access for Tetney Lock Road. There are some services such as the Crown & Anchor, which is currently up for sale. At the junction of Tetney Lock Road and North Coates Road traffic travel in both directions.

Note:

Approx. 500m of North Coates Road, no centreline or markings. De-restricted speed limit. Verges show evidence of parking. Link from road onto canal bank at southern end of Tetney Lock has poor visibility due to extensive vegetation and road layout.

Preferred Design

Reduce speed limit to 30mph.

Advisory cycle lanes 1.50m wide in each direction with no centreline to extend from Newton Marsh Lane through to North Coates.

Improve condition of verge and utilise space for cycle lane, protect from parking using light segregation / low bollards.

Northern End

S-N movement:

Re-align existing crash barrier to enable existing footway to be widened to 2.0m, protect access to footway from parked vehicles. New dropped kerbs to enable crossing movement into narrow lane.

Map format sign to indicate cyclist crossing.

N-S movement:

Signing on approach to canal bridge to say “cycle route ahead”.

Southern End

S-N movement:

Localised carriageway widening to change alignment of road and create space to implement protected merger into North Coates Road.

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid. Single bollard to act as route signing.

Re-locate existing OHP post and stays.

VAS sign on road with remote trigger from canal path.

N-S movement:

Localised carriageway widening to change alignment of road and create space to implement protected crossing from North Coates Road onto canal bank.

North Coates link

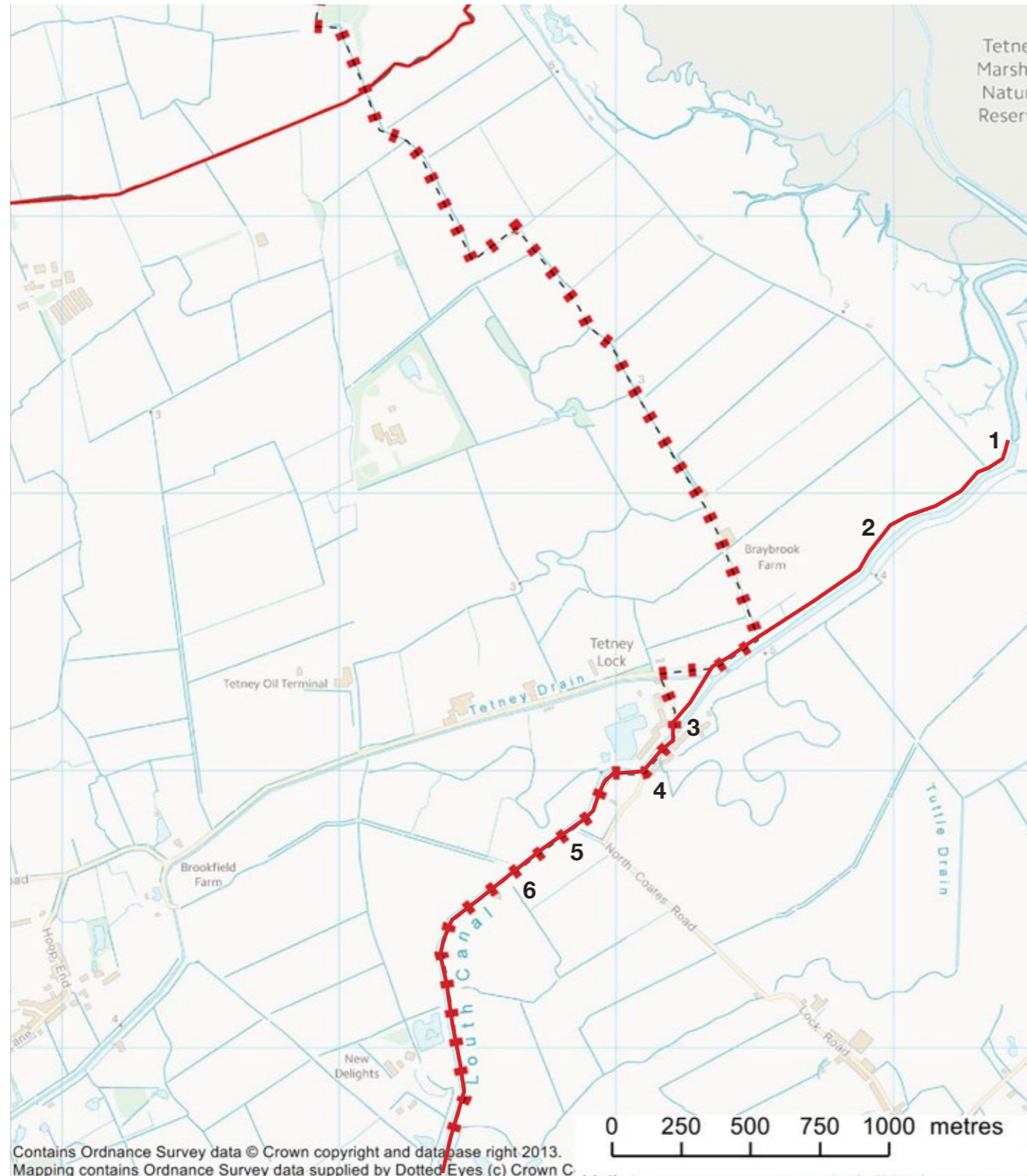
Consider connecting North Coates using a loop consisting of Ings Lane and the road link between Tetney Lock and North Coates.



Tetney Lock junction



Map 1 - Humber Estury to Tetney Lock



5 PRow between Tetney and Fen Lane (1)

The current path is over 3m wide and is over 5m from the canal (as seen on the photo).



The access point for pedestrian has an overgrown bush (see photo below). This is restrictive for users and isn't fit for propose.



Preferred Design

Remove existing bush if path alignment cannot be allowed to deviate.

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area and consider facilities for bird watchers (hide / information boards).

6 PRow between Tetney and Fen Lane (2)

Continuing north along the route the PRow the bank is lower, but is still within the requirements from any canal/habit disturbance.

The stile (below) will require an upgrade for horse-riders and cyclists.



Preferred Design

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area and consider facilities for bird watchers (hide / information boards).

7 PRow between Tetney and Fen lane (3)

Preferred Design

Amend current gate/stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench/seating area and consider facilities for bird watchers (hide / information boards).



8 PRow between Tetney and Fen Lane (4)

Limited width on the northern section of this route, approx. 1 – 0.4m. This is well below a standard footway width and therefore is not suitable for considering as part of the scheme.

However, this section of the route is very scenic and incorporating reserve. Due to the length of the route and locality we would highly recommend a siting areas with a café, interpretation board, and directional sign posts.

If a café was introduced at this point, then car parking could be incorporated.

Note:
Natural England – incorporate the nature reserve as a point of interest.

Preferred Design

Option1:

Approx. 400m new field path, including culvert or small bridge crossing of existing drainage channel, to avoid poor section of bank.

Approx. 70m carriage way works (A1081) to create 2.5m wide shared path link to canal bridge.

New road crossing to link to canal bridge.

May need to consider fencing / screening to adjacent property.

Option2:

New lightweight structure across canal to take path to west side, new link path to A1081.

Uncontrolled crossings of A1081 using existing road bridge footpaths to cross canal.

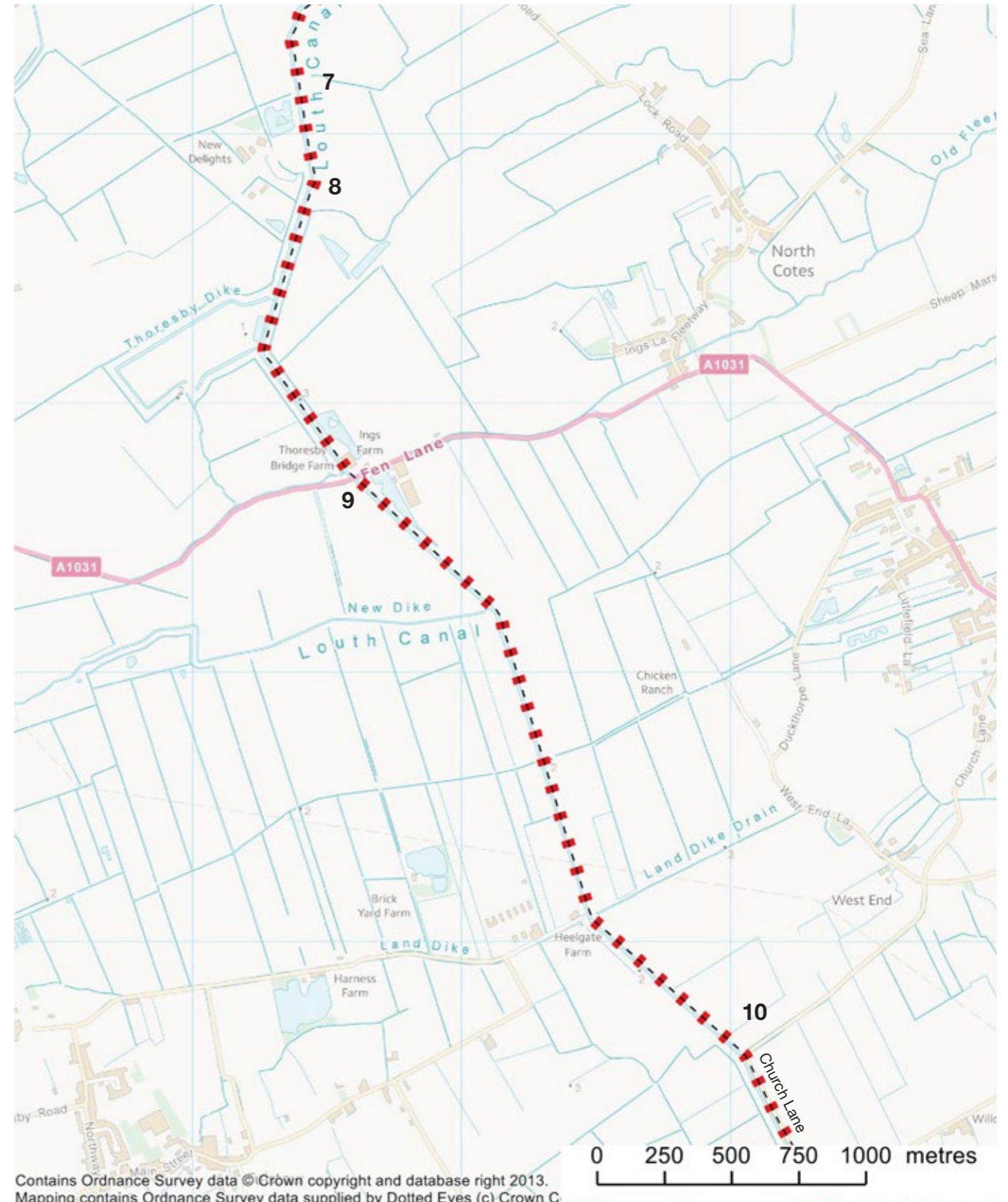


Fen Lane Nature reserve section



Narrow section running towards Fen Lane

Map 2. Tetney to Church Lane



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9 Junction at Ings Farm/Fen Lane

Limited footway width on both side of Fen Lane. Speed limit is 60mph, but good visibility.

Preferred Design

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid. May need to consider single bollard, which could also act as signing.

Provide bench / seating area adjacent to lakes / canal.

VAS signing on approaches and repeater warning signs. VAS signing to be triggered by cycle detector loops set within new path construction.

Use of 400 x 400 "Elephants Footprint" lining and coloured surface treatment possible but may need DfT approval.



10 Louth Canal (Land Dike - Church Lane) connecting Bull Bank & Firebeacon Lane

Once at the gated section at Land Dike Road has a tight sharp bend. At this point users will have join the road. There is a PRoW sign post.

Reduce vehicle entry speed at Land Dike and investigate a priority crossing.



Preferred Design

Land Dike & Church Lane

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area.

Church lane / Firebeacon Lane junction

Warning signs on approaches to current junction on Firebeacon Lane.

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

11 Bull Bank towards Austen Fen farm

A new entrance needs to be cut in the grass bank here which should incorporate a gate for maintenance vehicles. The current access point consists of a wooden gate and stile. The bank is within 5m of the canal and can accommodate a 3m wide path.

Preferred Design

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area.



View looking back up Church Lane from Bull Bank



Canal access gates south of Bull Bank



PRoW

12 Louth canal at Bull bank road access

Failed footway surfacing to be replaced and shared use to be introduced.

Pinch point outside Swift House can be removed by widening/removing the layby. Subject to approval from land owner.



Looking along Bull Bank, canal access on right

13 Bull Bank

Limited footway width on both side of Bull Bank. Speed limit is 60mph, but good visibility.

Preferred Design

Reduce existing speed limit from de-restricted to 40mph.

VAS sign on approaches activated by detector loops in new path.

Re-configure access with Austen Farm to provide vehicle access and separate pedestrian / bicycle arrangement.

Double bollard arrangements and cycle speed humps on new path to slow bicycle speeds.

Formal access point, with car parking potential may need to be considered.



14 Bull Bank to Austen Fen Farm

Sufficient width appears to exist for a shared use.

Further discussion needs to be had if parking is allowed at this section observed during site visit.

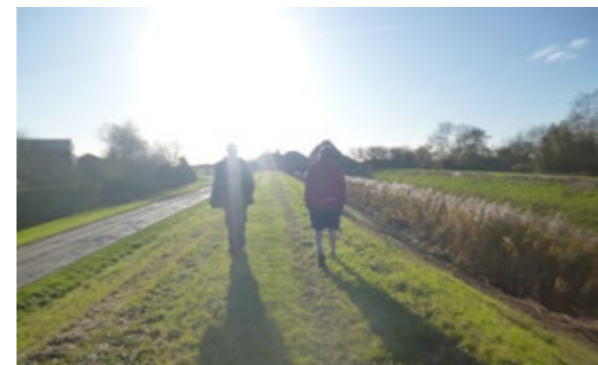
This section of the route is overgrown under foot. Once again it has a metal farm gate and a pedestrian gate.

Due to the undergrowth it was clear to see if 3m could be obtained, but the existing network would be able to fulfil a 2m. This issue would be resolved as part of ground investigation if the project is taken forward for funding. It is however, within the 5m threshold from the canal.

Preferred Design

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area.



Austen Fen Farm access



15 Austen Fen Farm

This section of the route is overgrown under foot. Once again it has a metal farm gate and a pedestrian gate.

Due to the undergrowth it was unclear if 3m could be obtained, but the existing network would be able to fulfil a 2m width. This issue would be resolved as part of ground investigation if the project is taken forward for funding. It is however, within the 5m threshold from the canal.

Preferred Design

Amend current gate/stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench/seating area.



16 Austen Fen Farm towards Fen Lane (1)

On a sunny day it was a surprise to see a young seal relaxing on the banks of the canal. This shows the extent of wildlife that inhabits the banks of Louth Canal. There is also capacity for a 3m wide multi use path.



Stile access point between Austen Fen



Overgrown section along canal



Austen Farm to Fen Lane gated access

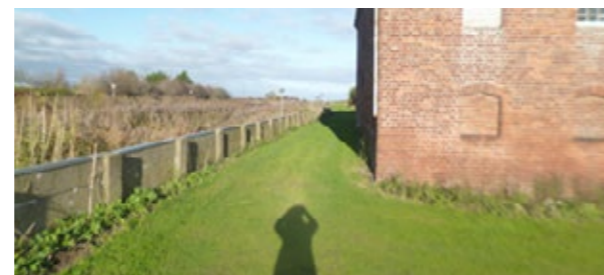
17 Austen Fen Farm towards Fen Lane (2)

Access stile was in poor condition, with loose barbwire and overgrown hedging. As you can see in the second photograph the grass isn't as well maintain as the rest of the PRow section.

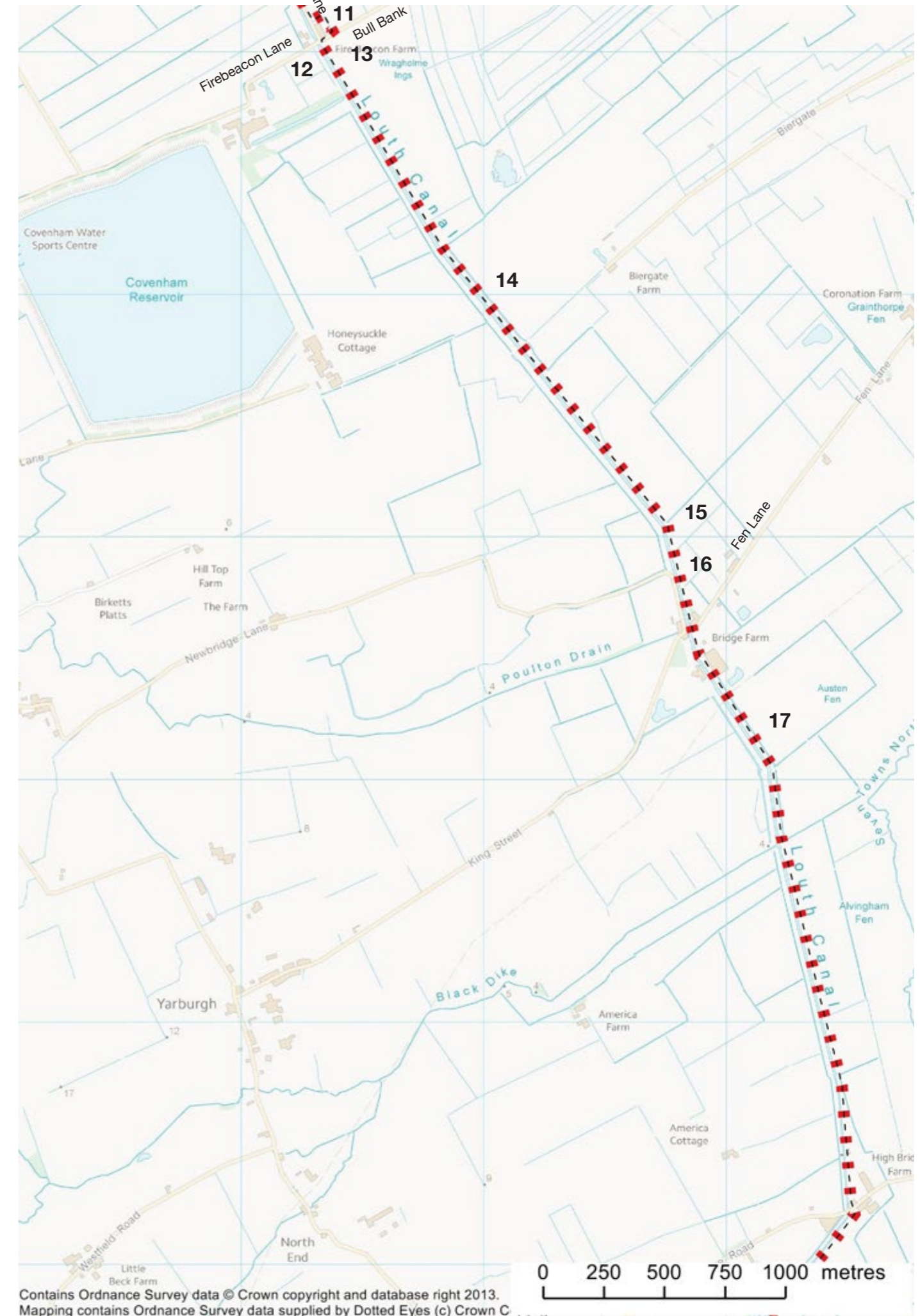
Preferred Design

Amend current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area.



Fen Lane



18 Austen Fen to Alvingham Lock

During the site visit we found a wall memorial plaque, under grass this whole section isn't maintained as well as the rest of the PRow section.



Farm access towards Alvingham lock



Overgrown embankment

19 Alvingham Lock Highbridge Road

Existing PRow effectively passes through the "rear garden" of an existing residential property, and whilst this may be currently accepted by the residents, construction of a new multi user route may not be so welcome.

There are the remains of an old lock gate approx. 500m North of the current Highbridge Road bridge.

Preferred Design

Re-use the remains of the lock gate to provide the abutments for a new lightweight structure, 3.50m wide and cross the path onto the western bank.

Construct a new section of path to reach Highbridge Road.

Amend current gate / stile arrangement on south side of Highbridge Road to provide farm vehicle /

maintenance access with side gate and separate cycle access with cattle grid.

Provide bench / seating area / signing.

Lock Road

Existing PRow to the side of an existing residential property, and whilst this may be currently accepted by the residents, construction of a new multi user route may not be so welcome.

Preferred Design

Upgrade existing PRow would be easiest option, but will need to retain verge / knee rail fence along canal as this has brick built vertical face.

Double row of bollards to slow cycles, on carriageway markings and signing on Lock Road.

Gateway feature for "Alvingham" to help reduce vehicle speeds.

On road route through Alvingham village should be signed as this creates a circular route.



20 Alvingham Fishing Lake towards Ticklepenny

Once you have navigated your way across Lock Road, follow the PRow sign along a wide access track. This takes you past the Alvingham Fishing Lakes and continues along the embankment of the canal.

Preferred Design

Upgrade existing access track to Alvingham Lakes to remove current pot holed surface.

New current gate / stile arrangement to provide maintenance access with side gate and separate cycle access with cattle grid once beyond access to the fishing lakes.

Provide bench / seating area.



Alvingham Lakes Lane access

21 Keddington Lock to Riverhead Lock

This section of the Canal crosses the Keddington Lock, which is between Eastfield Road and Cowslip Lane. During the site visit car currently use this section for parking. It is sign as a PRow does provide a waste bin. Along this section of land livestock grazes the banks. This section will need to be discussed in detail with the landowners.

Recommend livestock barriers.

Preferred Design

New current gate / stile arrangement to provide maintenance access with side gate and separate cycle access.

Formal parking area for 5/6 cars only and reinforce with "No verge side parking" - will require land owner agreement to ensure that crossing point is not obstructed / visibility obscured.

Provide bench / seating area.



22 Riverhead Lock

Existing path arrangements are narrow on the approaches with falling gradients to a barrow footbridge.

Preferred Design

Improve approach path width and levels.

New lightweight bridge 3.50m wide to link across on same alignment.

Provide bench / seating area.



24 Louth Canal to Riverhead Road



23 Mallard Ings to Navigation Warehouse

Footpath link to Mallard Ings is 2m wide but bounded by high boundary wall reducing usable width to approx. 1.50m.

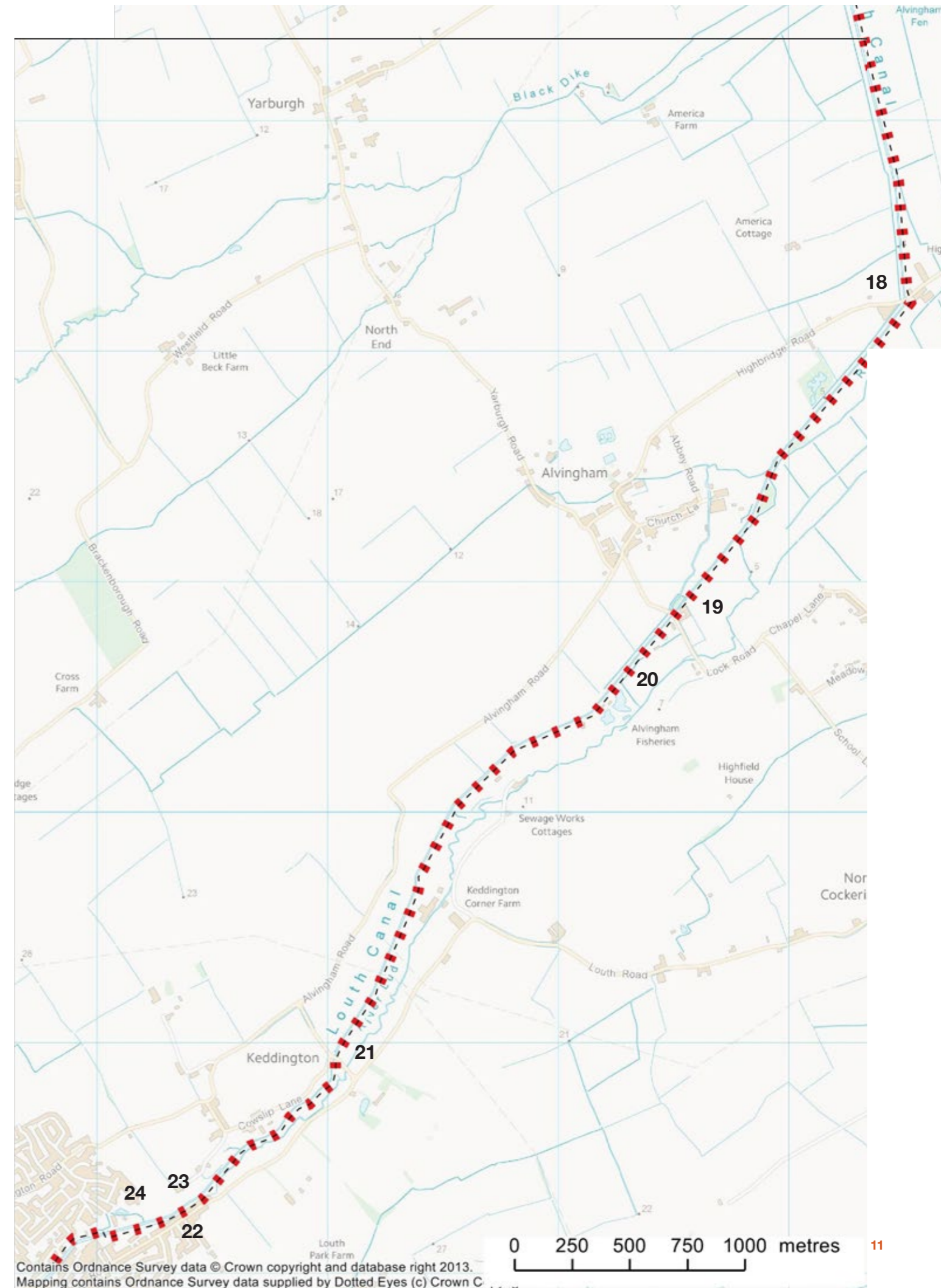
Constructed as part of a housing development the link may only be viable for pedestrian / cycle / mobility impaired use.

Preferred Design

Improve path width to 2.50m usable where possible along this section using adjacent verge.

Widen pathway alongside car parking area to 3.0m and protect from overhanging vehicles using timber bollards.

Map 4. High Bridge Farm to Riverhead Road



5.2 Louth Town Centre - Crowtree Lane to Riverhead Road - total length approx. 3km

1. Navigation House to Riverhead Road

Riverhead Road is a busy A category road carrying a large amount of commercial and residential traffic. Footway on the western side of the carriageway only, heading towards the town centre with some opportunity for footway widening to provide shared use without significant highway works.

It also was noted the all the routes connected across town are 30mph.



2. Riverhead Road to Eastgate Road

Pinch point in footway both sides of the road at mini roundabout leading to Market place.

Junction remodelling could provide width for shared use.



3. Eastgate to Church Street

Church Street and Eastgate are busier roads with the Bus Station being located on Church Street.



4. Church street to Kidgate

Kidgate is all one way with pinch points. A much better quiet road alternative to Middlegate and avoid the busy and difficult one-way sections.

This route avoids the Market place and also is at a gentler gradient for the majority of its length.

Suggest signing this option to provide connection to the town centre.



5. Kidgate to Gospelgate

Gospelgate is on a one-way system. The street is narrow with on street parking, The section of network would need traffic calming and signing, making it appropriate for younger cyclists to cycle on road.



6. Gospelgate to Crowtree Lane

Crowtree Lane connects Louth Town centre to Hubbards Hills.

During the site visit the network was quiet, but knowing the area this does get extremely busy. The lane is narrow and widens out as it approaches the town centre.

Cyclists currently cycle on road, but we observed not signage warning drivers. There is also no directional signs.

We would recommend that these issues are improved if the scheme goes forward to a design and build stage.



Map 5. Louth Town Centre



- Binding Margin -

Table 1 - Town Centre – Crowtree Lane to Riverhead Road Option Appraisal

Option		Increased cycle usage
Do Nothing	Road remains unsuitable for family groups or inexperienced children. Poor connectivity through the town. No provision for touring cyclists.	Unlikely
Do bare minimum	Signing through Louth from Hubbard’s Hill to the Louth Canal Path should be installed, and supplemented by diagram 1057 logo’s on carriageway. May encourage some users but unlikely to generate wholesale change in modal shift.	Unlikely Changes may encourage more confident of ability and help cycle tourers.
Route marked on road from Hubbard’s Hill along Crowtree Lane	Designate Crowtree Lane as a ‘Quiet Lane’ with appropriate signing and speed limit. Traffic calming may be required as Crowtree Lane reaches the built up area and the B1200 Edward Street junction. Changing the priority at Gospelgate to a ‘Give Way’ for Edward St traffic would ease crossing this B road.	Crowtree Lane is already well used by pedestrians and should be equally well used by cyclists given the correct treatment. May not suit young family groups or those that don’t want to be on road at any cost.
Contra flow cycle lanes on Gospelgate and Kidgate. Introduce 20mph speed limits	Designate Gospelgate as access only for vehicles and mark with diagram 1057 logo’s. Provide a route along B1520 for the short distance to Kidgate by changing the priority at both junctions installing cycle logo’s and removing the centre line. Alter existing traffic calming features on Kidgate by providing bypass lanes through build outs.	More appropriate use of existing facilities, and designates some space for cyclists. Changes in speed limit can be enhanced with appropriate levels of traffic calming but need to be designed to minimise impact on bicycles.
Traffic calming on the narrow section of Church Street and along Eastgate with a 20mph limit	Options that could be considered include a priority system on the narrow section of Church Street. Options on Eastgate include removal of the centre line and the installation of diagram 1057 logo’s with traffic calming.	Changes in speed limit can be enhanced with appropriate levels of traffic calming but need to be designed to minimise impact on bicycles.
Traffic calming for the link to Louth Canal path	The junctions of Riverhead Road /Eastfield Road and Riverhead / Riverhead Road would benefit from tables across them to ease the right turning manoeuvres for cyclists.	This final approach to the Louth Canal path will be challenging for family groups unless appropriate measures are installed.

5.3 Hubbard's Hills to Horncastle and Wragby

1-2 Navigation House to Riverhead Road

The A16 Louth bypass severs the old railway alignment to such an extent that reaching Louth town centre using it as the sole option is virtually impossible without significant expenditure and commitment from LCC Highways.

Traffic flows on this Western bypass are heavy and fast making it very difficult to provide an at grade crossing point (a bridge at this location would dominate the surrounding landscape and is not considered feasible).

The route alignment through Hubbard's Hills is therefore seen as the most practical and deliverable solution to creating connected corridor.

It is understood that widening the existing path through Hubbard's Hill for shared use would be opposed by local groups.

Preferred Design

Replace existing timber bridge with new 3.50m wide lightweight structure and improve approach paths.

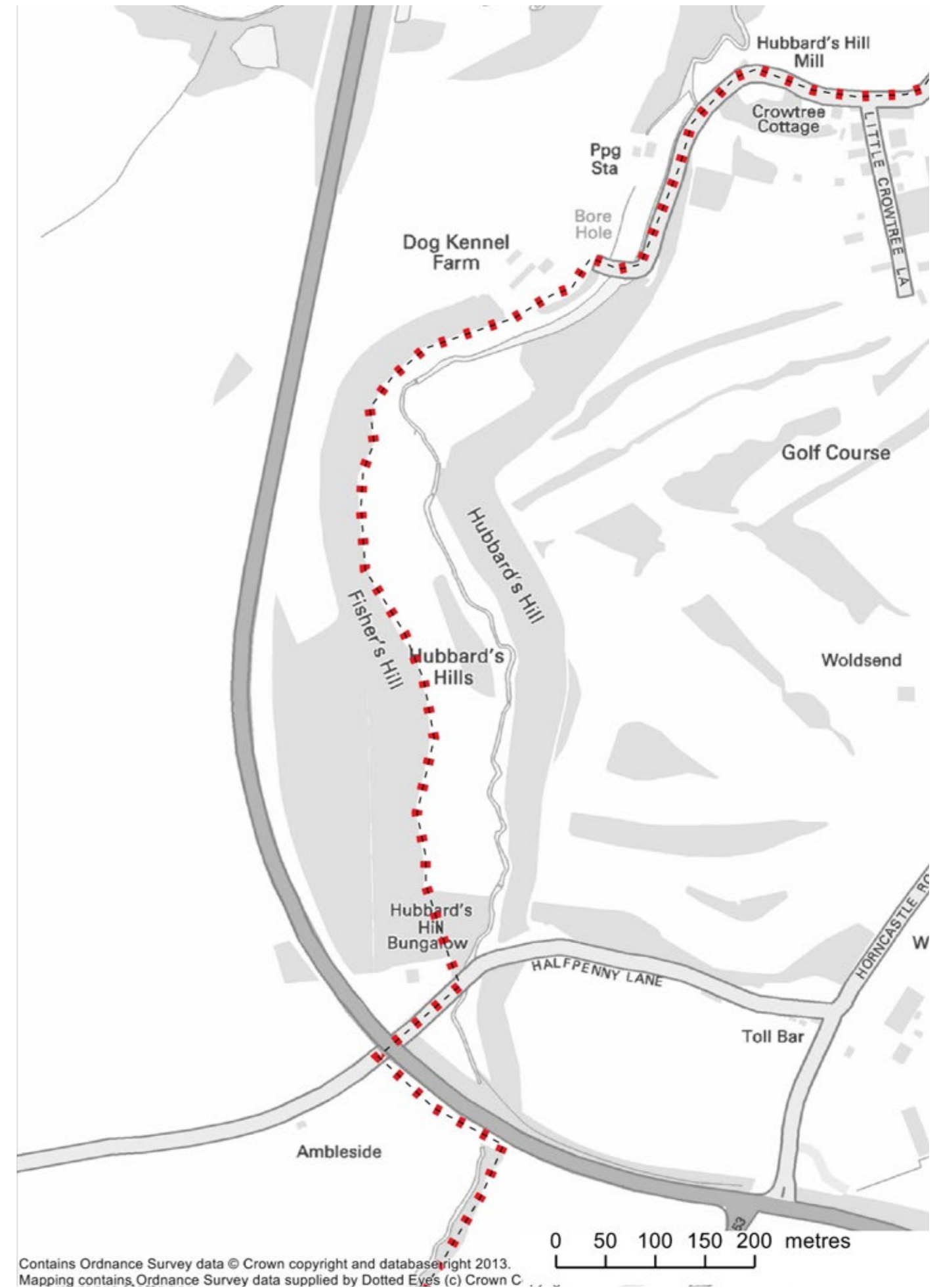
New 3m wide multi-user path around extremity of open space, partly built into the bank at the tree line – this will create a new circular loop, and reflect current pedestrian use.

Cycle speed humps at regular intervals to reduce desire to speed.

Halfpenny Lane is considered cycle friendly with low levels of intervention necessary, signing and lining initially, but if this section linking Hubbard's Hills to the rail line becomes popular further intervention may be appropriate.



Map 6. Hubbard's Hills



3-4 Railway corridor, Withcall Tunnel – Halfpenny Lane link

North of Withcall Tunnel the former railway alignment continues North West passing between Hallington and Raithby on the way to Louth a section distance of approximately 6.5km. Before reaching the outskirts of Louth the railway alignment comes up against the A16 the new path diverts to Halfpenny Lane using upgraded PRow.

Withcall Tunnel – Withcall Village

Existing rail alignment from Withcall Tunnel – Withcall Village, approx. 1850m, is currently used as farm access track.

Withcall Village – Hallington

Approx. 2600m, evidence of farm vehicle traffic, but not as extensive as link to Withcall Tunnel, indicated as “private” at Withcall end but appears to be bridleway at Hallington end.

Hallington Station – Halfpenny Lane

Station building is private residence, so rail alignment is lost to garden. Alternate using rough track (farm or private?) viable but need to understand the vehicle movements.

The field area immediately adjacent to the A16 / Halfpenny Lane link may be viable car parking, and may reduce pressure elsewhere in the vicinity should the route become popular.

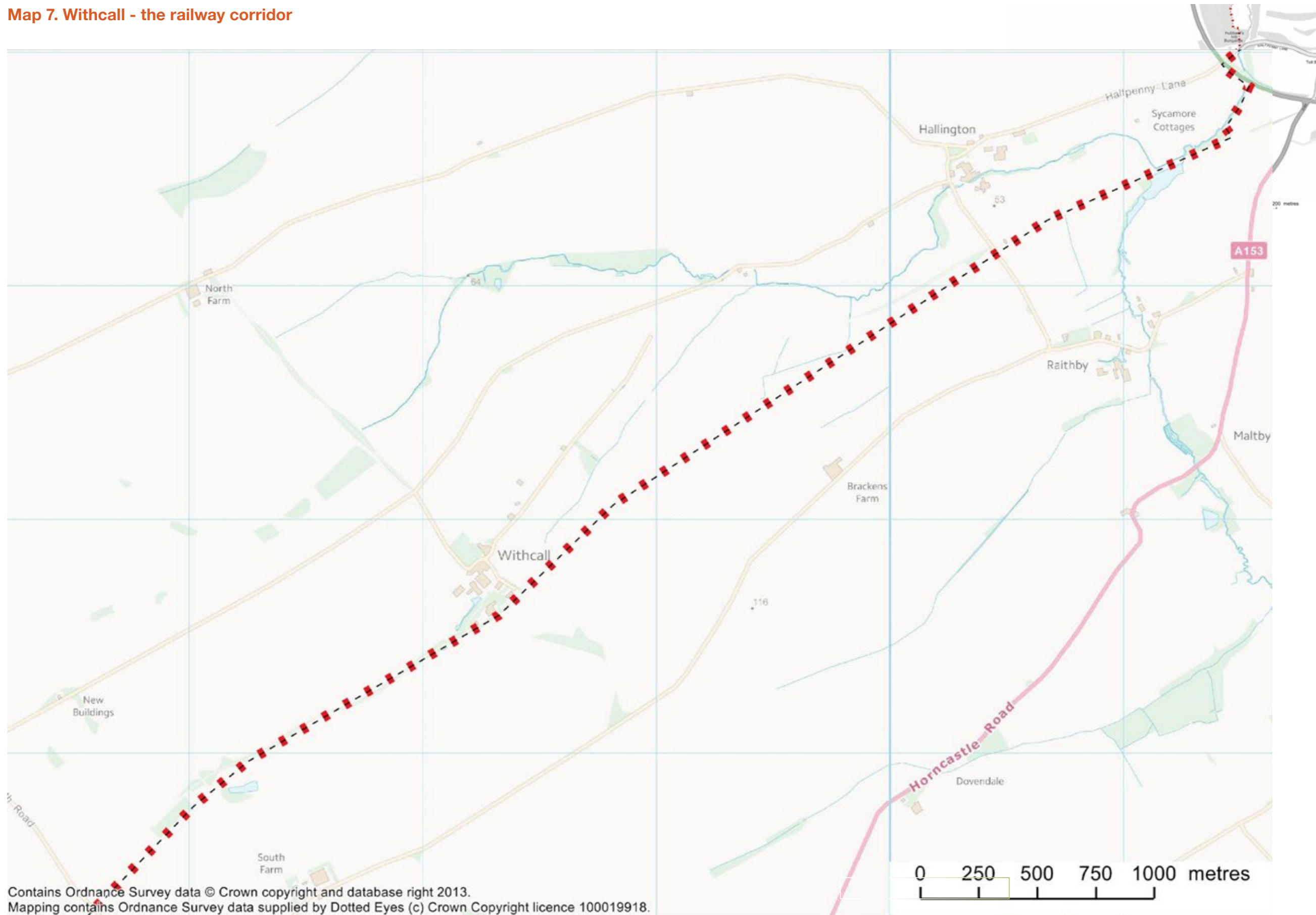
Preferred Design

Concrete preferred where farm traffic is to use the corridor length.

This can be precast (as per Dutch style tracks), or combination of concrete central strip with concrete surface turning areas at gateways.



Map 7. Withcall - the railway corridor



- Binding Margin -

6,7 Withcall Tunnel – Donington on Bain station (Route alignment potentially splits at this point to Wragby and Horncastle)

The route would head South West towards Stenigot via Withcall Tunnel.

Withcall Tunnel:

900m long and is in reasonable condition given its age (opened in 1876). The portals are bricked up with doorways provided for access. Humidity levels are high and temperatures stable providing ideal conditions for bats. The structure is a hibernaculum and has SSSI status.



Withcall Tunnel entrance



Old railway line on tunnel approach

Use of the tunnel as part of the route is the preferred option and it should be possible to mitigate for the bat presence.

Whilst providing an interesting historical and geographical feature to the route the tunnel also avoids steep stretches of diversion route. Subject to agreement of the landowner there is an opportunity to provide car parking within part of the nearest farm yard, however this may be limited to a certain number of vehicles.

Subject to a detailed survey the tunnel would be suitable in terms of width and height with an improved surface and lighting being the key requirements.

A further survey of the structural condition is recommended. The check list included in Sustrans Design Manual chapter 10 is included as an appendix to this report, and should be used as a basis of any further inspections.

Works identified to the structures should be recorded as “fundamental/short-medium/medium-long term target”. This will help to identify works that are essential to opening up the tunnels to the public and areas that whilst perhaps necessary could be carried out over a longer time period.

This would help stagger funding requirements and avoid expensive and perhaps inappropriate targets being set at the outset.

Track bed generally intact through to just north of Donington on Bain station site, where it runs diagonally across rough pasture.



North of Donington on Bain Station

The original road bridge over the railway has been removed and replaced with an embankment.

Donington on Bain railway station is a private residence, and the old goods yard is farm storage.

Potential for car parking area within old goods yards should be investigated.

Preferred designs should include consideration of farm vehicle movements, concrete pads at farm access points and /or concrete construction throughout should not be discounted if farm or livestock are present.



Donington on Bain Station from south

Withcall Tunnel Avoiding alignments

Should it not be possible to use the tunnel routes utilising quiet roads and new field paths are proposed.

Two alternative routes are indicated on the plan below. The shorter route (approximately 3km long – Orange dots) uses steeply graded new field paths from the tunnel entrances to take a path over the tunnels.

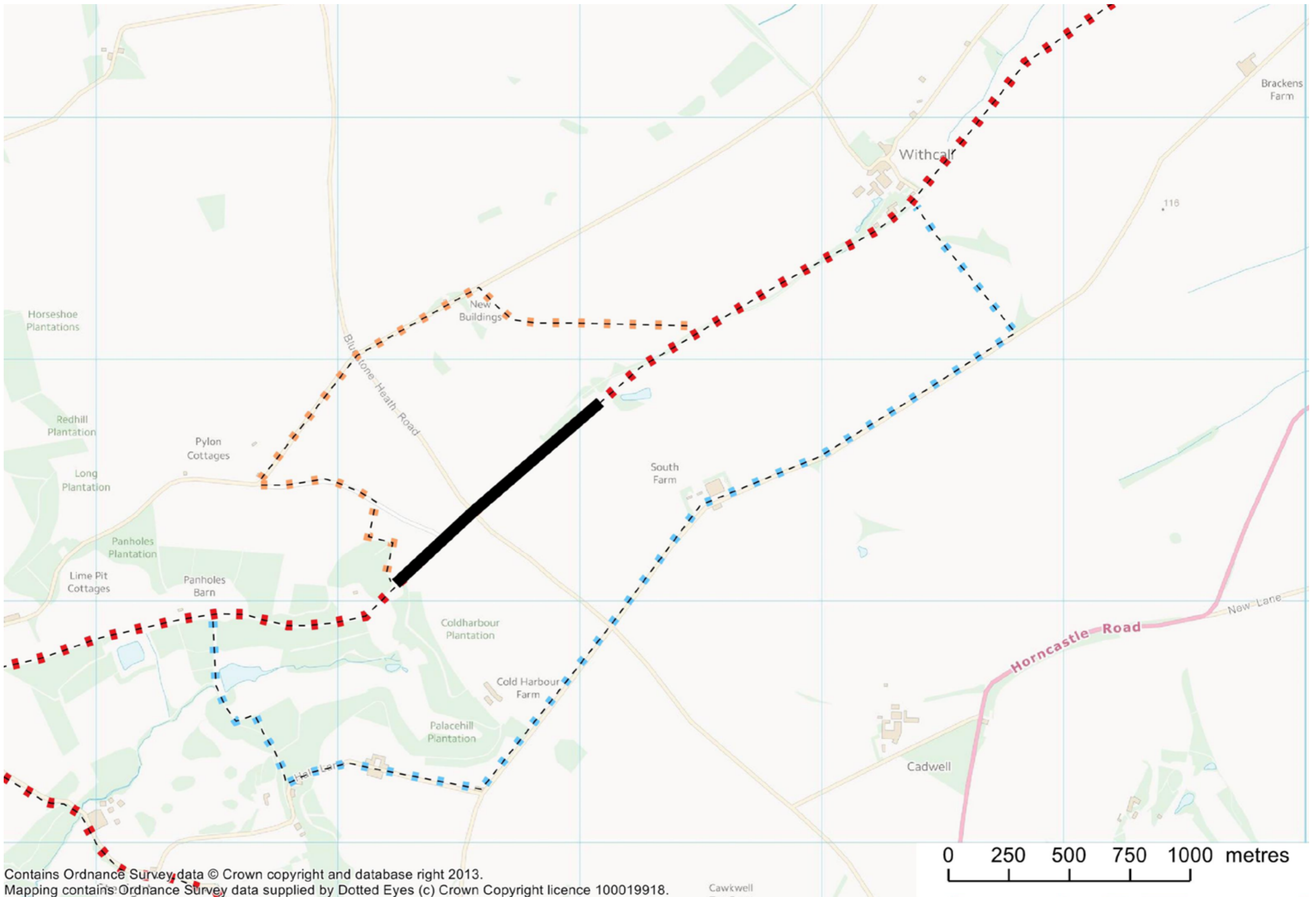
A longer route (5.5km long – Blue dots) is largely on road but also utilises Public Right of Way alignments.

Alternatives would require landowner negotiation, upgrading of PRow routes and improvements on the quiet roads.

The gradients involved in the alternative routes are indicated below the plan and are considered to be unsuitable for family groups (The gradient profile for the longer route is shown opposite).



Figure 1. Withcall Tunnel and environs showing gradient



- Binding Margin -

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6. South Willingham Station - High Street Tunnel South Willingham

Station is in private residence, including the original station access road, and much of the railway alignment has been incorporated into private garden.

The old railway bridge crossing Station Road has been removed, and a new property constructed on the north side of the road, approximately on the old alignment.

Preferred Design

New field path to follow parallel to railway corridor to avoid station building and link onto Station Road. Construction in tarmac and protected by post and rail fence.

New field path on North side of Station Road: to follow railway alignment across rough pasture field, to be constructed in concrete or as a field edge path to be constructed in tarmac with post and rail fence.

High Street tunnel

This is approximately 500m long and is again in reasonable condition given its age.

The tunnel has not been bricked up but is a bat hibernaculum and the site is designated as an SSSI.

As with the Withcall Tunnel use of the tunnel as part of the route is the preferred option should it be possible to mitigate for the bat presence.

Subject to a detailed survey the tunnel would be suitable in terms of width and height with an improved surface and lighting being the key requirements.

As tunnel information is limited, and a further survey of the structural condition is recommended. The check list included in Sustrans Design Manual chapter 10 is included as an appendix to this report, and should be used as a basis of any further inspections. Works identified to the structures should be recorded as "fundamental/short-medium/medium-long term target". This will help to identify works that are essential to opening up the tunnels to the public and areas that whilst perhaps necessary could be carried out over a longer time period. This would

help stagger funding requirements and avoid expensive and perhaps inappropriate targets being set at the outset.

Use of the tunnel allows the route to avoid the steep gradients present on the diversion route options. Clearly landowner negotiation would be required before this route section could be realised.



7. High Street Tunnel Option B

Should it not be possible to use the tunnel as a route section routes utilising quiet roads and new field paths are proposed.

One option for a diversion (2.6km) would use the quiet lane network between South Willingham and Benniworth (see blue route on the plan below) and link up to the B1225 where a route would need to run parallel to (approx. 225m) and then cross onto another quiet lane, returning to the former railway alignment either via new field path or at next available over bridge. In terms of deliverability this option would require only signing along the quiet roads.

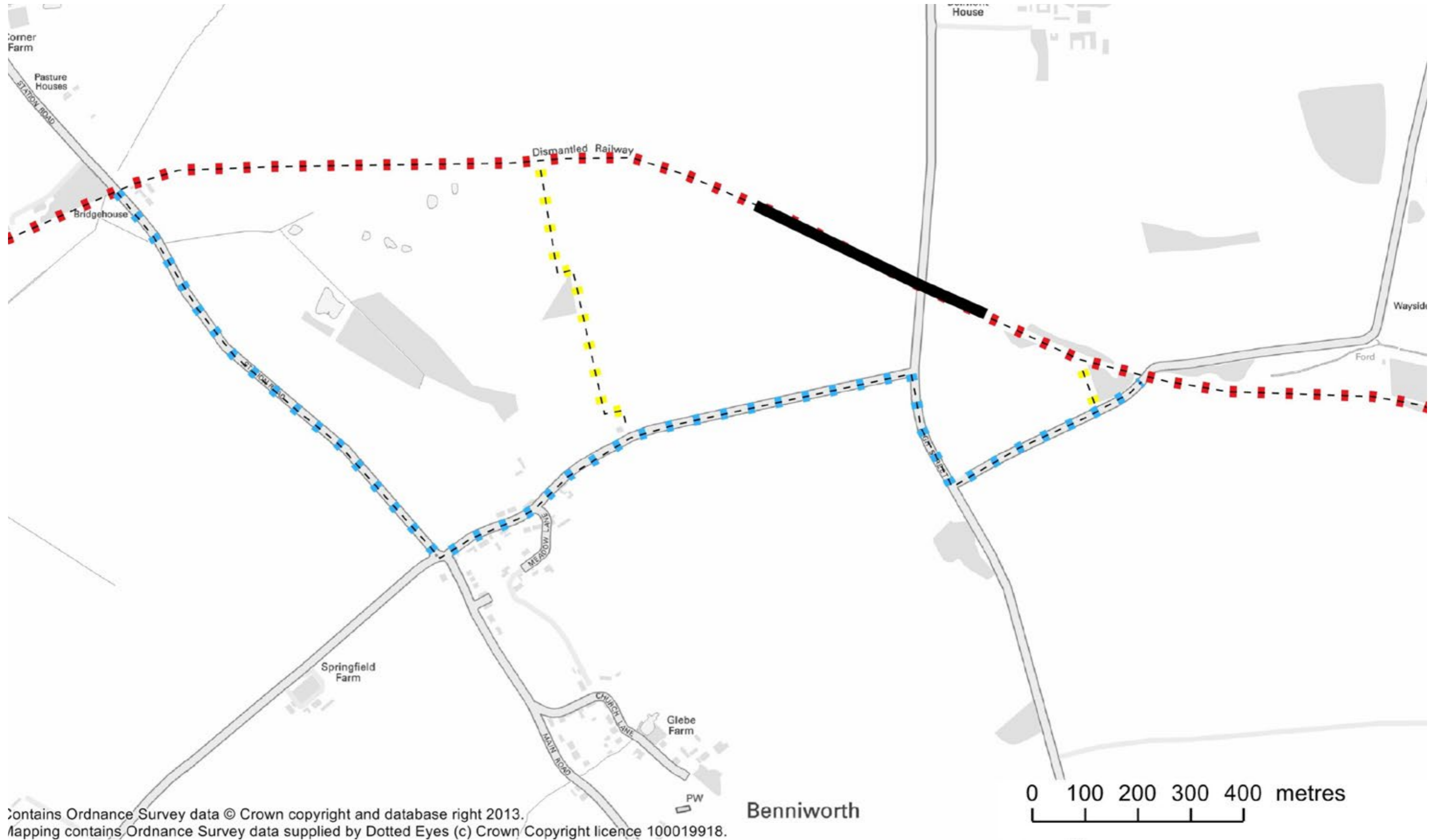
A shorter diversion option (1.6km) involves routing a path through fields (see yellow on the plan below) to reach the above quiet road route therefore bypassing Station Road and reducing the length of on carriageway route. This option would require more landowner negotiation.

A disadvantage of both alternative routes are the steep gradients that cyclists would need to negotiate (indicated in Figure 2 below). Gradients are likely to be beyond the capability of children making the diversion very challenging for family groups.



Figure 2. High Street Tunnel and environs showing gradient

Map 9. High Street Tunnel



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Benniworth

0 100 200 300 400 metres

- Binding Margin -

8 Wragby Spur (Stenigot to Wragby via High Street Tunnel)

Should it not be possible to use the tunnel as a route section routes utilising quiet roads and new field paths are proposed.

One option for a diversion (2.6km) would use the quiet lane network between South Willingham and Benniworth (see blue route on the plan below) and link up to the B1225 where a route would need to run parallel to (approx. 225m) and then cross onto another quiet lane, returning to the former railway alignment either via new field path or at next available over bridge. In terms of deliverability this option would require only signing along the quiet roads.

A shorter diversion option (1.6km) involves routing a path through fields (see yellow route on page 24) to reach the above quiet road route therefore bypassing Station Road and reducing the length of on carriageway route. This option would require more landowner negotiation.

A disadvantage of both alternative routes are the steep gradients that cyclists would need to negotiate (indicated in Figure 2 on page 22). Gradients are likely to be beyond the capability of children making the diversion very challenging for family groups.

A cycle route spur to Wragby following the former railway alignment would add a further 13km into the network and link more villages with the core route including East Barkwith and South Willingham. This Spur could be considered as a separate project bringing High Street Tunnel into the network (see plan below).

A link from Horncastle to Wragby routed via an alignment along the A158 and B1225 was considered in order to include that settlement and to link back onto the former railway alignment just to the north of the village. However, this was considered not to be viable due to significant concerns over multiple issues including traffic speeds (likely to be higher than the 60mph limit), vehicle volumes, continuous space availability within the carriageway, the likely need to obtain landowners agreement and, directness of the route.

Map 10. Wragby Spur



Map 11. Hemmingby - Goulceby- Stenigot



9 Hemmingby to Goulceby and Stenigot

It is proposed to use 9.3km of quiet roads to take the route from Hemmingby to Goulceby and on to Stenigot where the former railway alignment would be re-joined. This could be achieved by lowering the speed limit (from the existing 60mph outside villages) and installing diagram 1057 logo's on the carriageway along with signing. Alternatively 'Quiet Lanes' could be designated under the 2006 'Quiet Lanes and Home Zones' legislation. This would be subject to confirmation that traffic flows are below the 1000 vehicle a day limit for 'Quiet Lanes'. These lanes would be marked with gateway features, diagram 844 signs, speed limit repeaters and diagram 1057 logo's. Sections of the National Cycle Network in Scotland have successfully used this legislation to create cycle friendly rural roads.

The end of this route section in the vicinity of Donington Station also provides an opportunity to provide parking for the route.

Map 12. Hemmingby



10 Hemmingby Lane to Hemmingby

The preferred option is a route via Hemmingby and Goulceby using quiet unclassified roads. This route also includes challenges in that it is lengthy (9 miles) and has some steep gradients to negotiate.

Map 13. Horncastle

Horncastle to Hemmingby Lane

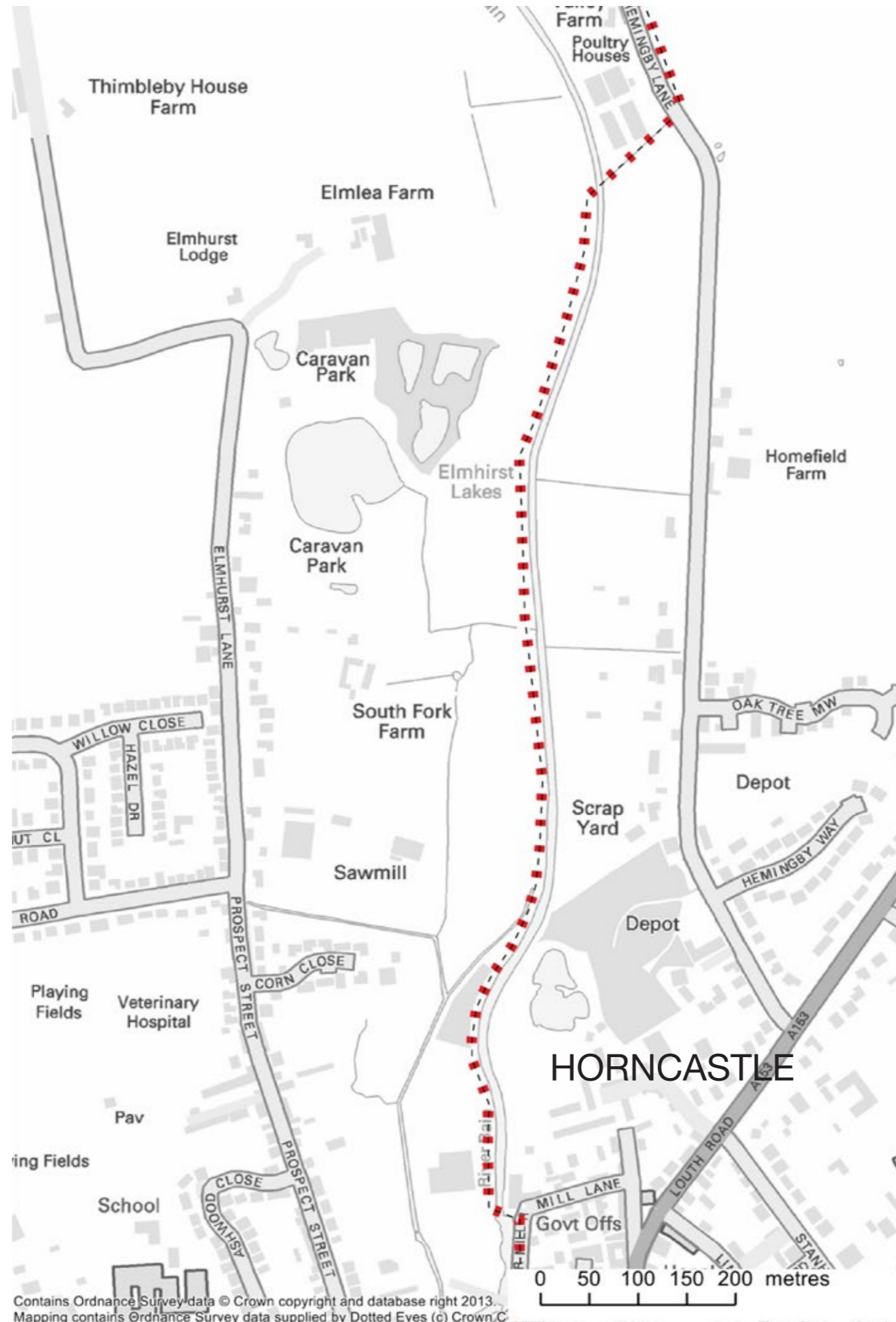
Space exists between the Tesco car park area and river bank to create a through corridor. Land ownership discussions with Tesco would be necessary to achieve this route section.

Tree removal may be needed to get the corridor through but lost trees could be replanted to create a "Boulevard", however the adjacent River Bain is ecologically sensitive and any design needs to take this into account.

To continue the route along the riverside beyond Tesco would again require landowner negotiation.

A link into the adjacent caravan site would give an added traffic free link into the town centre for this facility.

A new bridge would be necessary across the River Bain to give a route link onto Hemmingby Lane, and any designs would need to be assessed for ecological implications.



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5.4 Horncastle Town Centre (Hemmingsby Lane - Viking Trail)

Table 2 – Horncastle Option Appraisal

Option		Increased cycle usage
Do Nothing	Road remains unsuitable for family groups or inexperienced children. Poor connectivity through the town. No provision for touring cyclists.	Unlikely
Do bare minimum	Signing through Horncastle from The Sidings to Lawrence Street should be installed, and supplemented by diagram 1057 logo's on carriageway. Addition of cycle parking in the Market Place may encourage some users but unlikely to generate wholesale change in modal shift.	Unlikely Changes may encourage more confident cyclists and help touring cyclists.
Route marked on road from The Sidings to new cycle facilities at Jubilee Way junction.		Possible but likely to lead to conflict of approaches. May not suit young family groups or those that don't want to be on road at any cost.
Change speed limits from 30 to 20mph, remove road centrelines and mark Cycle Symbols.	Follows in line with Dutch style road solutions for similar style road layouts.	More appropriate use of existing facilities, and designates some space for cyclists. Changes in speed limit can be enhanced with appropriate levels of traffic calming but need to be designed to minimise impact on bicycles.
Market Place treatments and closure of Lawrence Street to access a riverside route.	Options that could be considered in the Market Place to reduce traffic speeds include using planting / trees to create better aesthetics or to look at community street design options and a 20mph speed limit. The Market Place would also benefit from wider zebra crossings on raised tables to replace existing guard railing with ornate bollards. Full closure of St Lawrence Street to vehicles would make this a safe cycle route to Tesco and would help to link this employment / shopping destination into the town centre.	Would encourage family groups and less experienced cyclists.
Alternate alignment from The Sidings to the Market Square.	The Sidings is a quiet traffic calmed residential road suitable for use as part of the route. From The Sidings an existing footpath passes over the River Bain to reach the swimming pool. This link could be widened to provide cycle access although an improved bridge would also be required. From the swimming pool 'Cagthorpe' provides access for pedestrians to an existing Signal controlled crossing of A158 Jubilee Way. With conversion of this crossing to a Toucan and a ramp to replace existing steps from 'Cagthorpe' this route section would reach to St Mary's Square, Manor House Street and into Market Place.	Would encourage family groups and less experienced cyclists.

4 St Lawrence Street – The Sidings – Viking Trail

2 options:

Preferred is via Jubilee Way / Church Lane / Market Place

Alternate is via West Street / Bridge Street / Market Place

Preferred Alignment:

Cagthorpe, Church Lane, Market Place

The link between the Spa / Viking Trail and Cagthorpe has an existing bridge across the River Bain, which in the short / medium term can be utilised, although widening the deck may be viable.

The existing signals crossing of the A158 needs to be upgraded to Toucan, and the adjacent car parking lay by removed to create sufficient space for a shared path to be constructed.

If this isn't possible an alternate crossing point needs to be included so that users can connect with Church Lane with Waring Street, with the current uncontrolled crossing arrangement being modified. This will also require a new bridge across the open culverted watercourse.

Church Lane is narrow and lightly trafficked, some consideration will need to be given to reconnecting the shared path with the carriageway in order to overcome a somewhat blind corner.

A survey to determine vehicle speeds and use in the Market Place is recommended.

St Lawrence Street is narrow accommodating low traffic volumes travelling at low speeds. A partial one way restriction already exists.

Alternate Alignment:

The Sidings, Langton Hill, West Street, Bridge Street and, St Lawrence Street is approx. 1.3km with a 30mph connected by public bus corridor.

Predominantly residential from the Jubilee Way junction to Market Square on both sides of West Road and Bridge Street with retail nearer to the Market Place. The residential properties generally have no off street parking provision. Parking alternates with waiting restrictions depending on the width of the carriageway. Market Square accommodates a central car park on none

market days and further parking occurs on roads around the central square.

It can be made to be cycle friendly but is aesthetically poor and lack of on street parking may contribute to higher vehicle speeds.

This is a bus corridor and also needs to have access for town centre deliveries.

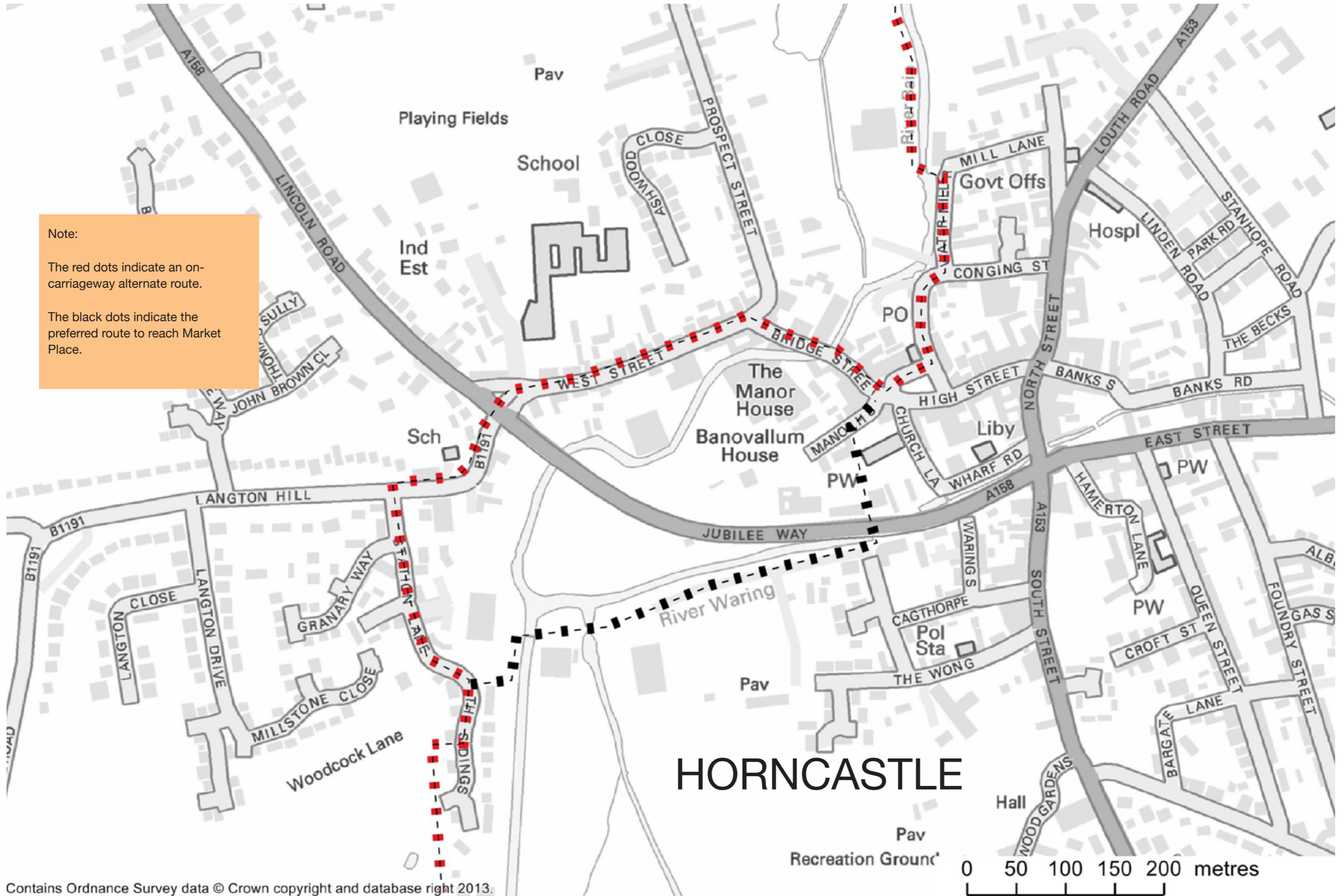
There are a number of junctions to negotiate through Horncastle. The busiest is the West Street / Jubilee Way signal controlled junction on a key route through the town. The remaining junctions with Prospect Street and around Market Place are 'T' junctions.



Note:

The red dots indicate an on-carriageway alternate route.

The black dots indicate the preferred route to reach Market Place.



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5.5 Viking Trail to Woodhall Spa

1 Viking Trail

Horncastle – Woodhall Spa

The Viking Trail starts on the South side of Horncastle and is already constructed as a walking and cycling corridor from The Sidings (Horncastle) through to Sandy Lane north of Woodhall Spa.

The Spa Trail crosses the lightly trafficked road at Thornton Lodge before continuing along the former railway alignment for approximately 175m to enter Horncastle at 'The Sidings'. The Thornton Lodge road crossing would require only warning signs.

Viking Way / Spa Trail continues for approximately 5.4km from Sandy Lane to Thornton Lodge. Given the likely increased numbers of users the existing shared use path should be provided with a wider improved surface. Existing parking provided at Thornton Lodge could be extended should demand be identified.

At Woodhall Spa Manor Spa Trail / Viking Way leaves the former railway alignment at the junction with Sandy Lane. It crosses the existing Woodhall Spa Golf Course using a public footpath, with clearly signed "No Access" for cycles.

This path stretches for nearly 2km and it is unclear why Viking Way uses this route through the Golf Course rather than the more direct former Railway alignment (Red dotted line) however, the proposed route would require agreement for cycle use from the Golf Club whichever route was pursued.

A 'Quiet Lane' approach would be required on a 300m this section of Sandy Lane, if the existing public footpath link were to be upgraded to allow for cycles.

If the old railway alignment can be agreed and re-used it would provide a more direct corridor, however some deviation would be necessary at the link around Sandy Lane.

Managing the impact upon the golf course would be essential, they are clearly not supportive of cycle / golf integration, however the actual impact on any holes is suggested to be minimal, and could be managed in an effective way.

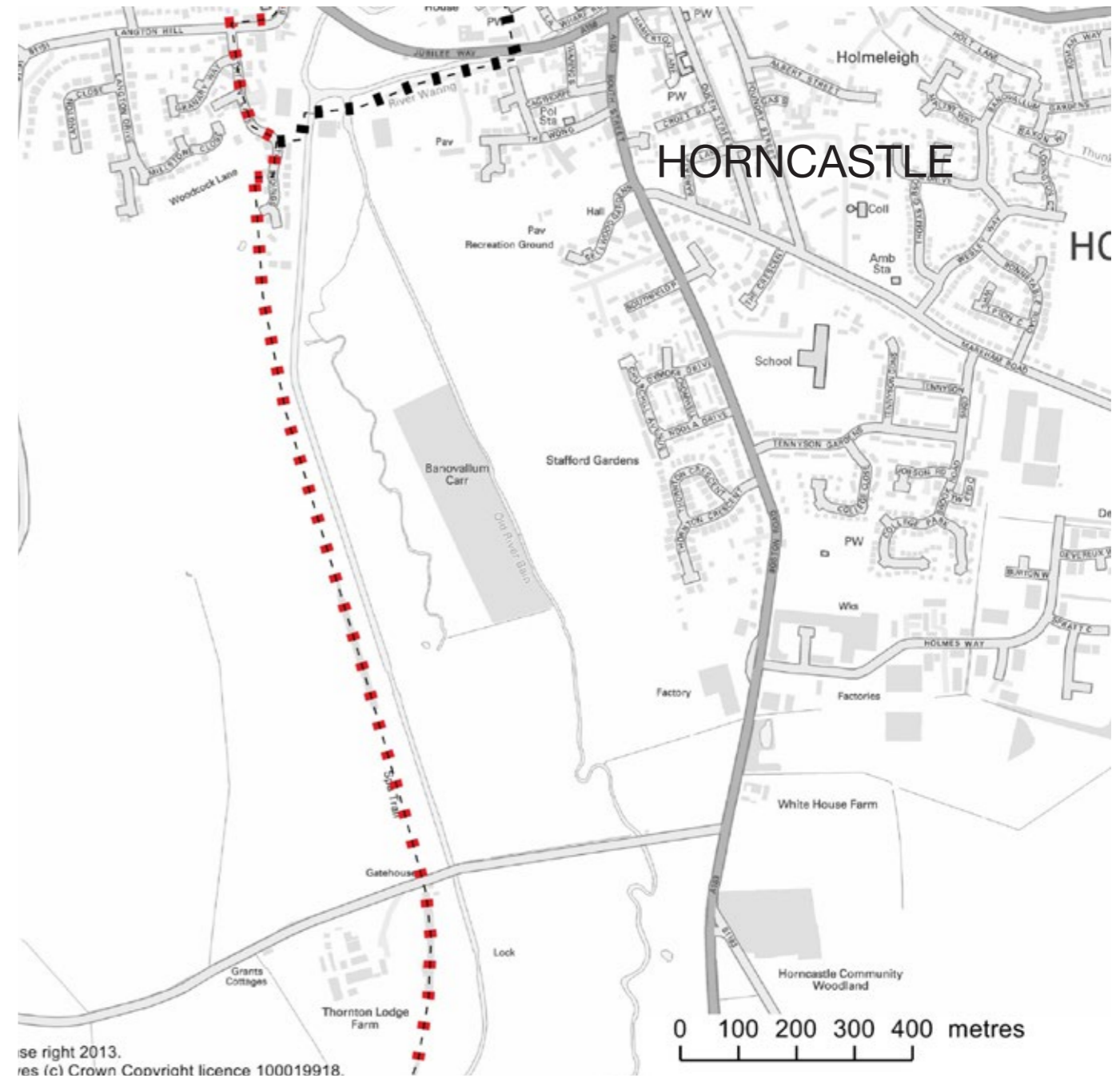
The current Viking Trail crosses 3 holes of the Hotchkin Course, and by replacing this current alignment with an improved railway alignment would provide benefit to the course management.

The railway corridor does impact upon one tee, which could be resolved through a "cut and cover" style approach.

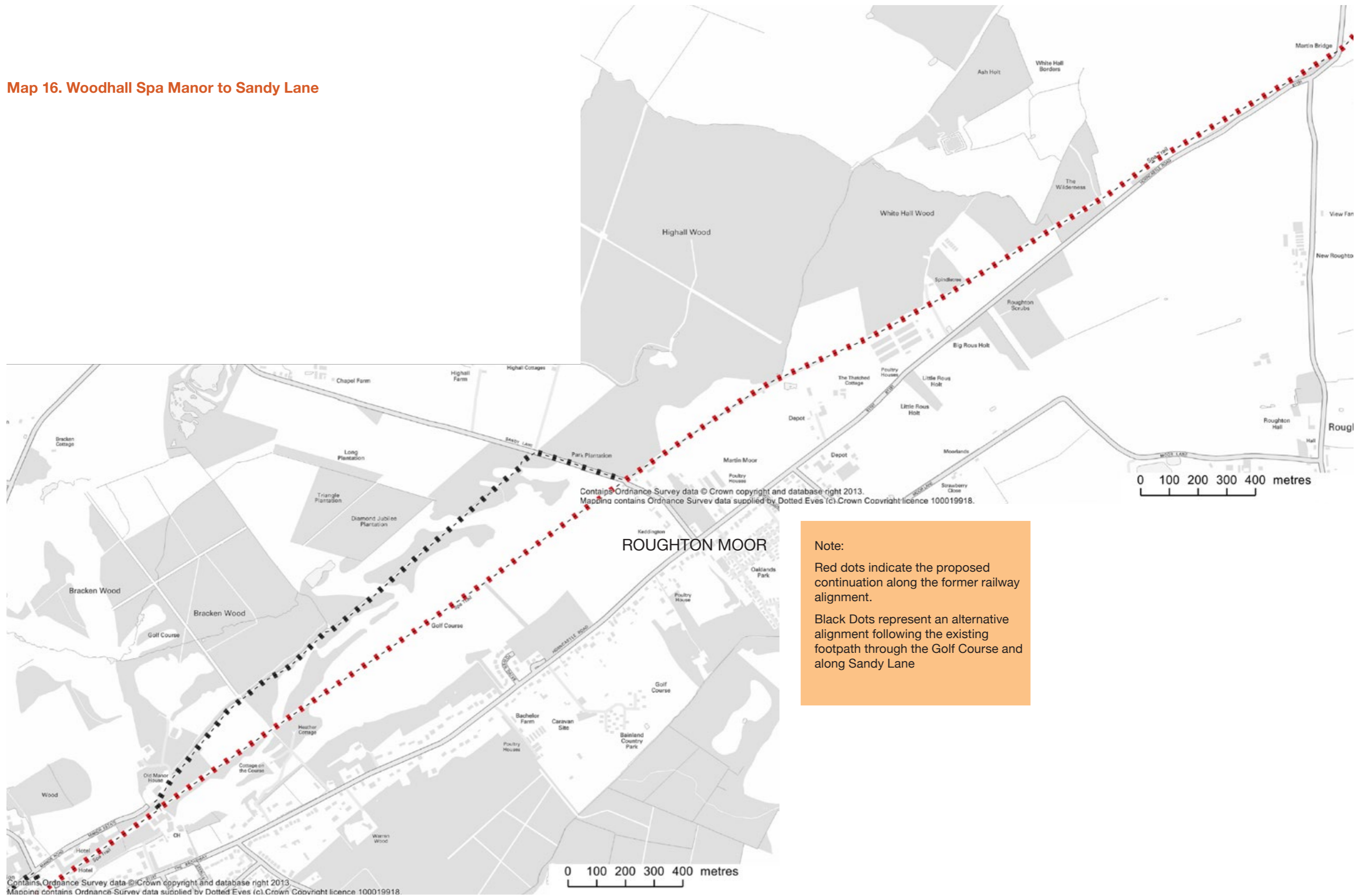
This though is the "Home of English Golf" and despite both golf course and railway line existing alongside each other in the past – views may not be the same.

An alternate route via Sandy Lane and Monument Road is possible, but this then takes users on a lengthy diversion and misses out much of what Woodhall Spa has to offer.

Map 15. The Viking Trail



Map 16. Woodhall Spa Manor to Sandy Lane



Note:
Red dots indicate the proposed continuation along the former railway alignment.
Black Dots represent an alternative alignment following the existing footpath through the Golf Course and along Sandy Lane

- Binding Margin -

5.6 Woodhall Spa

Route options for the proposed 'Danelaw' cycle route from Water Rail Way in Woodall Spa then heading to Horncastle and on to Louth. Where possible the former railway alignment is utilised through Woodhall Spa (Red dots). Alternative alignments are indicated using black dots.

Water Rail Way to Woodhall Spa

(Witham Road, Station Road), The Broadway (B1191)

Generally flat and straight from Kirkstead Bridge to town centre with good forward visibility.

Residential properties on both sides of Witham Road from Wentworth Way through to town centre. Residential properties with off street parking provision generally on West side only from Kirkstead Bridge to Wentworth Way. On street parking on both sides of Witham Road from King Edward Road.

Station Road businesses and on street parking to West side only through to Spa Road. No provision for cycle parking. No network signing connecting Water Rail Way with Spa Trail.

Awkward roundabout to negotiate at junction of Witham Road / Station Road / Stixwould Road (B1191 / B1192).

Area around CO-OP / Spa Road.

Residential side road junctions along Witham Road.

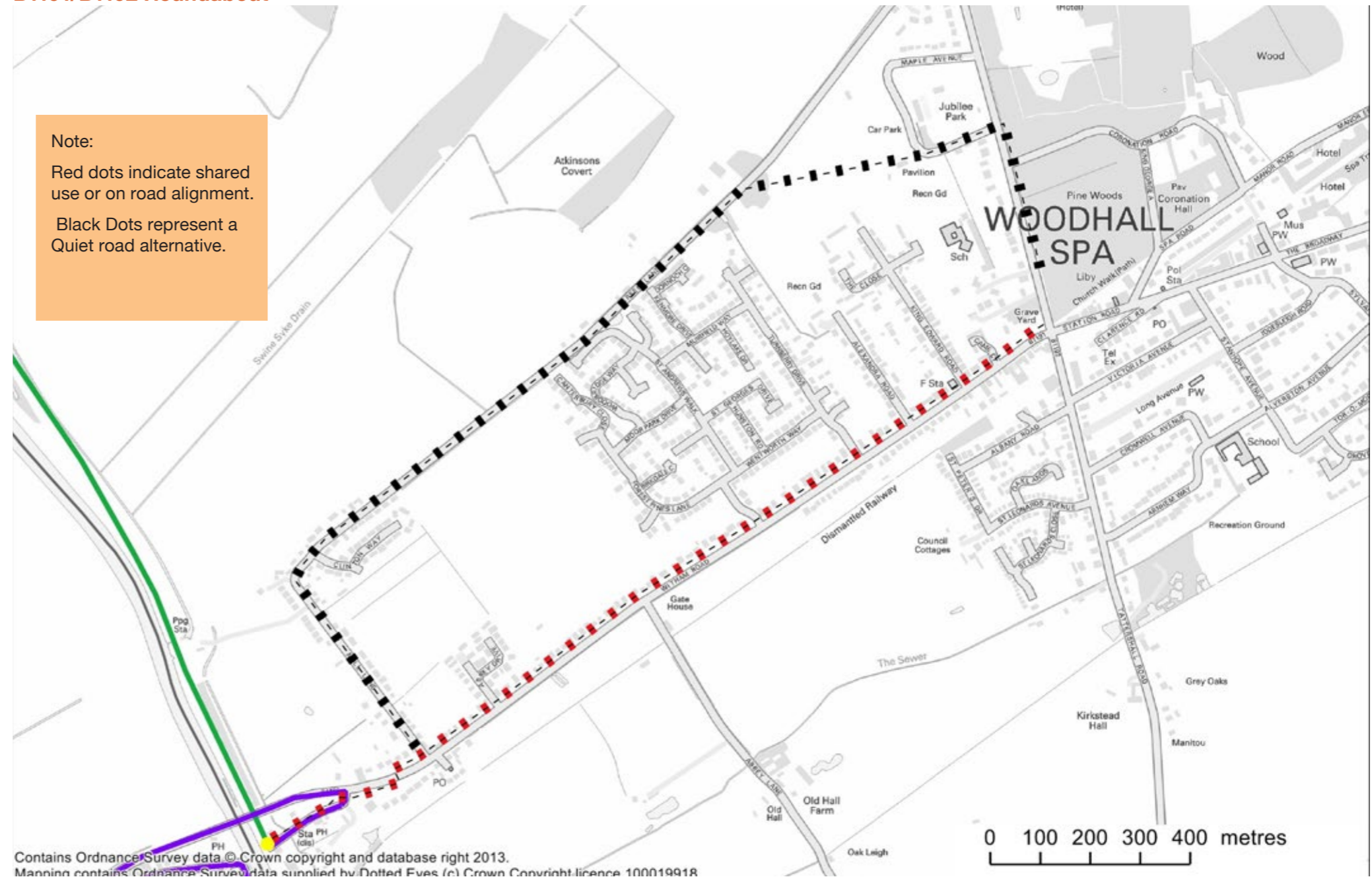
The current speed limit is 40mph Kirkstead Bridge to Wentworth Way then 30mph through to Kings Walk.

As a key tourist destination it has good facilities such as golf-course and hotel, caravan and campsite, supermarket, 4 bus routes, tea shops, pubs and a woodland cinema.



Spa Trail/Viking Way in Woodhall Spa

Map 16. Water Rail Way (NCN 1) to the B1191/B1192 Roundabout



Map 17. B1191/B1192 roundabout to the Spa Trail/Viking Way start

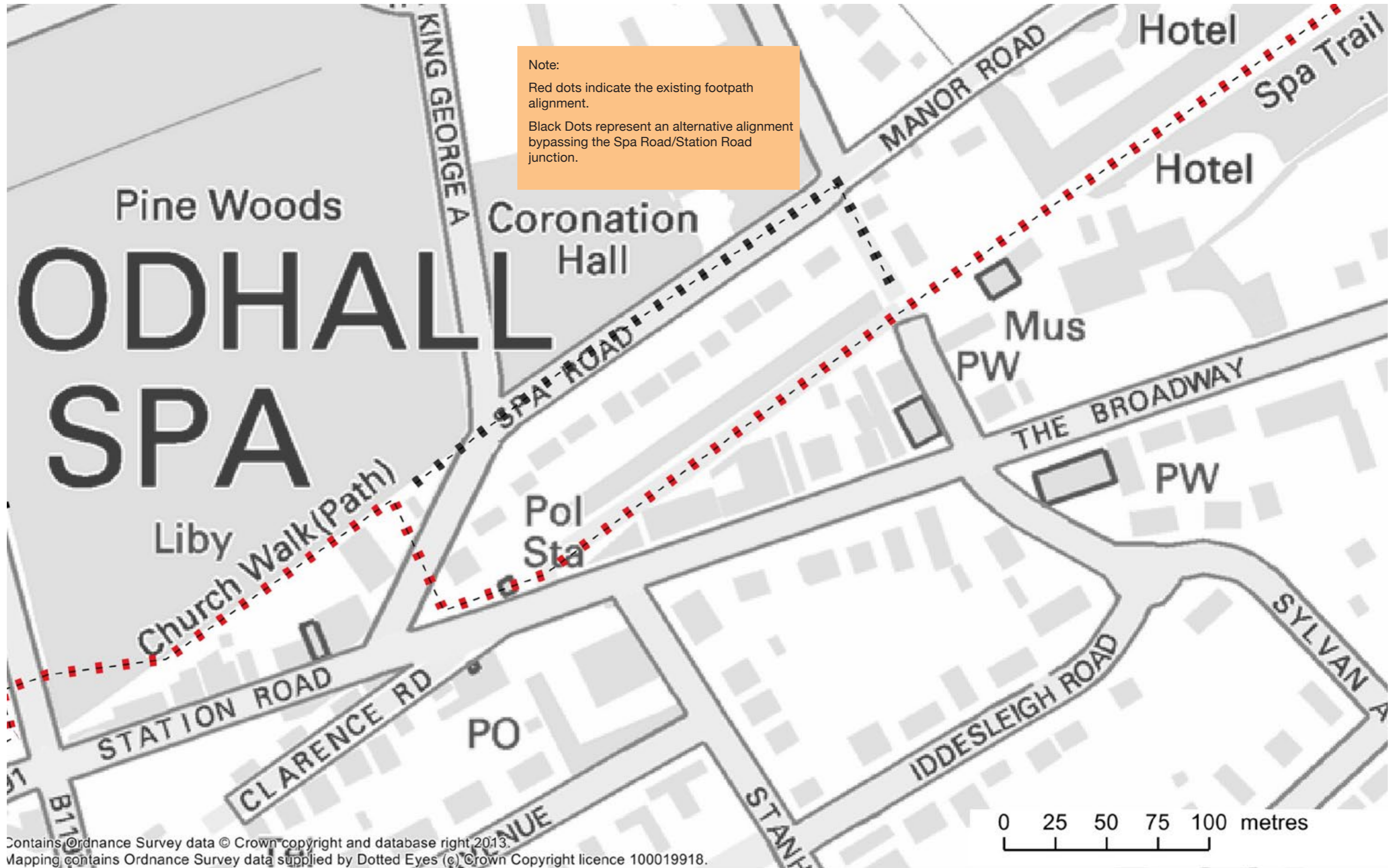


Table 3 - Design Options from Water Rail Way (NCN 1) to the B1191 / B1192 Roundabout

Option		Increased cycle usage
Do Nothing	Road remains unsuitable for family groups or inexperienced children. Poor connectivity between two well used corridors. No provision for touring cyclists.	Unlikely
Do bare minimum	Signing between NCN1 and Spa Trail / Viking Way should be installed, and supplemented by diagram 1057 logo's on carriageway. Addition of cycle parking along Station Road may encourage some users but unlikely to generate wholesale change in modal shift.	Unlikely Changes may encourage more confident cyclists and help touring cyclist.
Shared use path between NCN 1 and roundabout	Will introduce conflict between pedestrians and cycles at various points along the route as space becomes constrained. Preferred side is East side of Witham Road as this negates all but one of the residential side roads but this is only viable north from Wentworth Way as no footway currently exists south of this point (A connection through adjacent farmland could be considered). Space becomes more constrained closer to the town centre which may result in on street parking being removed / re-allocated. A shared path on either side of Witham Road will result in existing mature trees being lost to create space that meets current design standards for shared paths (LTN 1/12). Side road crossings will need to be designed to retain cycle priority where practicable.	Possible but likely to lead to conflict of approaches. May suit young family groups or those that don't want to be on road at any cost.
Change speed limits from 40-30 and from 30-20, remove road centrelines and mark advisory cycle lanes	Follows in line with Dutch style road solutions for similar style road layouts. Solution successfully implemented in areas such as Luton, Swansea, Cambridge, Gateshead and Felixstowe. Removal of road centre line and replacement with advisory cycle lanes 1.80m wide is easier option but also consider planning off top surface and relaying in coloured tarmac – with diagram 1057 logo's added to main traffic area.	More appropriate use of existing facilities, retains trees and softer element of current layout and also keeps separate space for pedestrians and cyclists. Changes in speed limit can be enhanced with appropriate levels of traffic calming but need to be designed to minimise impact on bicycles.
Alternate alignment (Shown in Black on the above plans)	Traffic calming along Mill Lane. Speed limit reduction and 'Quiet Lane' approach on Green Lane.	May suit less experienced cyclists.

6 Indicative costs

All costs are from our database of unit costs, derived from schemes we have built since 2012.

Design costs (15%), a contingency (20%) and a contractor's management fee (10%) have been added.

Traffic Management, Land purchase / negotiation costs, stats costs and VAT are not included.

All figures are then rounded to the nearest £5,000.

Table 1 – Woodhall Spa to Humber Estuary via Railway corridor and Withcall Tunnel

Table 6.1 – Woodhall Spa to Humber Estuary via Railway corridor and Withcall Tunnel

Ref No	Location	Measures	Estimate
1	Water Railway to Stixwold Road / Tattershall Road roundabout (Witham Road) and improvements to roundabout	Traffic calming, shared use path, crossing point and raised table.	£400,000
		Centreline removal and changes to speed limits, side road entry treatments	£250,000
2	Tattershall Road Roundabout to Spa Road. (Station Road)	Crossing point, improved path surface and signing.	£60,000
3	Spa Road to Viking Way	Junction alterations The Broadway / Station Road, improved crossing point and signing.	£300,000
4	Woodhall Spa Manor to Sandy Lane	New path construction, fencing and signing.	£385,000
5	Sandy Lane to Thornton Lodge Farm (5.2km)	Reconstruct as sealed surface path, crossing point and signing.	£650,000
6	Thornton Lodge to Horncastle	Reconstruct as sealed surface path, crossing point and signing.	£200,000
7	Route Through Horncastle	Upgraded paths / crossings new bridge, cycle contra flow	£200,000
8	Horncastle (Tesco) to Hemmingby Lane	New path construction, new bridge, Quiet road treatment and signing.	£325,000
9	Hemmingby to Stenigot via Goulceby	Quiet street treatments, speed limit reductions.	£40,000
10	Stenigot to Withcall Tunnel	New path construction, fencing and signing.	£400,000
11	Withcall Tunnel ancillary works	Drainage, structural repairs and, power supply	£500,000
12	Withcall Tunnel	New path construction, Lighting and signing.	£460,000
13	Withcall Tunnel to Louth	New path construction, crossing point fencing and signing.	£1,200,000
14	Route through Louth	New path construction, traffic calming, crossing points, contra flow cycle facilities.	£300,000
15	Louth to Cleethorpes	New path construction alongside the canal, fencing, signing and bridges.	£3,000,000
Total			£8,670,000

Table 6.2 - Woodhall Spa to Humber Estuary via Railway corridor with Tunnel diversion

Ref No	Location	Measures	Estimate
1	Water Railway to Stixwold Road / Tattershall Road roundabout (Witham Road) and improvements to roundabout	Traffic calming, shared use path, crossing point and raised table	£400,000
		Centreline removal and changes to speed limits, side road entry treatments	£200,000
2	Tattershall Road Roundabout to Spa Road	Crossing point, improved path surface and signing	£60,000
3	Spa Road to Viking Way	Junction alterations, the Broadway / Station Road improved crossing point and signing	£300,000
4	Woodhall Spa Manor to Sandy Lane	New path construction, fencing and signing	£385,000
5	Sandy Lane to Thornton Lodge	Reconstruct as sealed surface path, crossing point and signing	£650,000
6	Thornton Lodge to Horncastle	Reconstruct as sealed surface path, crossing point and signing	£200,000
7	Route Through Horncastle	Upgraded paths / crossings new bridge, cycle contra flow	£200,000
8	Horncastle (Tesco) to Hemmingby Lane	New path construction, new bridge, Quiet road treatment and signing	£325,000
9	Hemmingby to Stenigot via Goulceby	Quiet street treatments, speed limit reductions.	£40,000
10	Stenigot to Withcall Tunnel	New path construction, fencing and signing	£400,000
11	Withcall Tunnel diversion route	New path construction, Lighting and signing	£250,000
12	Withcall Tunnel to Louth	New path construction, crossing point fencing and signing	£1,200,000
13	Route through Louth	New path construction, traffic calming, crossing points, contra flow cycle facilities	£300,000
14	Louth to Cleethorpes	New path construction alongside the canal, fencing, signing and bridges	£3,000,000
Total			£7,650,000

Table 6.3 – Option 2: Woodhall Spa to Humber Estuary with Diversion from railway corridor through Woodall Spa but including Withcall Tunnel

Ref No	Location	Measures	Estimate
1	Spa Road to Viking Way	Junction alterations The Broadway / Station Road, contra flow cycle facility, crossing point and signing	£300,000
2	Water Rail Way - Spa Road	Using quiet lane alternative and woodland path links, new crossing on Stixwold Road	£250,000
3	Woodhall Spa Manor to Sandy Lane	New path construction, fencing and signing	£385,000
4	Sandy Lane to Thornton Lodge	Reconstruct as sealed surface path, crossing point and signing	£650,000
5	Thornton Lodge to Horncastle	Reconstruct as sealed surface path, crossing point and signing	£200,000
6	Route Through Horncastle	Upgraded paths / crossings new bridge, cycle contra flow	£200,000
7	Horncastle (Tesco) to Hemmingby Lane	New path construction, new bridge, Quiet road treatment and signing	£325,000
8	Hemmingby to Stenigot via Goulceby	Quiet street treatments, speed limit reductions	£40,000
9	Stenigot to Withcall Tunnel	New path construction, fencing and signing	£400,000
10	Withcall Tunnel ancillary works	Drainage, structural repairs and, power supply	£500,000
11	Withcall Tunnel	New path construction, Lighting and signing	£460,000
12	Withcall Tunnel to Louth	New path construction, crossing point fencing and signing	£1,200,000
13	Route through Louth	New path construction, traffic calming, crossing points, contra flow cycle facilities	£300,000
14	Louth Town Centre along the Louth Canal	New path construction alongside the canal, fencing, signing and bridges	£3,000,000
Total			£7,750,000

Table 6.4 – Option 2 Woodhall Spa to Humber Estuary with diversion from railway corridor through Woodall Spa and with Tunnel diversion)

Ref No	Location	Measures	Estimate
1	Water Railway to Sandy Lane	Route via quiet lanes including Monument Lane, upgrade footway on Stixwould Road, new crossing on Stixwould Road signing	£250,000
5	Sandy Lane to Thornton Lodge	Improved surfacing, crossing point and signing.	£650,000
6	Thornton Lodge to Horncastle	Improved surfacing, crossing point and signing.	£200,000
7	Route Through Horncastle	Upgraded paths / crossings new bridge, cycle contra flow	£200,000
8	Horncastle (Tesco) to Hemmingby Lane	New path construction, new bridge, Quiet road treatment and signing.	£325,000
9	Hemmingby to Stenigot via Goulceby	Quiet street treatments, speed limit reductions.	£40,000
10	Stenigot to Withcall Tunnel	New path construction, fencing and signing.	£400,000
11	Diversion around Withcall Tunnel	New path construction, Lighting and signing.	£250,000
12	Withcall Tunnel to Louth	New path construction, crossing point fencing and signing.	£1,200,000
13	Route through Louth	New path construction, traffic calming, crossing points, contra flow cycle facilities.	£300,000
14	Louth Town Centre along the Louth Canal	New path construction alongside the canal, fencing, signing and bridges.	£3,000,000
Total			£6,815,000

Table 6.5 – Wragby Spur with High Street Tunnel

Ref No	Location	Measures	Estimate
1	Donington on Bain station site to High Street Tunnel	New path construction, fencing and signing.	£425,000
2	High Street Tunnel ancillary works	Drainage, structural repairs and, power supply.	£300,000
3	High Street Tunnel	New path construction, lighting and signing.	£400,000
4	High Street Tunnel to South Willingham Station site	New path construction, fencing and signing.	£250,000
5	South Willingham Station site - Wragby	New path construction, fencing and signing	£900,000
6	Ancillary Works Donington on Bain station	Car /cycle parking facilities, signing, road crossing	£300,000
7	Ancillary works South Willingham station	Diversion alignment to station property, road crossing, signing, cycle and car parking	£250,000
Total			£2,825,000

Table 6.6 – Wragby Spur with the High Street Tunnel diversion

Ref No	Location	Measures	Estimate
1	Donington on Bain station site to High Street Tunnel	New path construction, fencing and signing.	£425,000
2	High Street Tunnel diversion works	New path construction, fencing and signing.	£300,000
3	High Street Tunnel to South Willingham Station site	New path construction, fencing and signing.	£250,000
4	South Willingham Station site - Wragby	New path construction, fencing and signing	£900,000
5	Ancillary Works Donington on Bain station	Car /cycle parking facilities, signing, road crossing	£300,000
6	Ancillary works South Willingham station	Diversion alignment to station property, road crossing, signing, cycle and car parking	£250,000
Total			£2,425,000

6.1 Maintenance Costs

Sustrans have over 40 years of experience of managing linear routes and in 2013 ran a three years project called Greener Greenways. The project is a biodiversity conservation project targeting 38 traffic-free walking and cycling routes owned, managed or enhanced by Sustrans, across Wales, England and Scotland. The initiative was founded on the premise that connectivity is as important for wildlife as it is for people, and so aimed to improve these routes for both biodiversity and the end users of the route who cycle or walk along them.

As the proposed routes sit within various environmentally sensitive areas, we would recommend that ongoing maintenance incorporates a Greener Greenway concept. Each individual phase of the project would have a variety of partners, local group involvement and potential for environmental improvements. This approach would deliberately bring together green infrastructure, biodiversity, community and active travel typically led to:

- Biodiversity enhancements, improvements to numbers and diversity of species and habitats along the route.
- Engaging local groups and communities to actively participate in environmental surveys, maintenance work-days and events as part of the greenway. This drives feelings of ownership over these green active travel routes, fosters intergenerational social connections, develops skills, and provides biodiversity and ecology education via citizen science.
- Increasing numbers of people walking and cycling due to enhanced connectivity, improved quality routes and a more pleasant green environment.
- Improving amenity value and accessibility of active travel routes, including creation of additional places to sit, rest and pause along linear routes
- Partnerships and co-operative working with local authorities, voluntary groups, academic and natural environment organisations that often leads to long-term partnerships and outputs.

Case Study: Path width restoration - The Lias Line in Warwickshire

The route along this disused railway line was developed 10-15 years ago and surfaced with limestone dust as a low cost solution.

Over the years vegetation has crept in from the edges reducing the effective width of the path from 3m to 1m. In order to keep the path in useable condition the edges of the surface were sprayed with glyphosate based herbicide and the surface was scraped back every 2-3 years, most recently in 2013.

In addition to this management sympathetic tree clearance works was carried out over a 300m section to allow light in, reduce leaf litter and let path dry out. When it is scraped back and dried the limestone dust reconsolidates to provide a useable path surface.

Path verges have been subject to limited management in the intervening years although some mowing and path clearance by volunteers had been carried out. 2km of path verge vegetation clearance was completed within one day.

Costs - mowing £15,000. Spraying £500. Scraping back path edges £300. Tree clearance works £2,500 (with a 2.5% uplift per year).

7 Ecology

Sustrans has carried out a desk-based assessment of likely ecological impacts on designated nature conservation sites, notable habitats and fauna. As no site visit has been undertaken conclusions in this report are provisional and will need to be verified by a site visit.

In **Appendix A – Ecology Report** it is anticipated that significant habitat loss is from the proposal due to the length of the route and undeveloped nature of the railway lines, canal side and verges affected. The importance of habitats along the route cannot be determined without a site visit but is likely to include notable grasslands and woodland.

A wide variety of notable plant and animal species could be impacted by the proposals. Given the significant habitat loss anticipated a large number of additional surveys and consultation will be required to fully assess the impacts on invertebrates, amphibians including great crested newts, sensitive bird species, badger setts, otter holts, bats, water voles, reptiles and, if a significant time elapses between the time of writing and construction, dormice. The presence of water voles could create a barrier to route creation along the Louth Canal if a sufficient buffer zone cannot be retained to protect this species in situ. The presence of great crested newts, reptiles and notable invertebrates could require substantial mitigation and compensation work along the railway corridor.

Direct and indirect impacts are anticipated on a large number of designated sites. Most notably, the proposal to open Withcall and South Willingham tunnels would impact bat hibernation roosts with Site of Special Scientific Interest (SSSI) designation. A Natural England mitigation licence to open these tunnels would not be granted unless it can be demonstrated that the project is in the over-riding public interest and that there is no suitable alternative to routing the path through the tunnels. The justifications that this project meets these criteria must be in proportion to the national importance of the bat hibernation roosts. At the time of writing it is considered unlikely that a licence would be granted and it is recommended that the route is diverted around these tunnels.

Impacts are anticipated on numerous designated nature conservation sites along the disused railway lines between Wragby and Louth and between Horncastle and Woodhall Spa. These railway lines are almost entirely covered by designations including statutory and local sites. As they are thin, linear sites and are likely to support habitats significantly different to the surrounding landscape, the impacts of cycle path creation could be very significant. The extent and significance of impacts cannot be fully determined without a site visit. The mitigation and compensation measures required to enable cycle path creation to meet planning criteria in these sections may be substantial.

Further assessment will be required to consider whether impacts could be anticipated on the Humber Estuary SAC, SPA and SSSI from increased numbers of cyclists continuing their journey from Tetney Lock on unsuitable paths and causing erosion to important habitats or from disturbance to birds at the destination point at Tetney Lock.

The proposed route may pass through a number of other locally designated sites between Bardney Lock and Wragby, at Hubbards Hill and between Wragby and Horncastle. In each case the impact will need to be assessed based on a site visit. Planning permission would only be granted for development in locally designated sites if their wildlife conservation interest is protected.

Further assessment is also required to determine whether the anticipated loss of grassland habitats along the proposed route would impact the network of designated sites protecting this habitat across the region by reducing the effective size of these sites or by increasing habitat fragmentation.

8 The Economic Case

There are a number of recognised tools and approaches available to help us make the economic case for walking and cycling. Key to this is Department for Transport's WebTAG (online Transport Appraisal Guidance). In addition to this, Sustrans have developed a Recreational Spend Model and Job Creation Tool which we will use in the following economic appraisal of the proposed Danelaw path. These tools have been developed as part of the Sustainable Transport Delivery Excellence Programme (STDEP), funded by DfT.

Both WebTAG appraisal and Sustrans Recreational Expenditure Model are based on a valuation of various benefits associated with forecasted route usage. The Job Creation Tool is based on the number of full time equivalent (FTE) jobs created or sustained by the development of cycling infrastructure. The best indicator of FTE created or sustained is the level of investment.

The following steps have been taken as part of the economic appraisal process:

- Defining the study area: we look at characteristics of the route via GIS including: region; rural/urban classification; length of route; type of intervention/design.
- Estimating baseline annual usage (number of users and journey purpose): based on existing survey and count data from the local area.
- Estimating post intervention annual usage:
 - We used Sustrans Infrastructure Impact Tool (IIT) to estimate the uplift in cycling we may anticipate on the proposed path. This draws on past evidence on the impact of interventions on usage of similar routes.
 - In order to do this with greater accuracy, we have split the proposed route into a number of distinct sections to account for different levels of impact that we might associate with different types of infrastructure (e.g. on-road non-segregated path as opposed to a segregated cycle path). These have then been combined to forecast usage across the path as a whole.

- Estimating the economic value of benefits associated with route usage and generating a Benefit to Cost Ratio(BCR): for this we have used the following tools:
 - Sustrans BCR tool, which is based on DfT's WebTAG framework for active modes.
 - Sustrans Recreational Expenditure Model (developing on the Tourism Model that was first developed by Sustrans in partnership with the University of Lancashire).
 - Sustrans Job Creation Tool, based on evidence from studies of major cycling infrastructure programmes such as Connect2 and Links to Schools.

When estimating benefits of the intervention, the baseline usage and benefits are subtracted from the forecasted usage and benefits to understand the anticipated net contribution of the proposed intervention.

Estimating baseline usage

When appraising the proposed path, we need to understand existing demand. This may be cyclists who are currently using sections of the proposed route as it is, or it may be existing cyclists who are using nearby roads and paths, but will switch to the proposed route.

The baseline usage estimate has been based on observed data collected in the area, taken from a four-day route user intercept survey (RUIS) in a location in Bardney. This survey location is extremely close to the route, providing the best available indicator of existing usage. Survey analysis indicated that there were 23,387 cycling trips per year in 2008. To account for growth in cycling since 2008, we have assumed a slight background increase in usage over time since the 23,387 cycling trips per year estimated in 2008, rounded to an annual usage estimate of 24,000 trips per year.

Taking this as our baseline estimate for the proposed Danelaw route, for the purposes of appraisal we assume that the observed usage will be consistent at any given point on the route. So, if we take a count at any point of the route, this would equate to 24,000 trips per year passing that particular point. However, as our route is 120km long, this would not simply equate to 24,000 trips per year across

the whole length of the route as people will not be travelling the entire 120km path on every trip. In fact, surveys conducted with cyclists in Bardney indicate that the average trip length is 12.8km. Using an approach outlined in the DfT's appraisal guidance, we therefore calculate the usage density for the route as a whole (in units of usage kms). Usage kms are calculated by multiplying the total length of the route (kms) by the usage at any given point on the route (e.g. 97km x 24,000 trips = 2,328,000 usage kms). As WebTAG appraisals and Sustrans Recreational Expenditure Model are based around adult usage, we then discount child usage kms. The route user surveys and counts conducted at Bardney showed 9.2% of users were children. We therefore only include 90.8% of all usage kms in our appraisal.

As 'usage kms' are a fairly intangible unit, it is then useful to convert this back into a total number of trips. The total usage kms travelled per year is divided by the average trip distance for the route (12.8km) to obtain an estimate of the number of trips being carried out across the route as a whole:

$$(2,328,000 \text{ usage kms} * 90.8) / 12.8\text{km} = 164,183 \text{ annual trips}$$

As well as an estimate of the overall number of journeys being made on the route, we also need to consider the profile of users – who are they and why are they travelling. This will refine the inputs we use in appraising the route. According to the Bardney route user survey, 90.8% of cycling trips are by adults. As there is uncertainty around how applicable the current methods of calculating certain economic benefits (such as health) are to children's cycling trips, we only consider adult cycling trips within our appraisal. As previously stated, this factor (90.8%) was applied to the baseline kms cycled in each section before conversion to a number of trips being carried out on the route.

Based on the Bardney survey data, all cyclist trips on the route were for leisure purposes, and so an average leisure trip distance of 12.87 kms was applied. This is based on median trip distances for all 'leisure' cyclists based on Sustrans' analysis of National Cycle Network usage).

Estimating post-intervention annual usage

Evidence from past comparative schemes indicates that, as a result of the intervention, we can expect to see an increase in cycling on the path. The uplift in kms cycled on each section of the route was calculated using Sustrans Infrastructure Impact Tool (IIT).

The IIT is a category model for different infrastructure types developed using data from a portfolio of previous interventions monitored and evaluated by Sustrans. It provides an estimate of the impact that an infrastructure scheme is likely to have on usage. The IIT has been developed in compliance with WebTAG guidance on the use of comparable scheme data for forecasting purposes. It has been developed with funding through DfT's Sustainable Transport Delivery Excellence Programme (STDEP).

Alongside the baseline usage estimate, the other key inputs for the IIT are infrastructure type and rural/urban classification. These were determined as follows:

- Infrastructure type: based on the descriptions of the sections of the route in the ecological report.
- Rural/Urban classification: based on observing 2009 urban/rural classification data in the GIS software Earthlight. There were small pockets of urban areas at points on the route, but the vast majority of the route is rural and so, in the absence of finer grained information about the extent to which sections lie within urban areas, all sections of the route are treated as rural.

The uplift in each section was calculated by applying the percentage uplift value generated for that Infrastructure type, to the kms travelled on the section, and then divided by the same average leisure trip distance as was applied at baseline. This allows us to provide a more accurate estimate of increased usage across the path as a whole, as we would expect different levels of uplift in relation to different 'intervention type' (i.e. different infrastructure designs at different stretches on the route). It would be too simplistic to apply one uplift factor across 100km of route comprised of a mix of on road cycle lanes and segregated cycle and pedestrian tracks.

This Baseline usage and uplift for each section, and in total, are as follows:

Section	Length (km)	Intervention Type	Adult pre-trips	Adult post-trips
1a	10	On Road Cycle Lanes	16,926	19,506
1b	0.5	Cycle and Pedestrian Tracks	846	2,311
2	20.5	Cycle and Pedestrian Tracks	34,699	94,752
3	19	Cycle and Pedestrian Tracks	32,160	87,819
4	16	Cycle and Pedestrian Tracks	27,082	73,953
5	20	On Road Cycle Lanes	33,852	39,011
6a	2	On Road Cycle Lanes	3,385	3,901
6b	9	Cycle and Pedestrian Tracks	15,234	41,598
Total			164,184	362,852

Estimating the economic value of the route and generating a Benefit Cost Ratio.

We calculated the economic benefits associated with the uplift in cycling on each section of the route in accordance with DfT's WebTAG framework, including use of World Health Organisation's HEAT for Walking and Cycling.

The table below shows the estimated economic impact, including health benefits, over a 30 year appraisal period for each section of the route.

Benefit	Value over 30 years (£)
Health	9,255,000
Absenteeism	1,133,513
Amenity	16,410,090
GHGs	29,108
Accidents	54,259
Decongestion	70,263
Air quality	0
Noise	2,602
Infrastructure	2,602
Indirect Taxation	-122,310
Total	26,835,128

Distribution of benefits over 30 year appraisal



- Health
- Absenteeism
- Amenity
- GHGs
- Accidents
- Decongestion
- Air quality
- Noise
- Infrastructure
- Indirect Taxation

The forecasted benefits are then presented alongside planned costs to form a BCR to help assess value for money of the proposed route. The table below shows the BCR for the upper and lower cost estimates presented in this feasibility study. The upper cost estimate of £8.76 million and lower cost estimate of £6.81 million appear higher in the BCR due to the inclusion of inflation and ongoing maintenance over a 30 year appraisal period.

	Upper cost estimate	Lower cost estimate
Total benefits (£)	26,835,129	26,835,129
Total costs (£)	9,701,086	7,923,752
Benefit : Cost	2.8 : 1	3.4 : 1

Economic impact of cycle tourism

Touring and leisure cycling can have a positive impact on local economies, generating revenue and supporting jobs. The value of this impact has been estimated for a number of routes which attract a high proportion of leisure journeys.

Economic impact was calculated for three leisure routes in Devon – the Drake Trail, Tarka Trail and Exe Estuary Trail. Annual expenditure by cyclists and walkers using the Trails was estimated at £9.3 million and business turnover, at £13.4 million. Two hundred FTE jobs were estimated to be supported by use of the Trails. An economic impact assessment for the Way of the Roses estimated £3 million to be generated for the local economy and 60 FTE jobs to be supported by cyclist spend on the route.

Sustrans has developed an economic impact model for touring and leisure cycling, allowing an estimation of income generation from this type of route use. The model uses information on the number of tourist groups using a cycle route and the characteristics of these groups to estimate economic impacts.

The model outputs include estimates of total spending and spend per head for home-based and holiday-based recreational users, and the number of full time equivalent jobs this spend could support.

The model considers only recreational spending by cyclists. The outputs therefore represent a conservative estimate of impact on the local economy as spending by walkers and horse riders using the route are not included.

Model inputs

The model requires inputs relating to route usage by cyclists, the proportion of cycle trips that are recreational or touring trips, and of these, the proportion that are made by home based users and tourists. For each of these groups, the proportion of journeys that are 'short' trips, the average trip length and the average group size are required. The following inputs and assumptions were made in calculating the potential economic impact of the Danelaw path:

- 164,184 cycle trips per year at baseline
- 362,852 cycle trips per year after completion of the path
- 90% of cycle trips are made for recreation or touring purposes. In the absence of more specific information, the same proportion of recreational trips is assumed before and after the intervention
- Due to a lack of data on the proportion of home-based leisure trips to overnight tourists, we have opted for a conservative calculation based only on home-based tourism
- For home based users, 80% of trips are assumed to be 'short' trips (less than three hours), split equally between 'round' and 'there and back' trips. This is consistent with previous studies on leisure routes
- Trip distance is assumed to be 12.8km, the average leisure cycle trip distance applied in the BCR calculation
- In the absence of any route specific information, average group size is assumed to be two.

Model outputs

The tables below summarise the outputs of the economic impact model for existing usage and potential impact following the intervention.

	Pre-intervention	Post-intervention	Difference
Number of recreational trips per year	147,029	329,470	182,441
Annual recreational spend	£325,675	£719,752	£394,077

	Pre-intervention	Post-intervention
Accommodation	£0	£0
Food and drink	£241,000	£532,617
Retail	£6,514	£14,395
Car costs	£39,081	£86,370
Cycle costs	£9,770	£21,593
Public transport	£9,770	£21,593
Other	£19,541	£43,185

Job Creation Model

A model has been developed by Sustrans to estimate the number of jobs potentially created through delivery of walking and cycling infrastructure. Based on data from 165 infrastructure schemes, the model calculates a broad estimate of direct and indirect jobs created following investment

The model requires an input of total scheme cost. Estimates have been provided for the upper and lower cost estimates (£8,670,000 and £6,815,000 respectively).

The table below summarises the estimated number of jobs created through the Danelaw path.

	Jobs created	
Total project cost	Upper: £8.67 million	Lower: £6.815 million
Direct jobs (FTEs)	11.1	9.6
Indirect jobs (FTEs)	11.3	9.6
Total jobs (FTEs)	22.4	19.3

Conclusion

Based on survey and count data collected locally in Bardney, we estimate existing demand at 164,184 cycling trips per year. Based on similar schemes, we anticipate an increase in cycling as a result of the intervention, with forecasted usage modelled using Sustrans Infrastructure Impact Tool of 362,852 trips per year post-intervention.

The potential value of increased use by adult cyclists is estimated to be £26,835,129 over 30 years as appraised following the DfT's WebTAG framework. Health and journey quality are key contributors to this economic benefit. Compared to the scheme costs outlined in this feasibility study, the BCR for the scheme is estimated to be between 2.8:1 and 3.4:1. The Department for Transport categorises schemes with a BCR greater than 2:1 as being 'high' value for money.

The planned route has other potential benefits beyond those monetised within the BCR calculation. The annual benefit to the local economy from recreational spending by cyclists on the proposed path is estimated at over £700,000, an additional £390,000 per year to the local economy based on increased usage. This is predominantly accrued from food and drink, but also includes contributions to the cycling industry (bikes, sales and services) and other transport costs.

In addition to this, evidence from past cycling infrastructure schemes indicates that a proposed investment of between £6.8 million and £8.7 million could create and sustain between 19 and 22 full time equivalent jobs.

9 Consultation

East Lindsey District Council Economy and Tourism are supportive of a continuous multi-user path between Tetney Lock and Water Rail Way where a formalised link along the old railway line and Louth Canal would have multiple economic benefits (e.g. the potential for establishing cycle hire businesses, improved sustainability of linked supply chain businesses, linking current attractions via sustainable transport etc.) This would also provide additional resident/tourist infrastructure with the potential to develop sporting activities linked to cycling, walking, running, triathlon, horse riding etc.

As part of the public online consultation the public were asked their views supporting the delivery of a Multi-User Path (MUP) which extends from the East Lindsey coastline along the Louth Navigation and then connects with the Water Rail Way MUP (potentially via the disused GNR Louth to Bardney train line), providing access for pedestrian, cycle, equestrian and disabled users and would bring multiple economic, social and environmental benefits to local residents and visitors to the area.

As part of the process it was vital we didn't just limit the route to cyclists. We want to include working with local horse riding groups and other potential users of such a route. This will allow Sustrans and East Lindsey District Council to get a better understanding of people's transport needs when it comes to sustainable modes, from Tetney Lock via Louth, Wragby, Bardney, Horncastle, Woodhall Spa and linking you up to the Water Rail Way Cycle path.

In order for this study to be completed Sustrans needed to understand expert local knowledge and input to any proposal. Therefore, in responses 31 January, 2017.

Overall 95% of the general public along with the Town, District Councillors are in support of a Multi-User path and believes it will increase visitor footfall and boost the local economy and help local people with mobility issues access the coast. During the consultation events, there was an overwhelming need and support from cycle clubs, volunteer groups, local businesses, horse riders, walking groups, and members of the public. See **Appendix C – Public Consultation results.**

Table 9.1 External Consultees set out their response

Organisation	Name	Support
Louth Canal Trust	All members	Fully supportive
Environment Agency	Jeremy Brown	In principal
Natural England	Roslyn Deeming	<p>Dear Gwyneth, Thank you for sending Natural England the Ecological Desk Study of the Danelaw Multi-user path which we received on 14th February 2017.</p> <p>Further to the recent meeting that you attended at the Natural England offices with my colleagues Delphine Suty and Carol Paterson we have no detailed comments to make at this stage but we reiterate our concern with the impact on the designated sites along the proposed route. We are pleased to see that the report highlights the issue of the bat hibernation roost within the Withcall and South Willingham Tunnels SSSI and we welcome the recommendation that alternative routes that will by-pass these tunnels will be considered. We also welcome the intention to carry out further assessment of the potential impacts on the Humber Estuary SAC, SPA and SSSI.</p> <p>We note that the route would potentially fall within the Lincolnshire Wolds AONB and we will need to consider this together with the Lincolnshire Wolds Countryside Service as the proposal progresses.</p> <p>I would refer you to the standing advice that Natural England has published on protected species which includes a habitat decision tree which provides advice on deciding if there is a 'reasonable likelihood' of protected species being present. It also provides detailed advice on the protected species most often affected by development. As Standing Advice it is a material consideration in the determination of applications in the same way as any individual response received from Natural England following consultation.</p> <p>If you would require further substantive advice as the Danelaw project progresses we suggest that you may be interested in Natural England's pre-application Discretionary Advice Service (DAS). The first step is to fill out a simple form, so we can register your interest, and make sure you have the right adviser for the case.</p>
Louth Town Council	Mrs. Jill Makinson-Sanders	Supportive
British Horse Society		Fully supportive
Drainage Board	Mr Andrew McGill	Support in principal. Further information will need to be discussed around drainage advice, what type of surfacing requirement you want to see, mitigation against water voles, information on the depth of Conoco Philips gas pipes
West Lindsey Council	Mrs Marion Thomas	Supportive and will help meet West Lindsey District Council objectives <ul style="list-style-type: none"> - improving job opportunities - Attracting new businesses - Grow and develop existing businesses - Encouraging innovation and new technologies - Promote a sustainable business environment
North East Lincolnshire Council	Anthony Snell	This project will increase movements across Great Lincolnshire and support North East Lincolnshire objectives to increase sustainable transport and promote economy growth
National Farmers Union		Meeting to be set-up with the local farming community through the NFU
Lincolnshire Wolds Countryside Service	Steve Jack	Supportive in principal on the canal section, but has concerns in terms of the AONB
Conoco Philips		No response

Appendix A - Danelaw Ecological Desk Study

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Executive Summary

Sustrans has been commissioned to establish the feasibility of a new walking and cycling route between the Water Rail Way (National Cycle Route 1) at Bardney Lock and Cleethorpes in Lincolnshire. A link is also proposed from Wragby, through Horncastle, to Woodhall Spa where it rejoins the Water Rail Way. This report makes a desk-based assessment of likely ecological impacts on designated nature conservation sites, notable habitats and fauna. As no site visit has been undertaken conclusions in this report are provisional and will need to be verified by a site visit.

Significant habitat loss is anticipated from the proposal due to the length of the route and undeveloped nature of the railway lines, canal side and verges affected. The importance of habitats along the route cannot be determined without a site visit but is likely to include notable grasslands and woodland.

A wide variety of notable plant and animal species could be impacted by the proposals. Given the significant habitat loss anticipated a large number of additional surveys and consultation will be required to fully assess the impacts on invertebrates, amphibians including great crested newts, sensitive bird species, badger setts, otter holts, bats, water voles, reptiles and, if a significant time elapses between the time of writing and construction, dormice. The presence of water voles could create a barrier to route creation along the Louth Canal if a sufficient buffer zone cannot be retained to protect this species in situ. The presence of great crested newts, reptiles and notable invertebrates could require substantial mitigation and compensation work along the railway corridor.

Direct and indirect impacts are anticipated on a large number of designated sites. Most notably, the proposal to open Withcall and South Willingham tunnels would impact bat hibernation roosts with Site of Special Scientific Interest (SSSI) designation. A Natural England mitigation licence to open these tunnels would not be granted unless it can be demonstrated that the project is in the overriding public interest and that there is no suitable alternative to routing the path through the tunnels. The justifications that this project meets these criteria must be in proportion to the national importance of the bat hibernation roosts. At the time of writing it is considered unlikely that a licence would be granted

and it is recommended that the route is diverted around these tunnels.

Impacts are anticipated on numerous designated nature conservation sites along the disused railway lines between Wragby and Louth and between Horncastle and Woodhall Spa. These railway lines are almost entirely covered by designations including statutory and local sites. As they are thin, linear sites and are likely to support habitats significantly different to the surrounding landscape, the impacts of cycle path creation could be very significant. The extent and significance of impacts cannot be fully determined without a site visit. The mitigation and compensation measures required to enable cyclepath creation to meet planning criteria in these sections may be substantial.

Further assessment will be required to consider whether impacts could be anticipated on the Humber Estuary SAC, SPA and SSSI from increased numbers of cyclists continuing their journey from Tetney Lock on unsuitable paths and causing erosion to important habitats or from disturbance to birds at the destination point at Tetney Lock.

The proposed route may pass through a number of other locally designated sites between Bardney Lock and Wragby, at Hubbards Hill and between Wragby and Horncastle. In each case the impact will need to be assessed based on a site visit. Planning permission would only be granted for development in locally designated sites if their wildlife conservation interest is protected.

Further assessment is also required to determine whether the anticipated loss of grassland habitats along the proposed route would impact the network of designated sites protecting this habitat across the region by reducing the effective size of these sites or by increasing habitat fragmentation.

Current planning policy demands that construction projects not only minimise their ecological impact, but provide enhancements wherever possible. Ecological enhancement measures proportional to the scale of the proposal should be built into the detailed design of the scheme.

1 Background

1.1 Project Introduction

EAST Lindsey District Council has commissioned Sustrans to carry out a feasibility study and business case development to support the delivery of the Danelaw Multi User Path (MUP). The path would extend from the East Lindsey coastline along the Louth Navigation and then connects with the Water Rail Way Multi User Path providing access for pedestrians, cyclists, equestrians and disabled users bringing economic, social and environmental benefits to local residents and visitors to the area.

The proposal is an element of the East Lindsey Economic Action Plan and has the potential to create multiple economic, social and environmental opportunities for local residents/businesses and visitors to the area. Sustrans will publically consult end uses and external partners for ideas and local knowledge including cyclists, horse riding groups and other potential users. This will help Sustrans and East Lindsey District Council to get a better understanding of people's transport needs from Tetney Lock via Louth, Wragby, Horncastle, Woodhall Spa and linking up to the Water Rail Way Cycle path.

An assessment of ecological opportunities and constraints has been considered as part of this study. This assessment considers over 120km of route, the approximate location of which is shown in Figure 1.1. Due to the very large scale of the proposal the route has been split into six sections. These are Bardney Lock to Wragby, Wragby to Louth, Louth to Cleethorpes, Wragby to Horncastle, Horncastle to Stenigot and Horncastle to Woodhall Spa. These sections are described in Section 1.2 of this report.

In order to provide an initial assessment of the likely ecological constraints of this proposal, a desk study has been conducted. This assesses the possible impacts of the proposed works on nature conservation sites, habitats and protected or notable fauna. This assessment has not included a site visit and does not constitute a Preliminary Ecological Assessment (in accordance with CIEEM guidelines 2013) but provides an overview of likely ecological issues and constraints for the development.

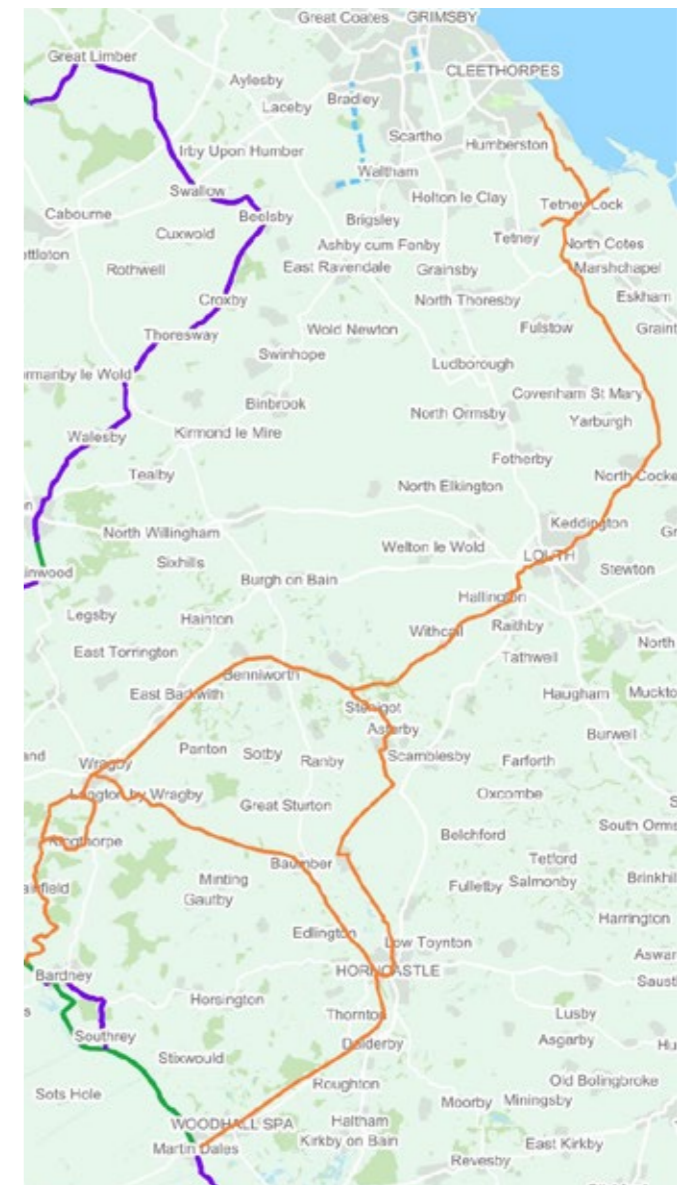


Figure 1.1 The proposed route

1.2 Engineering Options

Descriptions of the route of each section and any known details about engineering works required are provided below.

Bardney Lock to Wragby

The route described in this section runs from Bardney Lock on the River Witham (TF 105 699) to Wire Hill Lane, just northeast of Wragby (TF 146 786). It is approximately 11km in length. Two route options are proposed between Apley and Wragby.

From Bardney Lock the proposed route will be situated adjacent to the Old River Witham for approximately 500m. Where traffic-free sections of route are proposed, the path is anticipated to be 3m wide with an all-weather surface but the detailed design has not been prepared the exact route alignment is not known.

The route then follows existing tracks to TF117 715 where it joins an unnamed road. Widening and resurfacing of tracks may be required dependent on their current condition and width.



Figure 1 .2 Bardney Lock to Wragby

The route then follows roads until it meets the disused Lincolnshire Wolds Railway on Wire Hill Road. For the majority of this section the route will be situated on the road carriageways as they are quiet roads with good site lines. There are three locations where the route may need to be situated off the carriageway as the roads are fast, busy or not have sufficient sight lines. These are;

- Along the unnamed road between Snakeholme Farm and Stainfield Common (TF117 715 to TF112 723),
- The B1202 on the eastern route option between Apley and Wragby
- On the B1202, A158 and/or A157 around Wragby where the exact route alignment is not yet confirmed.

Again, any off road path would be likely to be 3m wide with an all-weather surface.



Figure 1 .3 Wragby to Louth

Wragby to Louth

Between Wire Hill Lane, just northeast of Wragby (TF 146 786) and Hubbard Hills, southwest of Louth (TF 310 854) the route follows the disused Lincolnshire Wolds Railway for approximately 20.5km. The path is anticipated to be 3m wide with an all-weather surface but the exact route alignment within the railway corridor is not known. The route along the railway will go through two tunnels, the Withcall and South Willingham Tunnels. It is not known what level of repair work would be required to these structures, but surfacing and lighting are likely to be necessary. Other bridges and structures may be present. It is not known what level of repair, if any, these will require.

The route will follow an existing footpath through Hubbard Hills. Widening and resurfacing may be required dependent on the current condition and width of the path. The route then follows quiet roads through Louth until it joins the Louth Canal at TF 339 880.

Louth to Cleethorpes

Between Louth and Cleethorpes the route will follow the Louth Canal for approximately 19km to Tetney Lock (TF 339 880 to TA 340). At Tetney Lock the route splits with one branch extending northwest to Cleethorpes (TA 323 063) and the other continuing along the canal to the edge of the estuary (TA 354 031) where it meets up with a footpath. It is assumed that the latter is intended as a view point and destination for the route.

The route along the canal will primarily follow existing tow paths but these will require widening and surfacing to 3m. It is anticipated that the route may need to be diverted briefly away from the canal at Thoresby Bridge Farm (TF 335 997).

The path to Cleethorpes is parallel to, and approximately 100m from the coastline and is situated along existing tracks and paths. A 1.3km path linking Tetney to the route is also proposed between TA 324 015 and TA 335 016 following the route of an existing track. Widening and resurfacing may be required dependent on the current condition and width of the path.



Figure 1.4 Louth to Cleethorpes

Wragby to Horncastle

The proposed route from Wragby to Horncastle will follow the A158 for 16km between Wragby (TF 133 781) and Horncastle (TF 254 695). It is anticipated that a segregated cycle way will be created either in the verges or through adjacent fields. The alignment of the route has not been confirmed at the time of writing but a path would be anticipated to be 3m wide with an all weather surface.



Figure 1.5 Wragby to Horncastle

Horncastle to Stenigot

This section describes a proposed route between Horncastle (TF 254 695) and the disused Lincolnshire Wolds Railway (TF 242 816). This section is entirely situated on quiet roads and will pass through the villages of Hemingby, Goulceby and Stenigot. No additional engineering works are anticipated in this section.

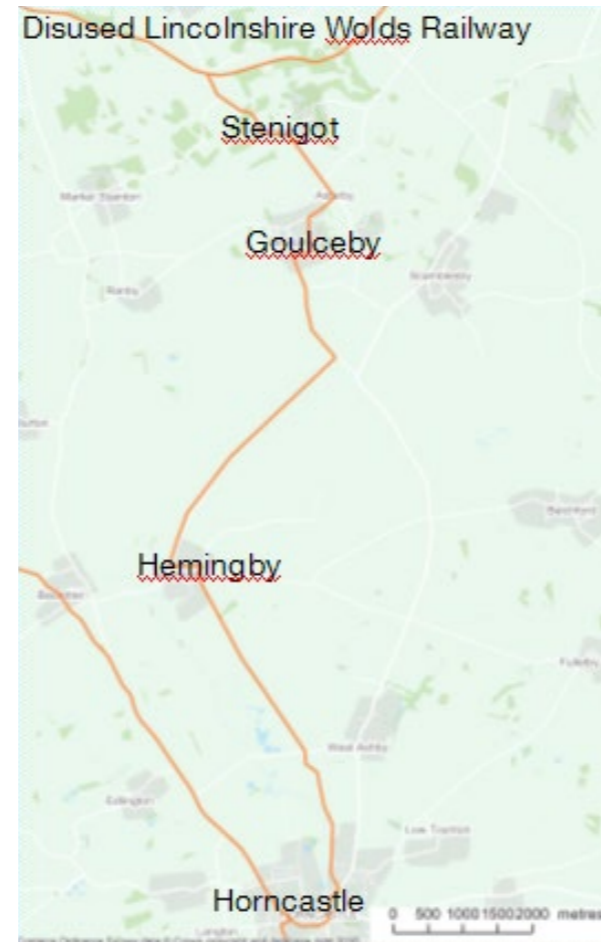


Figure 1.6 Horncastle to Stenigot

Horncastle to Woodhall Spa

This section is situated between Horncastle (TF 254 695) and the River Witham west of Woodhall Spa (TF 176 620). The route will follow the existing Spa Trail path for 6.5km to Woodhall Spa Golf Course (TF 216 647). At this point it will either continue along the Spa Trail for an additional 2.2km before joining roads through Woodhall Spa to the River Witham; or, will divert around the golf course and be situated on road from that point to the river.

A wide path with an all weather surface is already situated long the Spa trail. It is not known at the time of writing whether any path improvement works would be required along this section to widen or repair any sections of path. In Woodhall Spa this will link onto Witham Road and onto the Water Rail Way via an existing access point.



Figure 1.7 Horncastle to Woodhall Spa

1.3 Ecological Assessment

A desk study has been undertaken to determine likely ecological impacts of the proposal, identify further ecological assessments required and provide an evaluation of whether any ecological features identified might form a barrier or significant constraint to the proposal.

The desk study comprised a data search, an assessment of the likelihood of ecological features being present and an assessment of potential impacts.

The data search identified the presence of any designated nature conservation sites and records of notable plants, habitats and protected or notable fauna. The following statutory and non-statutory organisations holding ecological data relating to the survey area were contacted;

- Natural England - MAGIC website for statutory conservation sites, landscape classification and habitat inventories; and,
- Greater Lincolnshire Nature Partnership for records of protected and notable species and the locations of non-statutory nature conservation sites.

Aerial mapping and photographs of the route have been used to aid assessments of some of the broad habitat types present. An accurate habitat evaluation cannot be made from a desk based assessment such as this, but can inform where further survey and assessment will be required.

It should be noted that data has not been requested from Greater Lincolnshire Nature Partnership for species records or locally designated sites along the Horncastle to Stenigot route. This is due to the fact it is entirely situated on road, within the road carriageway with no engineering proposed. As such this is not considered to be a constraint to this assessment.

Potential impacts on ecological features from the proposed works have been assessed. Where impacts are anticipated, the value of the ecological feature and scale of the impact have been assessed. This has been undertaken in accordance with CIEEM Guidelines for Ecological Impact Assessment (CIEEM 2016). This is considered in light of current ecological legislation and planning policy and so considers

impacts on designated nature conservation sites, protected and notable species and landscape scale impacts such as habitat fragmentation.

This report therefore makes recommendations regarding what implications ecology has on the feasibility of the proposed route creation; what further studies would be required and what measures to avoid, mitigate or compensate for ecological impacts are likely to be necessary.

Current planning policy requires developments to include ecological enhancement measures wherever practical. These should be proportionate to the scale of the development and relevant to the wildlife present in the local area. Opportunities for ecological enhancement have been identified where appropriate throughout this document.

2 Baseline Information

2.1 Landscape

The Wragby to Louth and Horncastle to Stenigot sections of the Danelaw MUP are situated with the Lincolnshire Wolds AONB. The primary purpose of the AONB is to conserve and enhance natural beauty. Common objectives for AONB to achieve this are to support the economic and social wellbeing of local communities, promote public understanding and enjoyment of them and promote its natural services, such as the provision of clean air. This AONB is characterised by rolling chalk hills which supports sheep farming in the valleys and on steeper slopes unsuitable for arable land. Some of the grassland and abandoned chalk pits support rare flowers and insects and the area includes mixed woodlands with traditional oak ash and hazel coppice. The rural economy is based on arable farming and mineral extraction. The villages are increasingly used by commuters working in Louth, Grimsby and Market Rasen. There is recreation demand for walking, hunting, shooting and driving for pleasure.

The Danelaw MUP passes through four National Character Areas (NCA). In the extreme west it is situated in The Fens NCA. It then runs eastwards through the Central Lincolnshire Vale NCA until East Barkwith, the Lincolnshire Wolds NCA until Louth and the Lincolnshire Coast and Marshes NCA up the Humber Estuary. The path between Wragby and Woodhall Spa via Horncastle also passes through the Central Lincolnshire Vale NCA and Fens NCA. The route between Horncastle and Stenigot is situated in the Central Lincolnshire Vale NCA and Lincolnshire Wolds NCA.

The Fens were formerly the largest wetland in England and this NCA comprises low lying, flat and open land with many drainage ditches, dykes and rivers; most of which are now canalised.

The Central Lincolnshire Vale NCA is a sparsely settled, largely agricultural area with extensive conifer plantations. This area would naturally be wet woodland and grassland without agricultural improvements but also has patches of different habitats associated with sandy deposits including acidic, infertile and heathland habitats.

The Lincolnshire Wolds NCA is a rolling agricultural landscape with plateaux supporting agricultural land on the hill tops, chalk escarpments and deep dry valleys. Sinuous

beech woods, scattered ash *Fraxinus excelsior* and occasional settlements punctuate an otherwise open landscape. The geological sequences present create a varied topography and flora with sandy and chalk habitats present.

The Lincolnshire Coast and Marshes NCA comprises a wide coastal plain dominated by agricultural land. In the west the land is predominantly arable with more woodlands and hedgerows. In the east there is a greater proportion of pastureland and fields, divided by narrow dykes.

2.2 Nature Conservation Designations

The data search has identified one internationally designated site within 5km of the proposed route. This is the Humber Estuary Special Protection Area (SPA), Special Area for Conservation (SAC) and Sites of Special Scientific Interest (SSSI). Also within 1km of the route are ten SSSI, a National Nature Reserve (NNR) and sixty-seven locally designated nature conservation sites. These locally designated sites are Local Wildlife Sites (LWS) and Sites of Nature Conservation Interest (SNCI). LWS are the most important sites locally for wildlife (along with biological SSSI) and are selected based on expert advice and in consideration of formal criteria. SNCI predate the LWS classification system but this designation remains in place until the sites have been re-assessed against LWS criteria. Many of the SNCI sites have not been surveyed in 20-30 years and may have changed in the intervening period. Summaries of all sites within 1km of the route are provided in Table A1 in Appendix 1. Twenty-four sites were situated on proposed route alignments, and a further thirteen were situated in close proximity to the route i.e. within 10m. These are listed in Table 2.1 with reference to which section of the route they are on or adjacent to. Their locations are shown in Appendix 2. No statutory nature conservation sites have been identified as being on or adjacent to the Horncastle to Stenigot Section of the route. Non-statutory sites may be present but no data has been requested from the Greater Lincolnshire Nature Partnership for this section of the Danelaw MUP as it is entirely situated on the carriageway of quiet roads with no engineering required. Potential impacts of the proposal on these and other sites are discussed in Section 3.

Table 2.1: List of sites on, or adjacent to, the proposed route

Section	Proximity	Sites
Bardney Lock to Wragby	On route	Old River Witham at Branston Island LWS
		Snakeholme Pits LWS*
		Stainfield Wood (Bardney Limewoods SSSI)*
		Holme Hill Verge LWS*
	Adjacent	Shepherds Farm Road Verge SNCI*
		Foxhall Wood LWS
		College Wood (a unit of Bardney Limewoods SSSI and NNR)
Wragby to Louth	On route	Great West Wood New Plantation Little West Wood LWS*
		Louth to Bardney Disused Railway Line SNCI
		Withcall and South Willingham Tunnels SSSI
		Benniworth Haven SSSI
		Benniworth Haven Disused Railway LWS
		Hallington to Withcall Disused Railway Line SNCI
		Hallington to Withcall Disused Railway East LWS
	Adjacent	Hubbard's Hill LWS and RIGS
		Benniworth Haven LWS
		Benniworth House Farm LWS
		Ivyhouse Farm LWS
		River Bain near Pawsons Pond LWS
		Raithby Beck LWS
Louth to Cleethorpes	On route	Humber Estuary SAC, SPA and SSSI
	Adjacent sites	Thoresby Bridge Pond LWS
Wragby to Horncastle	On route	Hoop Lane Road Verges LWS and RNR*
		Withcall Meadow LWS*
		Walkers Farm SNCI*
		Baumber Road Verges LWS*
		Top Nursery Spinney SNCI*
		Shermans Wath SNCI*
		Triangle Copse West of Ashby Road SNCI*
Horncastle to Woodhall Spa	On route	Thornton Lodge to Horncastle Dismantled Railway SNCI
		Woodhall Spa to Thornton Lodge Dismantled Railway SNCI
		Woodhall Spa Golf Course SSSI
		Woodhall Spa to Horncastle Dismantled Railway SNCI
	Adjacent sites	The Wilderness, Roughton LWS
		Highhall Wood LWS
		Bracken Wood SNCI
		Woodhall Spa Meadow SNCI

*Dependent on final route design

2.3 Plants and Habitats

2.3.1 Habitats

Aerial photography and mapping indicate that the landscape surrounding the route is dominated by arable farmland with small settlements and small woodlands with the estuary and associated coastal habitats between Tetney Lock and Cleethorpes. The landscape around Woodhall Spa includes more significant areas of woodland.

Where the route is situated along the disused Lincolnshire Wolds Railway a variety of habitats are likely to be present. Some sections can be seen to be wooded, some have vehicle tracks along and others are likely to support grasslands of various types, ruderal vegetation and scrub. Other habitats such as bare ground, ephemeral and short perennial vegetation, heathland or standing water could potentially be present.

The easternmost section of the route is situated along the Louth Canal tow path and alongside Waithe Beck. Trees, shrubs, scrub and hedgerow may be sporadically present alongside the tow path. Some sections appear to have tracks and bare footpaths. Grassland is likely to be the dominant habitat along the towpath but the type and importance is not known. The canal and the Waithe Beck could support varying quantities and types of aquatic, marginal and other bankside vegetation. Other habitats such as tall ruderal, ephemeral and short perennial vegetation could also be present.

Elsewhere the route will predominately be situated along roads, tracks and field boundaries. As such bare ground, ephemeral and short perennial vegetation and crops are likely to be present. Hedgerows and trees may form field boundaries and road verges could support a wide range of habitat types including grassland and woodland.

No assessment of the habitat types or their importance can be made without a site visit and basic habitat survey.

Reference to habitat inventories indicate that notable habitats are present along the route. Small patches of priority habitats are scattered through the landscape and are continuous along the coast. These are habitats listed on the UK Biodiversity Action Plan and that form the basis of the list of habitats protected by the NERC Act (2006). These are primarily woodlands

and grasslands with coastal habitats within the Humber Estuary designated site. Habitat situated in close proximity to or along the route are summarised below.

- Small and medium sized patches of deciduous woodland are situated throughout the landscape including;
 - Along approximately 350m of the Louth Canal at Louth and in numerous locations on the disused Lincolnshire Wolds Railway.
 - Northwest of the A158 at Whitehouse Farm (TF 188 753);
 - Northwest of the A158 west of Baumber between TF 204 748 and TF 219 744; and,
 - Northwest of the A158 (Top Nursery Spinney) at TF 228 734.
 - In various locations along the Spa Trail between Horncastle and Woodhall Spa.
- Small patches of coastal and floodplain grazing marsh are present throughout the landscape along the route and are situated in close proximity to the route at its western end, by Bardney Lock, in numerous locations along the Louth Canal and along the River Witham.
- Areas of good quality semi-improved grassland are scattered throughout the landscape. Of particular note are;
 - Road verges of the B1202 north of Kinsgthorpe,
 - A 350m section of the railway formation south of Donington on Bain between TF 242 817 and TF 246 817.
 - Immediately south of the railway formation south of Benniworth House Farm LWS
 - The western verge of the B1202 between approximately TF 129 751 and TF 130 757 and between TF 132 762 and TF 133 767.
 - The eastern verge of the B1202 between approximately TF 129 751 and TF 130 758.
 - Patches of this habitat are also present adjacent to the Horncastle to Stenigot route in Goulceby and Stenigot.

- An area of lowland fens is present adjacent to the Horncastle to Stenigot route in Goulceby.
- Areas of lowland meadows are present adjacent to the Horncastle to Stenigot route in Goulceby, northwest of the A158 at TF 160 768 between Wragby and Horncastle and the railway formation immediately south of Benniworth House Farm LWS.
- Benniworth House Farm LWS is listed as purple moor grass habitat
- Small areas of lowland calcareous grassland are scattered through the landscape including a section of the railway formation between TF 204 830 and TF 211 829, immediately west of the South Willingham Tunnel.
- An area of parkland and wood pasture crosses the disused railway north of Stenigot, centred at TF 261 819, also adjacent to the Horncastle to Stenigot Route.
- The Humber Estuary adjacent to the route is dominated by salt marsh with intertidal foreshore (mud) along the river channel and fringed by coastal and floodplain grazing marsh.
- The Spa trail passes through an extensive area of lowland heath

2.3.2 Notable plant and fungal species

Records of twenty-seven plant species have been provided in the data search, twenty-five of which are Species of Principle Importance on the NERC Act (2006).

Three of these are nationally rare: throw-wax *Bupleurum rotundifolium*, red star thistle *Centaurea calcitrapa* and darnel *Lolium temulentum*. These are species associated with bare disturbed ground and it is anticipated that such habitat may be present along the proposed route on track edges, field margins and potentially in areas of ballast.

Nine of these species or subspecies are nationally scarce (eyebright *Euphrasia psuedokernerii*, fine-leaved sandwort *Minuartia hybrid*, pasque flower *Pulsatilla vulgaris*, meadow clary *Salvia pratensis*, small flowered catch-fly *Silene gallica* and *Silene gallica* var.

quinquevulnera, greater water parsnip *Sium latifolium*, marsh clubmoss *Lycopodiella inundata* and depford pink *Dianthus armeria*).

Small flowered catch-fly is associated with disturbed ground on acidic sandy soil, waste ground and coastal banks. Disturbed ground is likely to occur along the route, sandy habitats may be present and banks affected by coastal processes may be present at the east of this route. Depford pink *Dianthus armeria* is similarly associated with disturbed open habitats and has historically been associated with the railway system and pathsides. These species could be therefore present along the route.

Marsh clubmoss is primarily found in the west of Britain and grows on wet heaths and peaty soils that are underwater in winter and preferably somewhat disturbed. This habitat is considered likely to be frequent in the landscape and the record is likely to have been from Moor Farm SSSI. This habitat is considered unlikely to be present along the route but must be confirmed by a walkover survey.

The other five scarce species are primarily associated with calcareous habitats. An area of calcareous grassland has been identified on the railway formation immediately west of the South Willingham Tunnel. This area could support these and other notable species as could other suitable areas with calcareous influences, for example along the former railway ballast, road verges and field edges. The ditches and canal could support greater water parsnip where there are alkaline conditions.

Himalayan balsam has been noted to occur in two of the designated sites; South Delph and Benniworth Haven. Whilst the spread of this species would be constrained by arable land management, it could readily spread along unmanaged land along the railway formation, watercourses and canals and could be present along the proposed route.

Records of two notable fungus species were provided, both of which are also Species of Principle Importance on the NERC Act (2006); the beautiful bonnet *Mycena renati* and Berkeley's earthstar *Geastrum berkeleyi*. Both are associated with trees and woodland habitats and should potentially occur in such areas along the route.

2.4 Fauna

An assessment of the likelihood that notable and protected fauna may occur along the proposed route has been made using evidence from the data search. This section of the report has not been split into the five sections of the route. This is because individuals and populations are mobile and may move across the landscape and because most species are under-recorded. As such the presence of records in one location of the route only does not indicate they are absent from other sections of the route. Where species records are particularly relevant to certain sections of the route, this is highlighted in the text.

2.4.1 Invertebrates

The Humber Estuary SSSI citation notes that the estuary supports many scarce and threatened species across a range of taxa associated with a range of habitats. The saltmarshes support the solitary bee *Colletes halophilus* and starwort moth *Cucullia asteris*. Brackish and freshwater reedbeds support the reed-beetle *Donacia clavipes* and the silky wainscot moth *Chilodes maritimus* and areas of willow *Salix* spp. scrub within reedbeds support the cream-bordered green-pea moth *Earias clorana*. Fully aquatic species present in this SSSI include the water beetles *Agabus conspersus* and *Helophorus fulgidicollis*.

A large number of records of invertebrate species were provided by the data search including 88 species listed in Section 41 of the NERC Act (2006) whose possible presence is a material consideration of the planning process. Some of these are historic records and these species may no longer be present but many are more recent. They include species from a whole range of habitat types. The suitability of the habitats along the route for these invertebrates cannot be assessed without a site visit but some are associated with woodlands, wetlands and grasslands, habitats known to occur along the route.

2.4.2 Amphibians

Records of five amphibian species were provided by the local record centre; common toad *Bufo bufo*, common frog *Rana temporaria*, smooth newt *Lissotriton vulgaris*, palmate newt *L. helveticus* and great crested newt *Triturus cristatus*. It should be noted that a large number of records of great crested newt were provided and that these were scattered throughout the landscape along the route.

It is anticipated that amphibians, including great crested newts, will use habitats along the route for the entire length of the proposed path. Ponds which could be used by breeding amphibians are present throughout the landscape, many within 50m of the route. Parts of the route could therefore be within the core habitat for some populations of great crested newts.

Natterjack toad *Bufo calamita* are known from further south along the coast in Lincolnshire (at Saltfleetby and Theddlethorpe Dunes). The status and distribution of this population is not known. It is possible that this species could be present but unrecorded in the dunes and saltmarshes elsewhere in the Humber Estuary. The habitats along the route between Bardney Lock and Tetney Lock are not likely to be suitable habitat for this species although this must be confirmed by a site visit.

2.4.3 Birds

As discussed in Section 2 the Humber Estuary SPA is internationally important for migratory species and for breeding and overwintering Annex I birds. It is also noted to be important for bird species on passage. These include waders, little tern, bittern, hen harrier and shelduck. Records of 109 bird species were provided in the data search including twenty-nine Schedule 1 birds, listed in Table 2.1. Some of the species are known to breed in designated sites close to the route, but their location is not included in this report for security reasons.

A large variety of different habitats are present along the route, most of which could be used by foraging, nesting and roosting birds including some of the identified Schedule 1 bird species.

Table 2.1: Schedule 1 bird species identified by the data search

Scientific name	Common Name
<i>Accipiter gentilis</i>	Goshawk
<i>Acrocephalus palustris</i>	Marsh warbler
<i>Alcedo atthis</i>	Kingfisher
<i>Anas querquedula</i>	Garganey
<i>Botaurus stellaris</i>	Bittern
<i>Calidris pugnax</i>	Ruff
<i>Cettia cetti</i>	Cetti's warbler
<i>Charadrius dubius</i>	Little ringed plover
<i>Circus aeruginosus</i>	Marsh harrier
<i>Circus cyaneus</i>	Hen harrier
<i>Circus pygargus</i>	Montagu's harrier
<i>Coturnix coturnix</i>	Quail
<i>Crex crex</i>	Corncrake
<i>Falco peregrinus</i>	Peregrine
<i>Falco subbuteo</i>	Hobby
<i>Lanius collurio</i>	Red-backed shrike
<i>Larus melanocephalus</i>	Mediterranean gull
<i>Limosa limosa</i>	Black-tailed godwit
<i>Lullula arborea</i>	Woodlark
<i>Milvus milvus</i>	Red Kite
<i>Oriolus oriolus</i>	Golden oriole
<i>Pandion haliaetus</i>	Osprey
<i>Pernis apivorus</i>	Honey-buzzard
<i>Phoenicurus ochruros</i>	Black redstart
<i>Podiceps nigricollis</i>	Black-necked grebe
<i>Recurvirostra avosetta</i>	Avocet
<i>Regulus ignicapilla</i>	Firecrest
<i>Sternula albifrons</i>	Little tern
<i>Tyto alba</i>	Barn owl

2.4.4 Fish

A large variety of fish species will be present in the rivers and estuary. Lincolnshire Environmental Record Centre provided records of six fish species of principal importance listed in Section 41 of the NERC Act (2006): brown trout *Salmo trutta* subsp. *fario*, sea trout *Salmo trutta*, burbot *Lota lota*, European eel *Anguilla Anguilla*, spined loach *Cobitis taenia* and river lamprey *Lampetra fluviatilis*.

The SSSI designation for the Humber Estuary notes that it is an important migration route for river and sea lamprey *Petromyzon marinus* and both species are present year round.

2.4.5 Mammals

Records of two marine mammal species were provided by the data search: grey seal *Halichoerus grypus* and common seal *Phoca vitulina*. Records of twenty-one terrestrial mammal species were identified within 2km of the proposed route including fifteen with statutory protection.

- Badger *Meles meles* records are present throughout the landscape. Suitable locations for setts, such as woodland, hedgerows and embankments are situated in close proximity to the route for its entire length.
- Otter *Lutra lutra* records were present throughout the landscape including within Louth Canal and River Witham. This species should be assumed to be present in all watercourses and water bodies along the route.
- Nearly 1500 water vole *Arvicola amphibius* records were provided including many that were from the past ten years. This species has been recorded in drains and dykes across the landscape including the River Witham, Louth Canal and within the Humber Estuary SSSI. This species is likely to be present in any suitable watercourses and waterbodies in the landscape. As a strong population appears to be present in the area even watercourses and water bodies with lower suitability could support this species. It should be noted that a lower number of

records were provided from within 2km of the Wragby to Woodhall Spa route (just 129), but this is still indicative that populations are present in watercourses along this route.

- Although historic records of red squirrel *Scurius vulgaris* were provided this species is considered to be extinct in this region.
- 178 dormouse *Muscardinus avellanarius* records were provided from between 2002 and 2015, all from Chambers Farm Wood, the site of a reintroduction of this species in 2002. This is situated 1.5km from the route at its nearest point, which is the eastern route option between Apley and Wragby. They may have spread into other nearby woodlands where the intervening habitat is not too fragmented. This species is considered unlikely to be in woodlands distant from this point.
- Eleven bat species have been recorded within 2km of the route (listed in Table 2.2). Nationally important hibernation roosts for five species are known to be present in Withcall and South Willingham Tunnels. Other bat roosts could be present in trees and structures along the route but have not been identified by the data search. Bats are likely to forage in habitats along the proposed route and linear features such as hedgerows and vegetation along the railway line could be used for foraging and as a route for commuting bats. It is also important to note that large numbers of bats may commute considerable distances to and from the tunnels to hibernate and autumn swarming activity may also occur at the tunnels.

Table 2.2: Bat species recorded within 2km of the proposed route

Scientific Name	Common Name
<i>Barbastella barbastellus</i>	Barbastelle
<i>Myotis brandtii</i>	Brandts bat
<i>Myotis daubentonii</i>	Daubenton's bat
<i>Myotis mystacinus</i>	Whiskered bat
<i>Myotis natterii</i>	Natterer's bat
<i>Nyctalus leisleri</i>	Leisler's bat
<i>Nyctalus noctula</i>	Noctule
<i>Pipistrellus nathusii</i>	Nathusius pipistrelle
<i>Pipistrellus pipistrellus</i>	Common pipistrelle
<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle
<i>Plecotus auritus</i>	Brown long-eared bat

Records of various other terrestrial mammal species were provided including five species which have protection through the planning process though inclusion in the list of Species of Principal Importance in the NERC (2006) Act; hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus*, harvest mouse *Micromys minutus*, pole cat *Mustela putorius* and pine martin *Martes martes*. Also of note are records of feral ferret *Mustela putorius subsp. furo*, a non-native species. Hedgehog, brown hare and harvest mouse are all likely to occur along the route along with other mammal species.

2.4.6 Reptiles

The data search identified records of four reptile species within 1km of the route; adder *Viper berus*, grass snake *Natrix natrix*, common lizard *Zootoca vivipara* and slow worm *Anguis fragilis*. It should be noted that adder were only recorded within 2km of the Wragby to Woodhall Spa route and the few slow worm records within 2km of the Bardney Lock to Tetney Lock route were from 1977. Kirkby Moor Plantation LWS was noted to be particularly important for reptiles supporting adder, slow-worm and common lizard.

Grass snake were noted as being present in citations for four sites adjacent to the route.

The verges of roads, railways and canals could all support reptiles depending on the habitats present, their extent and their connectivity. Railway lines in particular can support extensive high quality reptile habitat and the habitat descriptions for the railway formation between East Barkwith and Louth suggest that this is the case. Reptiles could also hibernate in features in the verges such as the base of walls, bridges and other structures and in the root balls of trees.

Reptiles should be assumed to be present in all habitats along the route unless a walkover survey determines that habitats are not suitable or a specific survey for reptiles is undertaken.

3 Likely Impacts

Assessments of the likely impact of the proposal have been made in relation to nature conservation sites, habitats and notable or protected species. These are described below.

3.1 Nature Conservation Sites

3.1.1 Bardney Lock to Wragby

The proposed route between Bardney Lock and Wragby may pass through three designated sites;

- Old River Witham at Branston Island LWS;
- Either Snakeholme Pits LWS or Bardney Limewoods SSSI dependent on route design; and,
- Either Holme Hill Verge LWS or Shepherds Farm Road Verge SSSI dependent on route.

A further three sites were in very close proximity (likely within 10m) to the route options between Bardney Lock and Wragby. These were Foxhall Wood LWS and either College Wood (a unit of Bardney Limewoods SSSI and NNR) or Great West Wood, New Plantation and Little West Wood LWS dependent on which route option is selected.

Impacts on all these sites are discussed below.

Old River Witham at Branston Island LWS

Construction will be situated in close proximity to this river. Any poorly controlled construction by watercourses has potential to damage the habitat through siltation and pollution from site run-off. It is anticipated that these impacts can be readily avoided through adherence to best practice guidelines for working by water. The LWS designation also includes habitats adjacent to the river including substantial embankments with species-poor neutral grassland and route construction may be situated within the site boundary. This site is protected through the planning process and permission to construct a path through this site might not be granted, however, if habitats of low importance only are to be affected, it may be that sufficient mitigation and compensation could be undertaken to make this acceptable. Further survey and consultation will be required to determine whether this is the case.

Snakeholme Pits LWS and Stainfield Wood (Bardney Limewoods SSSI)

The exact location of the proposed route as it passes between Snakeholme Pits LWS and Stainfield Wood has not been confirmed at the current time. It has initially been proposed along Short Ferry Road but an on-road solution may not be viable in this location.

If the route were to be situated through Snakeholme Pits the habitat loss and disturbance of wildlife in this site could be significant due to the relatively small size of the site and the high proportion of terrestrial habitat that might be affected. Construction should be situated away from this site if possible. Any construction proposed within this site would need to be subject to further survey work and assessment, particularly in relation to plants, habitats, invertebrates, reptiles, amphibians and birds; for which the site may be important. This site is protected through the planning process and permission to construct a path through this site might not be granted.

Were construction to be proposed through the edge of Stainfield Wood this would result in direct impacts and habitat loss in this unit of the Bardney Limewoods SSSI. Path construction and route development within the site boundary

would be subject to Natural England approval. This would only be granted if it could be shown that the features of special interest for which the site was designated would not be affected. Although this site has a higher level of protection than Snakeholme Pits LWS, the impact on the site could be anticipated to be less due to its greater size, and therefore the smaller proportion of habitat that would be affected. A detailed survey of the proposed works footprint would be required to assess what the impact would be in terms of the direct loss of habitats and species and disturbance to wildlife within Bardney Limewoods. In particular an assessment would need to be made of whether increased access could affect the ability of species such as woodcock to breed here. As this site is in unfavourable condition but recovering, there may be an opportunity, regardless of the final decision about route alignment, to undertake enhancement works in this site.

The feasibility of constructing the route through either of these sites is subject to further survey, assessment and consultation.

Designated verges between Apley and Wragby (Holme Hill and Shepherds Farm Road Verge)

Two route options have been proposed between Apley and Wragby. The easternmost route option is situated along the B1202 between Kingsthorpe and Wragby. The westernmost option follows a quiet single lane track past Goltho Hall and Shepherds Farm.

It is likely that an off-road solution would be required along the B1202 between Kingsthorpe and Wragby due to the fast traffic speeds. The road verges along this stretch include Holme Hill Verge LWS an area of high quality semi-improved grassland in the western verge. It should be noted that the verges on the east and west of the road just north of Kingsthorpe are also listed as good quality semi-improved grassland although they are not designated. These habitat patches outside the designated site may increase the populations of invertebrates that the LWS can support compared to if it were more isolated. Route creation in the western verge between Kingsthorpe and Wragby would cause permanent loss or degradation of the majority of the grassland in the LWS and other areas of high quality grassland. Route construction in the eastern verge would not directly impact the

grassland in the LWS, but would cause the loss of an area of other good quality grassland that may be important in enabling the LWS to support higher invertebrate populations than if it were isolated. Assuming these areas of grassland are still important (the LWS survey was in 1983), construction in the verges of the B1202 between Kingsthorpe and Wragby would be a significant negative impact of the proposal.

The western route option between Apley and Wragby is located through the Shepherds Farm Road Verge SNCI. However, the route is proposed to be on road in this location and no impacts would be anticipated on the ecological interest of this designated site. This would therefore be the preferred route option between Apley and Wragby from an ecological perspective.

Adjacent Woodlands

The route between Bardney Lock and Wragby will be situated on road past Foxhall Wood LWS. It will also be situated on road past either College Woods (Unit 6 of Bardney Limewoods SSSI and NNR) or Great West Wood, New Plantation or Little West Wood LWS, depending on which route option is used between Apley and Wragby.

The route would be situated on road past Foxhall Wood. As such no direct impacts are anticipated on the habitats in the woodland. Reference to online imagery suggests that the woodland edge is mostly formed of scrub and young trees, forming a natural screen which would also be anticipated to reduce the likelihood of wildlife in the woodland being disturbed. Although this must be confirmed by a site visit, impacts on this LWS are considered to be unlikely.

The eastern route option between Apley and Wragby passes College Woods (Unit 6 of Bardney Limewoods SSSI and NNR) at TF 122 755. It will again be situated on road at this location with screening vegetation along the road edge. No direct impacts are therefore anticipated and disturbance to wildlife is considered unlikely although this must be confirmed by a site visit. If the preferred western route option between Apley and Wragby were used, this SSSI Unit would be avoided as it would be situated 450m from the route.

Great West Wood, New Plantation and Little West Wood LWS would also suffer no direct impacts and disturbance to wildlife is considered unlikely, although less natural screening vegetation is present alongside this wood than the others discussed here. As this site is designated for its flora and disturbance would be likely to be low and no impacts are considered likely on this site.

3.1.2 Wragby to Louth

The entire railway corridor between East Barkwith (TF 171 810) and Louth (TF 317 857), which is a length of approximately 17km, has been designated for nature conservation. The route will be situated through two SSSI and five designated sites with non-statutory designations along this disused railway corridor, which is also situated within the Lincolnshire Wolds AONB. Five further non-statutory sites are situated in very close proximity (likely within 10m) to this section of route, adjacent to the railway. The proposed route also passes through Hubbard's Hill LWS. Impacts on all these sites are discussed below.

Withcall and South Willingham Tunnels SSSI

The preferred route passes through Withcall and South Willingham tunnels which are nationally important for their bat hibernation roosts and receive statutory protection through their designation as a SSSI. Opening these structures would involve repairs to these structures, the installation of lighting during at least daylight hours and increased long-term disturbance from human activity. These actions have potential to disturb bats and damage or destroy these bat roost. In order for proposed route to use these tunnels, a Natural England development licence would be required. This would only be granted if the following criteria are met;

- The project must be in the over-riding public interest;
- There must be no suitable alternative; and,
- The conservation status of the species must be preserved.

The first two points must be clearly demonstrated and the arguments must be proportionate to the national importance of this roost. If these

criteria cannot be met, opening up the tunnels will not be possible. It is considered unlikely that the proposal will be able to meet these criteria, although it should be noted that no detailed analysis of the economic and social need for this particular route has been provided at the time of writing.

If these first two criteria can be met then significant and lengthy mitigation works will be required to meet the third criteria. Significant amounts of survey work may also be required to inform the strategy dependent on the detail of pre-existing information. It is also anticipated that this work would be highly controversial.

It is anticipated that an alternative route will need to be developed that by-passes these two tunnels for this proposal to be feasible.

Benniworth Haven Cutting SSSI

This site is designated for geological reasons only and impacts are therefore not discussed in this report. However, it should be noted that the geological interest of this site must be preserved and Natural England permission will be required for work in this site.

SNCI and LWS on the disused railway line

The five non-statutory nature conservation sites along the railway are primarily described as grassland sites with other habitats such as tall ruderal, scrub and woodland present in some sections. The grassland is predominantly neutral but calcareous species are present and some sections of grassland are species rich and/or calcareous.

Over 17km, a tarmac path 3m wide would represent 5.1Ha of habitat lost. The construction area might be up to 5m wide along most of the route, representing an additional 3.4Ha that could be disturbed, and that may require additional long-term management to prevent the vegetation encroaching the path. The exact proportion of rarer habitats such as calcareous grassland to be lost cannot be determined without a site visit as it is dependent on exactly what habitat is present in the footprint of the path, however, the mosaic of habitats is important for fauna and so all semi-natural habitats in the railway corridor are important. This is not only a large area of semi-natural habitat but represents a large proportion of the sites as they themselves are

thin and linear, at times less than 10m in width. They are also located within a landscape which is predominantly agricultural and so although they do link up with other areas of grassland and woodland they are relatively isolated.

This proposal will result in a significant negative impact on these sites. These SNCI and LWS receive protection through the planning process. It is only considered likely that the proposed development would be permitted if there were significant compensation and enhancement works undertaken. A site visit and consultation with the local ecologist would be required to determine what actions might be appropriate. Given the scale of the impact, significant offsite habitat creation is likely to be required in appropriate locations alongside the railway in addition to the adoption of a long-term habitat management plan for those areas and the verges of the proposed route for its entire length.

The AONB designation

Assuming the path creation does not detract from or threaten the long-term conservation of the natural beauty of the landscape between South Willingham and Louth the proposal has potential to contribute to the common objectives of the AONB by improving access for the local communities to enjoy the landscape and travel between village and towns in a sustainable manner, which will benefit their health and the environment.

Hubbard's Hill LWS and RIGS

The route proposal uses an existing access track through the valley floor. The valley floor is described in the citation as managed parkland that already suffers from high disturbance from recreation. It is anticipated that the woodland with notable calcareous ground flora situated on the valley sides would not be directly impacted. As such it may be that the proposal would not cause significant additional impacts through this LWS, however, this cannot be confirmed without a survey, detailed route design plans and consultation. No information is currently known about the extent of habitat damage, whether the proposal would increase recreation in areas currently less disturbed, or whether notable habitats and species not mentioned in the designation may be present in that location.

Any development through a LWS must protect the wildlife conservation interest of that site and provide enhancements wherever possible. Planning permission will not be granted unless this can be shown to be the case. An alternative off road route that uses the adjacent golf course has been proposed but has not been investigated.

The RIGS designation is for geological reasons only and impacts are therefore not discussed in this report. Advice on the implications of this designation on the proposal should be sought.

Adjacent designated woodland

Benniworth Haven LWS is situated immediately adjacent to the former railway. The railway in this location is listed as woodland habitat on the national inventory of woodland and trees but does not appear to have a continuous canopy from online aerial imagery. As such this section of the railway could support a similar flora to the rides and meadows in the designated site. The adjacent railway should therefore, as best practice, be considered to be an extension of this site, even though it is outside the official boundary unless survey evidence indicates that it does not have ecological significance for the adjacent site. Further survey of this section of route will be required to assess the impact on this site. If negative impacts on the site are anticipated they would be a material consideration of the planning process. It should also be noted that this site is known to contain Himalayan balsam and measures to prevent its spread during construction and in the long-term are recommended.

Adjacent designated grasslands

Benniworth House Farm LWS and Ivyhouse Farm LWS are large adjacent sites and are designated for their differing, important, grassland habitats. The site boundaries are outside the railway line and no direct impacts would be anticipated on the grassland habitats within these sites from the proposal. Given the large size of these adjacent sites (35Ha total), proposals affecting a small amount of grassland outside their boundary are unlikely to affect their ability to support populations of notable wildlife.

The River Bain near Pawson's Pond LWS and Raithby Beck, Raithby LWS citations also list grasslands along the bank tops of the watercourses as important habitats within those sites. Again no direct impacts on these sites are anticipated, but consideration must be given to whether the grassland loss anticipated along the entire railway corridor might lead to increased habitat fragmentation and the mobility of grassland species between these and other grassland sites.

Adjacent designated watercourses and water bodies

The River Bain near Pawson's Pond LWS and Raithby Beck, Raithby LWS both cross the disused railway line. It is not known at the time of writing whether this is via bridges or culverts and if these are still intact. These sites are designated for the habitats within the channel and those adjacent to the watercourses, Benniworth House Farm LWS and Benniworth Haven LWS also both contain ponds, although the proximity of the ponds to the proposed route is not known.

The site boundaries are outside the railway line and no direct impacts would be anticipated on wetland habitats within the sites from the proposal. However, poorly controlled construction can have significant negative impacts on wetland habitats due to siltation and pollution in site runoff. It is anticipated that these impacts can be readily avoided through adherence to best practice guidelines for working near water. Grass snakes are noted as present in the River Bain citation. Potential impacts on reptiles and other fauna are discussed in Section 3.3.

3.1.3 Louth to Cleethorpes

At the time of writing it is anticipated that the proposed route along the Louth Canal will be situated in close proximity to Thoresby Bridge Pond LWS and will end at the Humber Estuary SAC, SPA and SSSI.

Humber Estuary SAC, SPA and SSSI

The proposed route ends at the Humber Estuary. At Tetney Lock the route splits with one branch extending northwest to Cleethorpes and the other continuing along the canal to the edge of the estuary where it meets up with a footpath. It is assumed that the latter is intended as a view

point and destination for the route. The path to Cleethorpes is proposed 100m outside the boundary of the designated site with arable fields between.

It is anticipated that construction would not encroach the wetland habitats for which the SAC designation is primarily assigned. The long-term impact of a greater number of visitors arriving at this location must be considered. There are existing tracks and paths from this point along the marsh and out to the sea and so it is anticipated that there would not be a large increase in uncontrolled access and trampling of these habitats, although an assessment should be made to determine whether there might be a risk of increased path erosion and habitat damage if visitors chose to cycle these routes. This should take into account the potential presence of nationally scarce plant and invertebrate species listed in the SSSI designation.

Consideration must also be given to whether there would be disturbance impacts on birds using the site and therefore impacts on the SPA. The proposed link to Cleethorpes is already designated as a footpath for the majority of its length. As it links Cleethorpes to Tetney Lock and is a scenic route, it is anticipated that it will already be heavily used for recreation and the additional pedestrian and cycle traffic is unlikely to cause an increased disturbance to birds. If the end point of the route at the edge of the estuary is developed as a destination point (i.e. with seating, art works, information boards etc) then it may lead to a significantly greater number of people arriving and loitering in this location. As this represents a very small area in a very large site, this is not anticipated to be a significant impact, but this must be confirmed subject to a site visit to assess the habitat in this location and consultation with Natural England. If this exact location was considered to be potentially important for the birds using the SPA, and disturbance might be anticipated, further survey and/or mitigation may be required.

As part of the proposal there may be opportunities to increase the public enjoyment of nature through the creation of hides or information/interpretation materials in this location.

Thoresby Bridge Pond LWS

The proposed route is anticipated to be located on a raised floodbank outside the boundary of this site to the south of Fen Lane and then diverts around the site north of Fen Road as it cannot be located adjacent to the Canal in this location. Poorly controlled construction could impact the habitats within this site given its very close proximity and location down a bank slope. Construction in this location will need to be very carefully controlled to protect the canal and LWS, both situated downslope from the route.

3.1.4 Wragby to Horncastle

The detailed route design along the A158 has not been confirmed at the time of writing. Seven sites are situated within 10m of the A158 and could therefore be situated on the route alignment. Four are grassland sites, three are small copses. Four are situated on the south/west side of the road and three on the north/east side.

Hoop Lane Road Verges LWS and RNR and Baumber Road Verges LWS

The designated road verges are long linear habitats and construction would result in the loss of a very small proportion of these sites. This would be a minor negative impact of the proposal. The significance of the impact would be dependent on the species present in that location in comparison to the rest of the site.

Top Nursery Spinney SNCI, Shermans Wath SNCI and Triangle Copse West of Ashby Road SNCI

The three woodland sites are small and the site boundaries abut the road edge. As such construction on their side of the road could potentially result in the loss or disturbance of approximately 10-15% of these small sites. This is a small area but a high proportion of the sites. Work would likely include the removal of shrubs and would be likely to be situated in close proximity to mature trees. There may be a need to remove trees. Very limited information is provided in the citations for these sites and where information has been provided it has not been updated since 1978. The significance of impacts

upon these sites cannot be determined without a site visit.

Withcall Meadow LWS

Withcall Meadow LWS is similarly a small site which abuts the road. Construction could potentially result in the loss of approximately 40% of the species rich hedgerow or 10% of the unimproved grassland. These are significant proportions of locally important habitats and would be a locally significant negative impact of the proposal.

Walkers Farm SNCI

Walkers Farm SNCI site boundary is set back from the road edge with wider grass verges present along the road in this location. Construction may therefore be able to avoid this site, but this is not confirmed and damage to a boundary hedgerow might be anticipated.

3.1.5 Horncastle to Woodhall Spa

The proposed route from Horncastle to Woodhall Spa will pass through four designated sites;

- Thornton Lodge to Horncastle Dismantled Railway SNCI;
- Woodhall Spa to Thornton Lodge Dismantled Railway SNCI;
- Woodhall Spa Golf Course SSSI; and
- Woodhall Spa to Horncastle Dismantled Railway SNCI.

A further four sites will be in very close proximity (likely within 10m) to this section of route;

- The Wilderness, Roughton LWS;
- Highhall Wood LWS;
- Bracken Wood SNCI; and,
- Woodhall Spa Meadow SNCI.

Woodhall Spa Golf Course SSSI

The route is proposed to follow the dismantled railway line through this SSSI. This is not the line of the Spa Trail. Reference to online aerial photography indicates that a significant track or path is already situated along the former railway for much of this section. It is not known at the time of writing whether any additional construction is required in the SSSI.

This is a large site and the proportion of habitat that would be affected if any construction were required is not considered to be significant. The impacts however cannot be assessed without a site visit to determine what habitats and species are present along the former railway and their importance. Construction through this SSSI will require approval by Natural England but this is not considered likely to be a significant barrier to the proposal.

SNCI along the dismantled railway line

The citations for these three non-statutory sites have not been updated since 1987 and so may not be representative of the current ecological interest of the site. Like the disused railway line described in section 3.1.2, these are thin linear sites that appear to be 10-30m in width. As an existing surfaced path is already present along the Spa Trail it is not anticipated that significant additional construction would be required. As this route is open to the public, no significant impacts are anticipated in terms of long-term disturbance to wildlife from increased public access. A full assessment cannot be made of the significance of impacts at the time of writing due to the limited information available, but are unlikely to pose a significant constraint to the development of the Danelaw MUP.

Adjacent Woodland Sites

The Wilderness, Roughton LWS is an ancient woodland site situated on either side of the dismantled railway line. The railway in this location is listed as woodland habitat on the national inventory of woodland and trees and appears to have a continuous canopy with the woodland from online aerial imagery. Although the railway would not support veteran trees it may support the notable ground flora and fauna associated with the ancient woodland.

Highhall Wood LWS and Bracken Wood SNCI are woodland sites that abut the railway corridor. The railway line in these locations is listed as woodland habitat on the national inventory of woodland and appears from aerial imagery to form a loose canopy woodland edge habitat for these sites. If any construction work is required in the sections of the railway line beside these three designated sites, habitat loss should therefore be considered in relation to those designations in addition to its own SNCI designation. Further site visits and assessment will therefore be required to determine impacts on these sites.

Woodhall Spa Meadow SNCI.

This is a small site located immediately adjacent to the railway line. The descriptions of this site and the adjacent railway line are dated 1987 in the designation citations and may therefore not be accurate. The meadow appears to have been planted with conifers but may still retain some biological interest. The importance of this meadow and the relationship between the railway line and meadow cannot be determined from information available at the current time. The Impact of the proposal on this site cannot therefore be determined without a site visit and a detailed design that specifies whether any habitat loss could be anticipated,

3.1.6 Sites within the wider landscape

Sites located further from the proposed development are unlikely to suffer direct damage or disturbance from users of the path. The only impact that must be considered in more detail is whether the proposal increases habitat fragmentation in the landscape. If the habitat loss along the route causes the loss or degradation of habitat stepping stones or continuous links vital to the network of protected sites, it could affect their ability to preserve populations of species in the landscape.

Although the development will comprise a narrow strip, it is over a very long distance. A significant quantity of habitat will be lost over the 80km from road verges, disused railway lines and canal tow paths. These are in themselves narrow linear habitats and the proportion of habitats lost within them may be very high. These features may also be distinctly different from the surrounding

agricultural landscape. Thus the habitat loss could be very significant. Without a walkover survey to determine habitat types present, this impact cannot be fully assessed but is a notable consideration of the proposal. The different habitat types likely to be present and notable plant species they might support are discussed in more detail in Section 3.2.

3.2 Habitats and Plants

As discussed in Section 3.1.6, a significant amount of habitat loss is anticipated from the proposal due to the length of the route and undeveloped nature of the railway line and canal. The habitats that will be affected along the proposed route are not known at the current time as no field survey or site visit have been conducted. The assessment in this section is based in desk study data only and should not be considered to be comprehensive.

Grassland

Information available at the time of writing indicates that a large proportion of the habitat to be lost might be grassland. The character and diversity of this, and therefore the impact of its loss cannot be assessed without a field survey. It should be noted that some of the sections of grassland to be lost are listed as calcareous grassland. Calcareous grassland is a very important habitat nationally due to its rarity and the number and rarity of species it might support, particularly plants and invertebrates. Five nationally scarce plants associated with calcareous grasslands have been identified as present locally by the data search. This could be a significant impact of the proposal dependent on the current condition of this habitat and the area and proportion that would be lost. A site visit to upgrade this report to a Preliminary Ecological Appraisal will determine the scale of the impact on this habitat and the likelihood of notable species being present. Detailed botanical surveys may be required in this habitat. As discussed in Section 3.1, an assessment of whether grassland loss will further fragment grassland habitats in the landscape will be required.

Disturbed ground

It is also anticipated that disturbed habitats along tracks, footpaths and field edges might be lost. Various notable plant species associated with this habitat have been identified as present locally by this desk study. A field survey is required to identify the likelihood of this being the case and the need for detailed botanical surveys.

Broadleaved woodland

The route passes through sections of land listed as broadleaved woodland. In these areas some loss of trees and ground flora would be anticipated. As this is within a railway corridor and alongside a canal it is considered unlikely that veteran trees would be present (although this cannot be completely ruled out if old hedgerows form the boundaries). Where the route abuts other areas of woodland, a good ground flora may have developed in the secondary woodland. A field survey will identify the extent and significance of impacts in these areas.

Standing water

From Louth to Tetney Lock the route will be situated alongside the Louth Canal. Other ditches and ponds may also be present. As discussed in Section 3.1. Poorly controlled construction can have significant negative impacts on wetland habitats due to siltation and pollution in site run off. However, it is anticipated that these impacts can be readily avoided through adherence to best practice guidelines for working near water.

Invasive weeds

Himalayan balsam is known to be present in two of the designated sites in close proximity to the route and may be present in the proposed works area. Other invasive species such as Japanese knotweed *Fallopia japonica* or giant hogweed *Heracleum mantegazzianum* could also be present. Construction has the potential to spread these species, but it is anticipated that adherence to best practice guidelines would enable this impact to be avoided.

Other habitats

A large variety of other habitats and species may occur along the route such as hedgerows, tall ruderal habitats and scrub. A field survey is vital to determine what habitats are present and which are important to nature conservation.

3.3 Fauna

3.3.1 Invertebrates

Without a site visit and assessment of the potential importance of the land within the works footprint to invertebrates, an accurate assessment of the impacts of the proposal on invertebrates cannot be made. Disused railway lines often support important invertebrate habitat. Given the large area of railway habitat that will be affected this is a material consideration of this proposal but will depend on the exact habitats present in the works footprint and elsewhere. Other habitats often important to invertebrates such as calcareous grasslands could also be affected by the proposal.

Further assessment will be required in relation to invertebrates and may include detailed invertebrate surveys. Mitigation measures may be required to avoid important invertebrate habitats and compensate for impacts.

There may be opportunities to enhance the landscape along the route for invertebrates as part of this proposal.

3.3.2 Amphibians

The proposed route will be situated through high quality amphibian habitat and in close proximity to a number of ponds. Whilst no permanent fragmentation of amphibian habitat is anticipated there is a risk of amphibians, including great crested newts, being harmed during construction. Given the very large scale of this proposal, loss of amphibian habitat might be anticipated dependent on the proportion of high quality habitat to be lost within core or important areas for amphibians.

A great crested newt survey will be necessary to determine whether this species might be present in the works footprint. Should this species be present, a mitigation strategy, that may require

a Natural England European Protected Species licence, would be required. It is considered unlikely that the presence of this species would be a major barrier to the creation of this route, but the surveys and mitigation would add additional cost and timing restrictions to the construction.

A walkover survey would also confirm whether habitats suitable for natterjack toad were present along the route. Although this is not considered highly likely at the time of writing, this would be a material consideration of the proposal.

Dependent on the results of further surveys, there may be opportunities to enhance the landscape along the route for amphibians as part of this proposal.

3.3.3 Birds

The proposal will remove and disturb nesting habitat for birds, including habitats that could potentially be used by Schedule 1 bird species. The disturbance of birds can be avoided through the appropriate timing of works. It is considered unlikely that the proposal would result in the permanent loss of a significant proportion of the habitat available for nesting locally except if species very sensitive to disturbance such as honey buzzard nest along the route and the increased activity could make land unsuitable. Further assessment is recommended to determine whether this is the case. Surveys and/or consultation with local nature conservation groups may be required.

3.3.4 Fish

Construction is proposed within 5m of watercourses and water bodies. Poorly controlled construction near the canal or other water bodies could impact fish populations through siltation and pollution events. It is anticipated that these impacts could be readily avoided through adherence to best practice guidelines for working by water.

3.3.5 Mammals

Badger

Where badger setts are located within 30m of proposed construction, there may be the risk of disturbance and damage to setts in contravention of current legislation. Surveys will be required

to determine whether setts are present within 30m and the risk of works breaching current legislation. The presence of such setts would affect the timing and methods of path construction and could require more significant mitigation. Natural England development licences may be required for works to proceed. The proposal is not considered likely to fragment or reduce habitat suitable for badgers. The presence of badgers is unlikely to be a barrier to route creation unless damage to a main sett or many other setts cannot be avoided or sufficiently mitigated.

Bat

The implications for bats of opening the Withcall and South Willingham tunnels have been discussed in Section 3.1. It is anticipated that this is unlikely to be feasible due to the national importance of the roost and alternative routes should be developed to bypass the tunnels. Consideration should also be given to bats that may undertake autumn swarming activity at the tunnels and how bats use the wider railway corridor throughout the rest of the year and in migrating to and from this hibernation site.

Bat roosts present in other structures and trees along the route could potentially be lost if tree removal or structural repairs are required. These will need to be surveyed to determine whether roosts are present. If they are and impacts cannot be avoided, a Natural England licence would be required. It is anticipated that the three criteria discussed in Section 3.1 would be more readily met for other roosts than for the tunnels and their presence would be less likely to form a barrier to route creation although this is dependent on the species, type of roost and number of bats present. Surveys and mitigation will be necessary and would add cost to the project and timing constraints to construction.

It is not considered likely that the path creation would fragment habitat for bats unless significant hedgerow removal were required, for example along the canal. This should be confirmed by a site visit to assess the habitats likely to be retained and lost. Mitigation and compensation measures to maintain the suitability of this route for foraging and commuting bats will be required.

As significant habitat loss is anticipated along some sections of route, an assessment of

whether this might constitute a significant proportion of bat foraging habitat will be necessary from a field survey.

Dormouse

Dormouse are considered only likely to be present in the landscape immediately around Chambers Farm Wood at the current time, although may spread as the population grows. The closest location where work that could affect this habitats suitable for this species is in Stainfield Wood 2.8km from Chambers Farm Wood. The proposal would not significantly fragment dormouse habitats but it is recommended that further assessment is required to determine whether the proposal could risk a contravention of current legislation in this location by harming individuals during vegetation clearance and construction. There may be opportunity through this proposal to improve habitat quality and connectivity for dormice as part of this proposal.

Otter

The proposal will involve construction in close proximity to watercourses and water bodies likely to be used by otter and not currently open to public access. Otter readily habituate to human activity and no long-term impacts would be anticipated on their ability to move through the landscape and use the habitats along the route for foraging. There is however a risk that breeding holts could be situated close to the route. These would be more prone to disturbance during construction and from future path use. It may be that the proposal makes features along the route less suitable for use as a breeding holt. An assessment of the likely presence of features that could be used as holts will be necessary along the Louth Canal and other watercourses close to the route to determine possible impacts. The presence of such features would have timing implications for construction and might require the detailed route design to include mitigation to reduce future disturbance of those features (changes to path location, additional planting etc).

Water vole

It is understood that no long-term alterations to the banks of watercourses or water bodies are proposed, and therefore no long term impacts are

anticipated on the quantity, quality or connectivity of water vole habitat from the proposal. However where works are situated within 5m of the bank of a water course or water body that supports water vole there is a risk of damage to burrows and incidental mortality from construction due to the collapse of burrows. In certain circumstances, dependent on the character of the bank and soils, it may be feasible to work up to 3m from a bank before these impacts would be anticipated. Works are highly likely to be situated within 5m of several watercourses and water bodies, most notably the River Witham and Old River Witham at the west of the route and a large proportion of the Louth Canal. It is anticipated that a 3m wide buffer between works and the toe of the bank should be achievable along much of the Louth Canal but it is not known at the time of writing whether this would be a sufficient buffer zone to protect water vole burrows.

Where only short sections of watercourse are to be affected, the presence of water voles would not be considered likely to be a barrier to route development although the necessary surveys and mitigation measures will add costs to the proposal.

Where the path is situated alongside the Louth Canal the large length of potential water vole habitat that might be affected is a significant consideration of the proposal. If the detailed path design and construction methods cannot protect water voles at their current population status locally, their present could be a barrier to the proposal. Further assessment will be required for water voles although the level of survey needed is dependent on the detailed route design and anticipated impacts.

3.3.6 Reptiles

During construction works reptiles could be harmed in contravention of current legislation. Given the very large scale of this proposal, significant loss of reptile habitat might be anticipated. The path itself would not be considered to constitute a barrier to reptile movements, but if its construction in some locations removed a significant proportion of the reptile habitat in those locations it could further fragment the landscape.

Further surveys are recommended to determine what reptile species are present and their

populations status and to determine whether significant habitat loss or fragmentation would be anticipated from the proposal.

Wherever reptiles are present a mitigation strategy will be required to avoid or minimise the risk of harm to individuals and to ensure no loss of habitat occurs. This requirement would not be a barrier to route creation but would have implications for the timing and cost of works. The methods that would be appropriate would depend on the quantity and quality of habitats to be affected by the proposal.

Further mitigation to minimise and compensate for habitat loss and fragmentation would be required wherever this was identified as an impact. Dependent on the results of further surveys, there may be opportunities to enhance the landscape along the route for reptiles as part of this proposal.

4 Summary of Significant Impacts

A summary of the significant ecological impacts that have been identified for this phase of the proposal are summarised below.

4.1 Nature Conservation Sites

The following impacts have been identified on designated sites;

Bardney Lock to Wragby

- Habitat loss is anticipated in the Old River Witham at Branston Island LWS. The significance will depend on the exact nature of the habitats present within the works footprint. Measures to protect the river from siltation and pollution will also be required.
- The proposal is likely to impact either Snakeholme Pits LWS or Stainfield Wood (Bardney Limewoods SSSI) if the route cannot be situated on the road in this location. The significance will again depend on the exact nature of the habitats present within the works footprint in each site. It is anticipated that the impact on Stainfield Wood might be less severe than Snakeholme pit due to its greater size, however the wood has a greater level of legal protection.
- If the easternmost route option from Apley to Wragby is used, negative impacts are anticipated on Holme Hill Verge LWS. If the west verge is used for the proposal, this site and adjacent good quality grassland would be severely impacted. If the eastern verge was used, there would be no direct impact on the site, but the loss of associated good quality grassland might impact invertebrate and plant populations present in the site. The westernmost route option from Apley to Wragby is therefore preferred.

Wragby to Louth

- The entire railway corridor between East Barkwith (TF 171 810) and Louth (TF 317 857), a length of approximately 17km, has been designated for nature conservation. The proportion of semi-natural habitat within the SNCI and LWS that would be permanently destroyed or damaged by the proposal is very high and without mitigation the impact would be a severe negative one at a local or potentially regional level depending on the exact nature of the habitat that would be lost. These SNCI and LWS receive protection through the planning process. It is only considered likely that the proposed development would be permitted if there were significant compensation and enhancement works undertaken. A site visit and consultation with the local ecologist would be required to determine what actions might be appropriate. Given the scale of the impact, significant offsite habitat creation is likely to be required in appropriate locations alongside the railway in addition to the adoption of a long-term habitat management plan for those areas and the verges of the proposed route for its entire length. If sufficient mitigation and compensation could be undertaken, the associated cost might be prohibitive for this scheme.
- The woodland on the railway adjacent to Benniworth Haven LWS is continuous with that on the designated site and should, as best practice, be considered to be an extension of this site and could support the notable ground flora for which it is designated. Further survey of this section of route will be required to assess the impact on this site.
- The proposal to open Withcall and South Willingham Tunnels SSSI is unlikely to be feasible due to the nationally important bat hibernation roosts present. In order for a licence to undertake this work to be issued it would need to be demonstrated that the project is in the over-riding public interest and that there must be no suitable alternative. The justification of these tests

must be proportionate to the national importance of the roost. If these criteria can be met, the mitigation required to preserve the conservation status of the bats would have significant implications for the cost and timescales of the project. It is recommended that the route is diverted around these tunnels.

- The route is situated through Hubbard's Hill LWS. The impacts on the nature conservation interest of this site are considered likely to be low, however, this will require confirmation by a site visit that looks at the exact habitats to be affected and whether it would lead to any increased disturbance to wildlife using the site.

Louth to Cleethorpes

- The route will be located on a raised embankment immediately adjacent to Thoresby Bridge Pond LWS. Construction in this location will need to be very carefully controlled to protect the LWS.
- One end of the proposed route is at the edge of the Humber Estuary SAC, SPA and SSSI. It is anticipated that the important estuarine habitats would be unaffected and protected during construction. An assessment should be made to determine whether there might be a risk of increased path erosion and habitat damage from this point into the designated site if visitors chose to cycle these potentially unsurfaced routes. Consideration must also be given to whether there would be disturbance impacts on birds using the site and therefore impacts on the SPA. Although this is considered unlikely this must be confirmed subject to a site visit to assess the habitat in this location and consultation with Natural England. If this exact location was considered to be potentially important for the birds using the SPA, and disturbance might be anticipated, further survey and/or mitigation may be required.

Wragby to Horncastle

- The route along the A158 between Wragby and Horncastle has not been confirmed at the time of writing but seven sites are located immediately adjacent to or in close proximity to the road. These include designated road verges which join the A158 on which a low impact might be anticipated, three woodland SNCI and a meadow LWS which might suffer loss or disturbance of a significant proportion of their area and Walkers Farm SNCI which works could potentially avoid or have a low impact upon. Impacts should be considered further once the route is confirmed and a walkover survey has been conducted.

Horncastle to Stenigot

No potential impacts have been identified on designated sites along this route due to its on road location, although this would need to be reassessed should any changes be made to the proposal.

Horncastle to Woodhall Spa

It is not known at the current time whether any construction is required along this section of the route as the Spa Trail is already surfaced. If any additional engineering work is required the following nature conservation sites would need to be considered;

- The entire railway corridor between Horncastle and Woodhall Spa, a length of approximately 9km, has been designated for nature conservation. Impacts on the three SNCI would need to be assessed based on up to date surveys (as the citations are not current) and dependent on the detailed route design,
- The route crosses Woodhall Spa Golf Course SSSI. The proportion of habitat that would be affected if any construction were required is not considered to be significant but is dependent on the habitats and species present in the works footprint. Construction through this SSSI will require approval by Natural England but this is not considered likely to be a significant barrier to the proposal.

- Three woodland sites LWS and SNCI are situated adjacent to the railway line between Horncastle and Woodhall Spa. If construction adjacent to these were required, any habitat loss should be considered in relation to these designated sites and their habitats are continuous with those on the railway line and should be considered as one ecological unit.
- Woodhall Spa Meadow SNCI is a small site adjacent to the railway line. The importance of this meadow and the relationship between habitats on the railway line and meadow cannot be determined from information available at the current time. The impact of the proposal on this site cannot therefore be determined without a site visit.

All Sections of Route

- Designated sites with wetlands and watercourses are situated adjacent to the proposed route in various locations. Best practice guidelines for working near water will need to be followed in close proximity to these sites to protect the aquatic habitats.
- Whilst no direct damage or long-term disturbance on designated sites within the wider landscape are anticipated, further assessment is required to determine whether the proposal increases habitat fragmentation regionally due to the high levels of habitat loss anticipated.

Activities within a SSSI would be subject to Natural England approval. This would only be granted if it could be shown that the features of special interest for which the site was designated would not be affected. Any development through a LWS or SNCI must protect the wildlife conservation interest of that site and provide enhancements wherever possible. Planning permission will not be granted unless this can be shown to be the case.

4.2 Habitats and Plants

A significant quantity of habitat will be lost over the 80km from road verges, disused railway lines and canal tow path. These are in themselves narrow linear habitats and the proportion of habitats lost within them may be very high. These features may also be distinctly different from the surrounding agricultural landscape. Thus the habitat loss could be very significant.

The habitats that will be affected along the proposed route are not known at the current time as no field survey or site visit have been conducted. The following potential impacts have been identified but should not be considered to be comprehensive.

- A large proportion of the habitat to be lost is anticipated to be grassland and is likely to include calcareous grassland, an ecologically important habitat that might support nationally scarce plants identified as present locally by the data search. This could be a significant impact of the proposal dependent on the current condition of this habitat and the area and proportion that would be lost.
- Various notable plant species associated with disturbed habitat have been identified as present locally by this desk study and it is anticipated that disturbed habitats along tracks, footpaths and field edges might be lost.
- The route passes through sections of land listed as broadleaved woodland. In these areas some loss of trees and ground flora would be anticipated. As this is within a railway corridor and alongside a canal it is considered unlikely that veteran trees would be present (although this cannot be completely ruled out if old hedgerows form the boundaries). Where the route abuts other areas of woodland, particularly ancient woodland sites, a notable ground flora may have developed in the secondary woodland.
- From Louth to Tetney Lock the route will be situated alongside the Louth Canal and other ditches and ponds may also be present. Best practice guidelines for working near water will need to be followed to protect this habitat from construction impacts.

- Himalayan balsam is known in the area and other invasive species could also be present. Construction has the potential to spread these species, but it is anticipated that adherence to best practice guidelines would enable this impact to be avoided.
- A large variety of other habitats and species may occur along the route and a field survey is vital to determine what habitats are present and which are important to nature conservation.

4.3 Fauna

- Disused railway lines often support important invertebrate habitat. Given the large area of railway habitat that will be affected this is a material consideration of this proposal but will depend on the exact habitats present in the works footprint and elsewhere. Without a site visit and assessment of the potential importance of the land within the works footprint to invertebrates, an accurate assessment of the impacts of the proposal on invertebrates cannot be made.
- The proposed route will be situated through high quality amphibian habitat and in close proximity to a number of ponds. Whilst no permanent fragmentation of amphibian habitat is anticipated there is a risk of amphibians, including great crested newts, being harmed during construction. Given the very large scale of this proposal, loss of amphibian habitat might be anticipated dependent on the area of habitat to be lost within core or important foraging areas for amphibians. A site survey would also confirm whether habitats suitable for natterjack toad were present along the route. Although this is not considered highly likely at the time of writing, this would be a material consideration of the proposal.
- The proposal will remove and disturb nesting habitat for birds, including habitats that could potentially be used by Schedule 1 bird species. The disturbance of birds can be avoided through the appropriate timing of works. It is considered unlikely that the

proposal would result in the permanent loss of a significant proportion of the habitat available for nesting locally except if species very sensitive to disturbance such as honey buzzard nest along the route and the increased activity could make land unsuitable.

- Construction is proposed within 5m of watercourses and water bodies. Adherence to best practice guidelines for working by water would be anticipated to protect fish populations.
- Surveys will be required to determine whether badger setts are present within 30m and if works will breach current legislation. The presence of setts would affect the timing and methods of path construction and Natural England development licences may be required for works to proceed. The presence of setts is unlikely to be a barrier to route creation.
- The opening the Withcall and South Willingham tunnels is unlikely to be feasible due to the national importance of the bat hibernation roost. Consideration should also be given to bats that may undertake autumn swarming activity at the tunnels and how bats use the wider railway corridor throughout the rest of the year and when migrating to and from this hibernation site.
- Bat roosts may be present in other structures and trees along the route could potentially be lost if tree removal or structural repairs are required. These will need to be surveyed to determine whether roosts are present. If they are, and impacts cannot be avoided, a Natural England licence would be required.
- Dormouse are present locally but unlikely to be present along the route yet. This will need to be re-assessed if a significant time elapses between writing and construction.
- If otter breeding holts are situated close to the route they could be disturbed during construction and from future path use. It may be that the proposal makes features along the route less suitable for use as

a breeding holt. An assessment of the likely presence of features that could be used as holts will be necessary.

- Works are highly likely to be situated within 5m of several watercourses and waterbodies likely to support water voles, most notably the Louth Canal. Where works are situated within 5m of the bank of a water course or water body there is a risk of damage to burrows and incidental mortality from construction due to the collapse of burrows. It is anticipated that a 3m wide buffer between works and the toe of the bank should be achievable along much of the Louth Canal, an assessment must be undertaken to determine if this is a sufficient buffer to protect water voles. If a sufficient buffer cannot be maintained to protect this species their presence might be a barrier to the proposal.
- During construction works reptiles could be harmed in contravention of current legislation. Given the very large scale of this proposal, significant loss of reptile habitat might be anticipated. The path itself would not be considered to constitute a barrier to reptile movements, but if its construction in some locations removed a significant proportion of the reptile habitat in those locations it could further fragment the landscape.

Further surveys will be required in relation to fauna. Where impacts are confirmed the necessary mitigation requirement might add significant cost and timing constraints to the proposal.

5 Recommendations

The following recommendations are made to help develop a detailed design for this project;

- The route should be diverted around Withcall and South Willingham Tunnels SSSI unless there are justifications, proportionate to the national importance of this roost, as to why the project is in the over-riding public interest and that there is no suitable alternative. If this is judged to be the case, consultation and surveys will be required to inform a mitigation strategy to preserve the conservation status of affected bats. Early consultation with Natural England is recommended.
- A field survey should be undertaken to upgrade this report to a full Preliminary Ecological Appraisal (PEA). A full PEA may be able rule out some of the potential impacts identified in this report.
- Further assessment will be required to consider whether impacts could be anticipated on the Humber Estuary SAC, SPA and SSSI through cyclists continuing their journey from Tetney Lock on unsuitable paths and causing erosion to important habitats or from disturbance to birds at the destination point at Tetney Lock. Measures to prevent these impacts will need to be designed into the scheme. Field surveys and consultation will assist this assessment.
- The westernmost route from Apley to Wragby should be used to avoid impacts on Holme Hill Verge LWS. Careful consideration will need to be given to the location of the route between Wragby and Horncastle to minimise impacts on designated sites. Field surveys and consultation with relevant authorities will assist this assessment.
- Careful consideration will need to be given to whether the proposed construction can be achieved without ecological harm to designated sites. Field surveys and consultation with relevant authorities will assist this assessment. Where impacts cannot be avoided, sufficient mitigation and compensation will be required to protect their conservation status.
- Further assessment is required to determine whether the anticipated loss of grassland and other habitats along the proposed route would increase habitat fragmentation and impact the network of designated sites protecting this habitat. Field surveys will be an important part of this assessment.
- An assessment should be made of the route along the Louth Canal to determine whether a sufficient buffer zone can be maintained to protect water voles during construction.
- Further surveys will be required in relation to a variety of protected and notable plant and animal species along the route. A full PEA will be able to advise whether any of the surveys described in this report will not be necessary based on the habitat types present along the route.
- The detailed design will have to include compensation measures to make up for the habitat loss anticipated. The requirements will be determined by the surveys and consultation undertaken. Consideration should also be given to the long-term management of the habitats along the route, particularly any areas of habitat created as compensation for the impacts of the proposal.
- Current planning policy demands that construction projects not only minimise their ecological impact, but provide enhancements wherever possible. Ecological enhancement measures proportional to the scale of the proposal should be built into the detailed design of the scheme. Field surveys and consultation will determine the most appropriate measures for this project.

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Designated Nature Conservation Sites

Table A1.1: Designated Nature Conservation Sites Through Which The Route May Be Situated Bardney Lock to Wragby (Continues)

Name	Location	Description
Old River Witham at Branston Island LWS	TF 104 707	This natural water channel is connected at both ends to its man-made replacement and supports a wide range of aquatic species. Marginal vegetation features tall species including the scarce flowering-rush <i>Butomus umbellatus</i> . Pink water-speedwell <i>Vernica catenata</i> is also present. Woody vegetation is sparse but scattered scrub is present along the channel. Also included in the designation are substantial embankments with species-poor neutral grassland.
Snakeholme Pit LWS	TF 115 716	A mosaic of wetland, neutral grassland, scrub and trees. The large pond supports diverse flora and fauna, including many species of dragonfly and damselfly. The grassland comprises an excellent flora that includes pepper-saxifrage, betony, great burnet and adder's-tongue. The primary reason for establishment of the reserve was conservation of butterflies for which habitat enhancement has been undertaken.
Stainfield Wood South Unit 8 of Bardney Limewoods SSSI and NNR.	TF 117 721	Bardney Limewoods SSSI comprises ten woodland patches representing Britain's greatest concentration of woodlands dominated by small-leaved lime <i>Tilia cordata</i> . Other tree species are frequent in the canopy and wetter areas are dominated by alder <i>Alnus glutinosa</i> . They cover a range of soil types and drainage conditions and therefore have varied ground flora and differing tree and shrub communities. In the low lying wet areas the ground flora is rich in mosses. Lily of the valley <i>Convallaria majalis</i> is locally dominant in sandy locations and some woods support greater butterfly orchid <i>Platanthera chlorantha</i> , herb Paris <i>Paris quadrifolia</i> and bird's nest orchid <i>Neottia nidus-avis</i> . The limewoods are also known for their butterfly populations including white admiral <i>Limenitis camilla</i> , dingy skipper <i>Erynnis tages</i> , grizzled skipper <i>Pyrus malvae</i> , purple hairstreak <i>Favonius quercus</i> , brown hairstreak <i>Thecla betulae</i> and scare moths. Badgers <i>Meles meles</i> , four bat species and breeding woodcock <i>Scolopax rusticola</i> and nightingale <i>Luscinia megarhynchos</i> and nationally important heronries are also present. Stainfield Wood South is one of these woodland patches and is considered to be in unfavourable condition due to proportion of conifers, lack of ancient trees and low understorey cover but is recovering.
Holme Hill Verge SNCI	TF 133 765 (adjacent to eastern Apley to Wragby Route Option only)	Good quality semi-improved grassland. A 1983 survey identified pignut <i>Conopodium majus</i> , common spotted orchid <i>Orchis mascula</i> and cowslip <i>Primula vulga</i> .
Shepherds Farm Road Verges SNCI	TF 120 769 Adjacent to Western Apley to Wragby Route Option (550m from eastern route).	Neutral grassland in verges with woodland species along hedgerow and damper patches. A survey in 1978 recorded goldilocks <i>Ranunculus auricomus</i> , small reed <i>Calamagrostis epigeios</i> , pignut <i>Conopodium majus</i> and greater burnet saxifrage <i>Pimpinella major</i> in the verge.
Louth to Bardney disused railway SNCI	Various sections along the route between TF 171 810 and TF 317 857	Four sections of the disused railway formation, approximately 20% of which has been incorporated into arable land. The remainder comprises grassland with scrub. The designation states that between South Willingham and Stainfield Wood there are no species or habitats of particular interest although devil's bit scabious <i>Succisa pratensis</i> and reed canary grass <i>Phalaris arundinacea</i> occur outside Stainfield Wood.
Lincolnshire Wolds AONB	TF 198 829 to TF 323 864	The route between South Willingham and Louth lies within the Lincolnshire Wolds AONB. The primary purpose of the AONB is to conserve and enhance natural beauty. Common objectives for AONB to achieve this are to support the economic and social wellbeing of local communities, promote public understanding and enjoyment of them and promote its natural services, such as the provision of clean air. This AONB is characterised by rolling chalk hills which supports sheep farming in the valleys and on steeper slopes unsuitable for arable land. Some of the grassland and abandoned chalk pits support rare flowers and insects and the area includes mixed woodlands with traditional oak ash and hazel coppice. The rural economy is based on arable farming and mineral extraction. The villages are increasingly used by commuters working in Louth, Grimsby and Market Rasen. There is recreation demand for walking, hunting, shooting and driving for pleasure.
Withcall and South Willingham Tunnels SSSI	TF 213 828 and TF 265 823	Two disused, brick built, railway tunnels with a range of internal microclimates that make them suitable for hibernating bats. These hibernacula are nationally important and examples of such large hibernacula are rare in the East Midlands. Both tunnels are used by stable populations of hibernating Daubenton's <i>Myotis daubentonii</i> , Natterer's bats <i>Myotis natterii</i> , Brandt's bats <i>Myotis brandtii</i> , whiskered bats <i>Myotis mystacinus</i> and brown long-eared bats <i>Plecotus auritus</i> . One entrance to Withcall Tunnel is gated but entrances are otherwise not secured but human activity is not known to be causing disturbance. The description of the unit says that comprehensive temperature logs have been kept in South Willingham Tunnel and plans were noted for similar temperature logging to occur in Withcall Tunnel in the information provided. This SSSI is in favourable condition.

Table A1.1: Designated Nature Conservation Sites Through Which The Route May Be Situated Bardney Lock to Wragby (Continued)

Name	Location	Description
Benniworth Haven Cuttings SSSI	TF 226 822 and TF 234 821	Site designated for geological reasons only and in favourable condition.
Benniworth Haven Disused Railway LWS	TF 229 822 and TF 233 821	The site encompasses cuttings, embankments and flat areas. Cuttings are characterised by neutral grassland. The sandstone outcrops are rabbit-grazed and sparsely vegetated. These support large populations of a number of specialised plants, such as bird's-foot <i>Ornithopus perpusillus</i> , thyme-leaved sandwort <i>Arenaria serpyllifolia</i> and early hair-grass <i>Aira praeoox</i> . Also present are wavy hair-grass <i>Deschampsia flexuosa</i> , fern-grass <i>Catapodium rigidum</i> , squirrel-tail fescue <i>Vulpia bromoides</i> and small nettle <i>Utricularia multifida</i> . Less diverse habitats supporting rank vegetation are also present, as are areas of woodland and scrub.
Hallington Withcall Disused Railway SNCI	TF 269 828 to TF 292 846	Railway formation with small grass verges, dominated in part by tor grass <i>Brchypodium pinnatum</i> and tall herbs. Species richness increases west towards Withcall where the verges become more overgrown and include common spotted orchid <i>Dactylorhiza fuchsia</i> , centaury <i>Centaureum erythraea</i> and calcole species such as hoary plantain <i>Plantago media</i> .
Hallington to Withcall Disused Railway East LWS	TF 292 846 to TF 304 851	The site is predominantly neutral grassland which supports a variety of species including some calcicole species in the west of the site such as tor grass <i>Brachypodium pinnatum</i> . The margins of the formation support trees and shrubs and a small cutting at western end supports woodland species such as woodruff <i>Galiium odoratum</i> , bluebell <i>Hyacinthoides non-scripta</i> and hairy brome <i>Bramopsis ramosa</i> .
Hubbard's Hills LWS	TF 315 864	A section of the River Ludd Valley including managed parkland along the river which is subject to high recreational pressure. The valley slopes are wooded with areas of good chalk woodland flora with species such as sanicle <i>Sanicula europaea</i> harebell <i>Campanula rotundifolia</i> and soft shield fern <i>Polystichum setiferum</i> .
Hoop Lane Road verges LWS and RNR	TF151760	1.9km of roadside verge supporting a moderately diverse neutral/calcareous grassland, overgrown ditches and hedgerows that include mature standard trees.
Withcall Meadow LWS	TF160768	A 1.9acre triangular hay meadow created in 1937 now comprising unimproved neutral grassland and surrounded by species-rich hedgerows.
Walkers Farm SNCI	TF 172 758	Lowland neutral grassland
Baumber Road Verges LWS	TF194754	0.8 km roadside verge supporting moderately diverse neutral grassland and hedges.
Top Nursery Spinney SNCI	TF 228 734	A small copse.
Shermans Wath Copse SNCI	TF 242 714	A small copse supporting a rookery.
Triangle Copse south of West Ashby Road SNCI	TF 241 711	A small copse.
Thornton Lodge to Horncastle Dismantled Railway SNCI	TF 257 681 to TF 255 694	The surveys in 1982 and 1987 described this section of disused railway line as having little floristic interest and being used as a farm track and being dominated by grass, bare ground and scrub.
Woodhall Spa to Thornton Lodge Dismantled Railway SNCI	TF 200 634 to TF 257 681	The surveys in 1982 and 1987 described this section of disused railway and the adjacent SNCI as grass, scrub and woodland edge along the SPA/Viking Trail. Species noted include midland hawthorn <i>Crataegus laevigata</i> , broom <i>Cytisus scoparius</i> , heather <i>Calluna vulgaris</i> and twayblade <i>Listera ovate</i> . Previous owners are noted to have recorded hare's-foot clover <i>Trifolium arvense</i> , basil thyme <i>Acinos arvensis</i> , centaury <i>Centaurea erithraea</i> and bell heather <i>Erica cinerea</i> .
Woodhall Spa Golf Course SSSI	TF 210 643	A 5Ha site that supports diverse heathland with an exceptional lichen community in the rough areas of the golf course. Damper areas are present, particularly in the northwest, which support species notable in the county such as marsh gentian <i>Gentiana pneumonanthe</i> , cross-leaved heath <i>Erica tetralix</i> , heath rush <i>Juncus squarrosus</i> , bog pimpernel <i>Anagallis tenella</i> , lousewort <i>Pedicularis sylvatica</i> and round-leaved sundew <i>Drosera rotundifolia</i> . Woodland and areas of gorse are also present creating a more varied habitat structure across the site and also support a rich bryophyte flora..
Woodhall Spa to Horncastle Dismantled Railway SNCI	TF 196 633 to TF 200 634	The surveys in 1982 and 1987 described this section of disused railway and the adjacent SNCI as grass, scrub and woodland edge along the SPA/Viking Trail. Species noted include midland hawthorn <i>Crataegus laevigata</i> , broom <i>Cytisus scoparius</i> , heather <i>Calluna vulgaris</i> and twayblade <i>Listera ovate</i> . Previous owners are noted to have recorded hare's-foot clover <i>Trifolium arvense</i> , basil thyme <i>Acinos arvensis</i> , centaury <i>Centaurea erithraea</i> and bell heather <i>Erica cinerea</i> .

Table A1.2: Designated Nature Conservation Sites Situated Within Approximately 50m of the Proposed Route (Continues)

Name	Proximity	Location	Description
South Delph LWS	<10m	TF 092 707	<p>This site comprises the South Delph drain, embankments and associated drains and is up to 100m wide and 9.5km long. A variety of wetland habitats are present, supporting a large number of associated plants, a wide range of invertebrates, birds and other fauna including grass snake.</p> <p>The South Delph drain is slow-moving, nutrient-rich, deep and supports a flora typical of such rivers. Himalayan balsam <i>Impatiens glandulifera</i> has been noted in two locations. Grassland around the South Delph drain is limited in diversity, although of some note is presence of corn parsley <i>Petroselinum segetum</i> on an embankment slope.</p> <p>The associated drains are shallow, small watercourses with clear water and abundant vegetation which varies in composition from South Delph drain. The eastern end of Silkholmes Drain lies on acidic peat and supports an unusual flora including a large population of greater bladderwort <i>Utricularia vulgaris sens. str.</i>, a very rare species in Lincolnshire. This drain becomes more species rich to the west.</p>
Inner Drains at Branston Island LWS	<10m	TF 103 707	<p>This site comprises a 2km long drain at the foot of an embankment alongside the Old River Witham and other short stretches of shallow drain and small lake at the southern end of Branston Island. Aquatic vegetation includes large populations of rigid hornwort <i>Ceratophyllum demersum</i> and ivy-leaved duckweed <i>Lemna trisulca</i>. Water fern <i>Azolla filiculoides</i> is abundant on the lake, but scarce or absent elsewhere. A diverse flora is present along the edges of these waterbodies, predominantly tall semi-aquatic species. Drier land on the drain margins includes tall ruderal species, trees and shrubs</p>
Foxhall Woods LWS	<10m	TF 110 737	<p>Although extensively re-planted with conifers and beech, this wood supports interesting ground flora species particularly in the more species-rich northern half. Damp grassland occurs in two large north-south strips, one on each side of, and connected to, the central ride. Wild service tree <i>Sorbus torminalis</i> is present in one location.</p>
Great West Wood, New Plantation and Little West Wood LWS	<10m Western Apley to Wragby Route Option	TF 111 764	<p>Woodland adjacent to Bardney Limewoods SSSI which also has frequent small leaved limes as well as conifers. Botanically rich rides which include wetland species such as remote sedge <i>Carex remota</i>, lesser spearwort <i>Ranunculus flammula</i> and ragged robin <i>Lychnis flos-cuculi</i>. Drier areas also included interesting flora including heath speedwell <i>Veronica officinalis</i> and slender St.John's-wort <i>Hypericum pulchrum</i>.</p>
College Woods: Unit 6 of Bardney Limewoods SSSI and NNR.	<10m	TF 122 755	<p>This is a unit of the Bardney Limewoods SSSI and NNR (previously described) and is considered to be in unfavourable condition due to proportion of conifers but is recovering. Some of the rides are noted to have a range of interesting species although elsewhere the ground flora is sparse.</p>
Ings Plantation SNCI	50m	TF 177 815	<p>Deciduous woodland</p>
Benniworth Haven LWS	<10m	TF 227 824	<p>A wooded valley with two large ponds within a marshy area. The woodland varies in its floral composition as it includes damp and dryer areas and some conifers. The rides and meadows are noted to contain occasional rides and meadows. The ponds have sparse marginal flora due to steep banks and shading from trees. Himalayan balsam is locally frequent.</p>
Benniworth House Farm LWS	<10m	TF 230 828	<p>This 24.5Ha site supports dry acidic grasslands and wet grasslands and marshes, listed as purple moor grass on national habitat inventories. These include areas with diverse swards and notable species. Of particular note are fen bedstraw <i>Galium uliginosum</i> and water avens <i>Geum rivale</i> and an abundance of brown sedge <i>Carex chordorrhiza</i> and bottle sedge <i>Carex rostrata</i> in the north of the site: the latter was recorded nowhere else in the Wolds during 2005 survey. Ponds are also present in the south east of the site and support common frog <i>Rana temporaria</i>, grass snake and many dragonflies and damselflies.</p>
River Bain near Pawson's Pond LWS	<10m	TF 233 818	<p>The River Bain and associated wetland habitats including Pawson's Pond, two marshy areas and a pasture which includes wet and interesting patches. Woodland and scrub are also present.</p> <p>The river is large and bordered by trees, shrubs and coarse vegetation. Shaded and unshaded habitats are present and it supports a range of aquatic and marginal species such as water-starwort <i>Callitriche stagnalis</i>, branched bur-reed <i>Sparganium erectum</i> and water figwort <i>Scrophularia auriculata</i>. The most diverse marshland is further from the main river and includes areas around the tributaries. The marshes include areas of note for the presence of brown sedge and their diversity. Grass snake has been recorded at this site.</p>
Ivyhouse Farm LWS	<10m	TF 232 826	<p>A 10.5 Ha site comprising three pastures that are generally botanically-poor but have extensive marshy fringes by the river and a series of low banks supporting acidic, dry, sandy grassland. The marsh and acidic sandy banks support diverse flora. Fauna records included barn owl <i>Tyto alba</i>, grass snake and toad.</p>

Table A1.2: Designated Nature Conservation Sites Situated Within Approximately 50m of the Proposed Route (Continues)

Name	Proximity	Location	Description
Raithby Beck, Raithby LWS	<10m	TF 310 848	Excellent chalk stream and tributaries, standing water and adjacent neutral pasture and marshy habitats. The marginal and marshy areas support species such as celery-leaved buttercup <i>Ranunculus sceleratus</i> , jointed rush <i>Juncus articulatus</i> , and square-stalked St John's-wort <i>Hypericum tetrapterum</i> . Species within the river include water-starwort and stream water-crowfoot <i>Ranunculus penicillatus</i> . Shady stretches of the beck are of less interest and many introduced plants are also present. The beck flows through two artificial shallow, silty lakes at the northern end of the site, up to the disused railway line. Whilst this adds habitat diversity, it has eliminated a stretch of potentially excellent chalk stream. The richest drier grassland occurs on small banks next to the stream and includes greater burnet-saxifrage <i>Pimpinella major</i> , harebell <i>Campanula rotundifolia</i> and lady's bedstraw <i>Galium verum</i> .
Thoresby Bridge Ponds LWS	<10m	TF 337 996	Two ponds on separate site. The northern of these is an angling lake with extensive marginal vegetation comprising common species. Associated habitats include swamp, overgrown hedgerow and disturbed habitats. The southern site comprises a fishing lake, and some marginal vegetation (again comprising common species) and mown grass. Some willow <i>Salix sp.</i> scrub present at its southern end.
New Delights SNCI	Within 50m other side of canal	TA 333 008	Coastal and floodplain grazing marsh, semi-improved grassland with ditches.
Tetney Flood SNCI	Within 50m other side of canal	TA 328 001	A well vegetated ditch with a varied flora including plants that suggest slightly brackish conditions such as sea club-rush <i>Scirpus maritimus</i> but also many species typical of fresh water such as water plantain <i>Alisma plantago</i> aquatic and lesser water parsnip <i>Berula erecta</i> .
Humber Estuary Ramsar, SAC, SPA and SSSI and Cleethorpes Sands LNR The boundaries of these four designations are the same in the area closest to the route	<10m	Adjacent to site at TA 352 035	Extensive wetland and coastal habitats with the second highest tidal range in Britain. Approximately a third of the estuary is exposed mud and sand flats at low tide. The inner estuary includes reedbeds, salt marsh and grazing marsh and some areas of low sand dunes, marshy slacks and brackish pools. The SSSI unit located adjacent to the proposed works (Unit 169) is described as littoral sediment. National habitat inventories show it to be dominated by saltmarsh with intertidal mud present along the Waith Beck. The SAC designation is primarily for are the estuary (the second largest coastal plain estuary in the UK) and the extensive mud and sand flats not covered by seawater at low tide. Other Annex I habitats also present include sandbanks, coastal lagoons, <i>Salicornia</i> and other annuals colonizing mud and sand, Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>) and various different types of dunes. Annex II species that are present but not a primary reason for site selection included sea lamprey <i>Petromyzon marinus</i> , river lamprey <i>Lampetra fluviatilis</i> and grey seal <i>Halichoerus grypus</i> . The SPA designation reflects the international importance of this area for birds. Internationally important populations of little tern <i>Sterna albifrons</i> and marsh harrier <i>Circus aeruginosus</i> , Annex I bird species, breed here. Over winter it supports important populations of four Annex I bird species; bar tailed godwit <i>Limosa laponica</i> , bittern <i>Botaurus stellaris</i> , hen harrier <i>Circus cyaneus</i> and over 11% of the UK overwintering golden plover <i>Pluvialis apricaria</i> . It is also important in winter for the migratory dunlin <i>Calidris alpina iber</i> , shelduck <i>Tadorna tadorna</i> , redshank <i>Tringa tetanus</i> and knot <i>Calidris canutus</i> . The overwintering knot population represents nearly 10% of the wintering population from northeastern Canada, Greenland, Iceland and Northwest Europe. The site is also used on passage by redshank and sanderling <i>Calidris alba</i> . The SSSI designation also notes that scarce and threatened invertebrates and at least ten nationally scarce vascular plant species are present.
The Wilderness, Roughton LWS	<10m	TF232657	4.7Ha ancient woodland. The woodland is damp and contains several ponds and ditches. Herb Paris <i>Paris quadrifolia</i> and early purple orchid <i>Orchis mascula</i> have been recorded at the site.
Highhall Wood LWS	<10m	TF218654	100
Bracken Wood SNCI	<10m	TF 200 643	A 72Ha woodland site, which is approximately two thirds conifer plantation. Small leaved lime <i>Tilia cordata</i> coppice remains in the northeast corner. Wide grassy rides with ditches are present throughout which are more botanically interesting. Wild service tree <i>Sorbus torminalis</i> has been noted in a hedgerow in this site.
Woodhall Spa Meadow SNCI	<10m	TF 198 635	An 0.5Ha site described in 1987 as an unimproved grassland supporting a wide variety of species including bugle <i>Ajuga reptans</i> , pignut <i>Conopodium majus</i> , great burnet <i>Sanguisorba officinalis</i> and betony <i>Stachys officinalis</i> . This land is listed on national habitat inventories as conifer woodland with lowland meadow also present. Online imagery suggests that it is partially planted with conifers but that remnants of a more interesting grassland may remain.

- Binding Margin -

Table A1.2: Designated Nature Conservation Sites Situated Within Approximately 50m of the Proposed Route (Continued)

Name	Proximity	Location	Description
Horncastle Canal Grassland LWS	30m	TF256686	A 11.6 ha seasonally damp grassland site bordered by small drains and the Horncastle Canal that is apparently now rarely flooded. Ephemeral pools are present with more diverse flora including a significant population of adder's-tongue fern <i>Ophioglossum vulgatum</i> . A large crack willow <i>Salix fragilis</i> , scattered scrub and drier grassland are also present. Himalayan balsam and barn owl <i>Tyto alba</i> have also been recorded here.
Disused Railway Line Woodhall Spa SSSI	40	TF 185 624- TF 190 628	A 1.5km long, 5m wide strip of scrub, grassland, tall ruderal vegetation and bare ground, parts of which have been incorporated into gardens. A footpath is present.
River Bain, Shearman's Wath Bridge to Horncastle SSSI	50m	TF 258 695	Part of the River Bain.

Table A1.3: Designated nature conservation sites situated 50m – 1000m from the proposed route (continues)

Name	Proximity	Location	Description
Roughton Scrubs SNCI	TF 231 653	70m	No information provided. Looks like woodland from map
Abbey Lane to Kirkstead Disused Railway Line SNCI	TF 178 619 to TF 185 625	70m	A short section of the disused railway dominated by scrub. At the time of the survey (1987) areas of grassland were recorded supporting common whitlow grass <i>Erophila verna</i> , carrot <i>Daucus carota</i> and perforate St.John's-wort <i>Hypericum perforatum</i> .
Banovallum House LWT	TF 257 695	80m	The Lincolnshire Wildlife Trust Headquarters including a wildlife garden, walled garden, field of good quality semi-improved grassland and 200m of the River Bain.
Pleasure House Wood SNCI	TF 128 761	100m	Fragments of broadleaved woodland within a plantation with a diverse ground flora.
Benniworth Pasture LWS	TF 224 827	100m	A large botanically poor pasture dominated this site with a patch of mature hawthorn scrub resent. A prominent south facing cliff line is present in the central-southern part which supports a sparse sward on thin soil that is diverse and acidic in character. Species present include parsley-piert <i>Apera spica-venti</i> , bird's-foot, field mouse-ear <i>Cerastium fontanum</i> , and meadow saxifrage <i>Saxifraga ister as</i> .
Big Rous Holt SNCI	TF 236 652	110m	Deciduous and mixed woodland.
Old Corner Moor Plantation SNCI	TF 230 725	130m	Woodland described as dominated by elm <i>Ulmus sp.</i> in 1978 when last surveyed. Neighbouring field margins included uncommon arable weeds such as night flowering catchfly <i>Silene noctiflora</i> , small toadflax <i>Chaenorhinum minus</i> , venus looking glass <i>Legousia hybrid</i> and a con salad <i>Velarianella denata</i> .
Cream Poke Wood LWS	TF 123 744	150m	Dense woodland with a fringe that supports more diverse ground flora.
Badgermoor Wood LWS	TF 136 769	150m	Woodland with a large lake and two adjacent ponds. The woodland supports a good population of herb-Paris and goldilocks <i>Ranunculus auricomus</i> , and a reported twayblade <i>ister asp</i> . Site also known to support breeding badgers.
Bracken Wood, Woodhall Spa LWS	TF201644	150m	38Ha ancient woodland with semi-natural and replanted sections. Flora varies dependent on the soil type, which changes across the site. Streams, ditches and woodland banks support a more diverse and interesting flora and the site supports a good bryophyte flora.
Witham Way SNCI	TF 189 599 to TF 200 577	150m	Dismantled Lincoln to Boston Railway supporting varied habitats and flora. The River Witham is located adjacent to the railway for much of its route.
Silver Lines Meadows	TF 260789	150m	Unimproved grassland with dry and marshy communities supporting calcareous species.
Witham Way LWS	TF144660 – TF187602	160m	7.4km linear site dominated by coarse grassland parallel to the River Witham. Areas of more diverse grassland are present along the route. Other habitats present include woodland, scrub and species rich hedgerows.
New Corner Moor Plantation SNCI	TF 231 722	180m	Ash dominated woodland with a corner which is wetter and supports species typical of damp habitats.
Camshaws Plantation LWS	TF 119 743	200m	Plantation woodland from which the conifers have been removed. The remaining woodland has good structural diversity but poor ground flora except along the wet rides where common fleabane <i>Pulicaria dysenterica</i> and water avens are present.
Coalpit Wood LWS	TF196636	200m	3.7Ha woodland with a spring, standing and running water and ditches. The woodland includes veteran trees and supports a reasonably diverse bryophyte flora.
Goltho Pond and Meadow LWS	TF 117 772	200m from western Apley to Wragby Route Option 750m from eastern route.	A linear lake with botanically rich fen, good grassland and scattered trees.

Table A1.3: Designated nature conservation sites situated 50m – 1000m from the proposed route (continues)

Name	Proximity	Location	Description
Black Plantation LWS	TF 117 760	200m to western Apley-Wragby Route 500m to Eastern Route	Mixed woodland with a large pond complex, glades and ditch.
Firsby to Louth Dismantled Railway SNCI	TF 337 872	230m	Contains a mix of scrub, woodland and grassland including richer areas of grassland in the shallow cuttings. This citation is dated 1977 with a noted stating that it had been rejected, but no further explanation.
Stainfield Wood North Unit 7 of Bardney Limewoods SSSI and NNR.	TF 112 730	250m	This is a unit of the Bardney Limewoods SSSI and NNR (previously described) and comprises young woodland with no ancient trees and is in unfavourable but recovering condition.
Lodge Covert SNCI	TF 178 808	300m	A predominantly coniferous woodland with areas of deciduous woodland and young trees.
Pokes Hole Verge LWS	TF 297 851	300m	Calcareous grassland.
Frisby to Louth Dismantled Railway SNCI	TF 338 870	300m south	Formation includes a variety of habitats and features, the most notable of which are in shallow cutting south of Louth and near Authorpe. Species of note present included Dyer's greenweed <i>Genista tinctoria</i> , yellow-wort <i>Blackstonia perfoliata</i> and spiny restharrow <i>Ononis spinosa</i> .
Triangle Copse SNCI	TF 238 708	330m	A small copse dominated by lime <i>Tilia x vulgaris</i>
College Wood North East LWS	TF 124 756	350m	Diverse woodland noted for its large population of small-leaved lime and network of rides with diverse marshy grasslands. The eastern boundary is particularly rich, supporting a group of wild service-trees and plentiful spindle <i>Euonymus europaeus</i> , red currant <i>Ribes rubrum</i> and midland hawthorn <i>Crataegus laevigata</i> .
Hallbush Wood LWS	TF 137 792	350m	Woodland, with remnant ancient woodland species, dominates this site. Its wide rides hold vast populations of ragged robin <i>Lychnis flos-cuculi</i> and sedges. Pale sedge <i>Carex pallescens</i> and water avens are noted to occur here. Large open areas with wet grassland and two small lakes are also present.
Withcall Road Verge North LWS	TF 280 839	350m	Calcareous grassland.
Old River Bain Grassland SNCI	TF 261 678	350m east	This site contained water features and grassland but its ecological interest was described as 'destroyed' in 1992.
Great West and Cocklode Woods: Unit 5 of Bardney Limewoods SSSI and NNR.	TF 105 765	350m from western Apley to Wragby Route Option 650m from eastern route	This is a unit of the Bardney Limewoods SSSI and NNR (previously described) and includes a conifer block with few ancient trees but does have very ground flora with patch of herb Paris present. It is considered to be in unfavourable but recovering condition.
Ash Holt, Roughton LWS	TF230661	370m	7.4Ha ash <i>Fraxinus excelsior</i> wood with a hazel <i>Corylus avellana</i> coppice understory. The ground flora contains a range of ancient woodland indicator species. Nettle-leaved bellflower <i>Campanula trachelium</i> , remote sedge <i>Carex remota</i> , sweet woodruff <i>Galium odoratum</i> and hairy st john's-wort <i>Hypericum hirsutum</i> are all present and water avens <i>Geum rivale</i> dominates 1ha in the northern part of the wood. A golden variegated form of water avens is also present. Pignut <i>Conopodium majalis</i> occurs in large patches on the edge of the area of water avens. Ponds are also present and ditch banks support a bryophyte community

Table A1.3: Designated nature conservation sites situated 50m – 1000m from the proposed route (continues)

Name	Proximity	Location	Description
Ostlers Plantation North SNCI	TF 213 635	370m	Oak and birch woodland with some conifer sections. More interesting species present in the understorey and rides including lily of the valley <i>Convallaria majalis</i> , climbing fumitory <i>Corydalis claviculata</i> , narrow buckley fern <i>Dryopteris carthusiana</i> and mountain fern <i>Thelypteris oreopteris</i> .
South Willingham Meadow LWS	TF 197 834	400m	A semi-improved neutral meadow adjoining and draining into the adjacent South Willingham Pond Field LWS. The main habitats are damp grassland, marsh and fen. Other habitats include neutral and improved grassland, tussocky vegetation, steep slopes, ridge and furrow, seasonally damp areas and hedgerows.
South Willingham Pond Field LWS	TF 197 834	400m	This field supports a good damp/neutral grassland flora, a pond and is bound by hedgerows. The pond is covered by broad-leaved pondweed <i>Potamogeton natans</i> . Fungi recorded include the unusual funeral bell <i>Galerina marginata</i> .
Red Hill SSSI	TF 264807	400m	Species rich chalk grassland which also supports a large and diverse invertebrate fauna.
Grainthorpe Grassland LWT	TF 363 967	450m	Three fields of neutral grassland bound by ditches and hedgerows. The margins of the fields are the most diverse.
Wragholme Ings LWT	TF 365 970	450m	No information provided.
Wragholme Greenlanes Ings Lane LWS	TF 365 974	500m	Botanically rich neutral grassland, hedgerows and ditches. This site is noted for its importance for butterflies.
Hatton Meadows LWS and LWT	TF166753	500m	4.0 ha of botanically-diverse neutral grassland, some of which is damp. Rich wetland habitat is associated with a stream and pond.
Roughton Moor Road verges SNCI	TF 231 649	500m	Road verges.
Roughton Moor SNCI	TF 218 640	500m	Described as two sandy fields with a former sand pit supporting interesting grassland species in 1978. A note is present on the citation that this site was now a holiday village and authorised for down grading in 1996.
Little Welton Chalkbank LWS	TF 310 870	530m	1.5Ha neutral and calcareous grassland, the latter being on steep south facing slopes including small areas of high quality chalk grassland.
Square Wood SNCI	TF 124 376	550m	Plantation wood with deciduous fringe.
Covenham Reservoir SNCI	TF 345 960	550m	Open water
Roughton Moor Wood Nature Reserve LWT LWS	TF210632	560m	10Ha acidic unmanaged secondary woodland noted for its fern flora. Also contains a stream and ditches.
Donnington Road Verges LWS	TF 208 837	600m	Botanically rich road verges with meadow vetchling <i>Lathyrus pratensis</i> , bird's-foot-trefoil <i>Lotus corniculatus</i> and lady's bedstraw. Also present are field scabious <i>Knautia arvensis</i> , tufted vetch <i>Vicia cracca</i> , downy oat-grass <i>Helictotrichon pubescens</i> , goat's-beard <i>Tragopogon pratensis</i> and common knapweed <i>Centaurea nigra</i> .
Withcall Road Chalk Cutting SNCI	TF 275 845	600m	Road verge with steep chalk cuttings and an interesting calcicole flora.
Thornton Wood LWS	TF227664	600m	Oak and ash dominated woodland with some excellent specimens of small-leaved lime and that is noted to be good for ferns. Good damp grassland is present on the ride and includes herb paris <i>Paris quadrifolia</i>
Ash Holt, Langton LWS	TF 143 763	630m	Small woodland with ancient woodland indicator species. Badger activity and a small shaded pond also noted.
Moors Plantation and Covert LWS	TF 204 839	650m	Mostly coniferous plantation but with veteran specimens of native broadleaved species present and standing and fallen deadwood. Heathland, acid peatland and bracken <i>Pteridium aquilinum</i> were also present.
Hallington Farm Grassland SNCI	TF 278 823	650m	Calcareous grassland

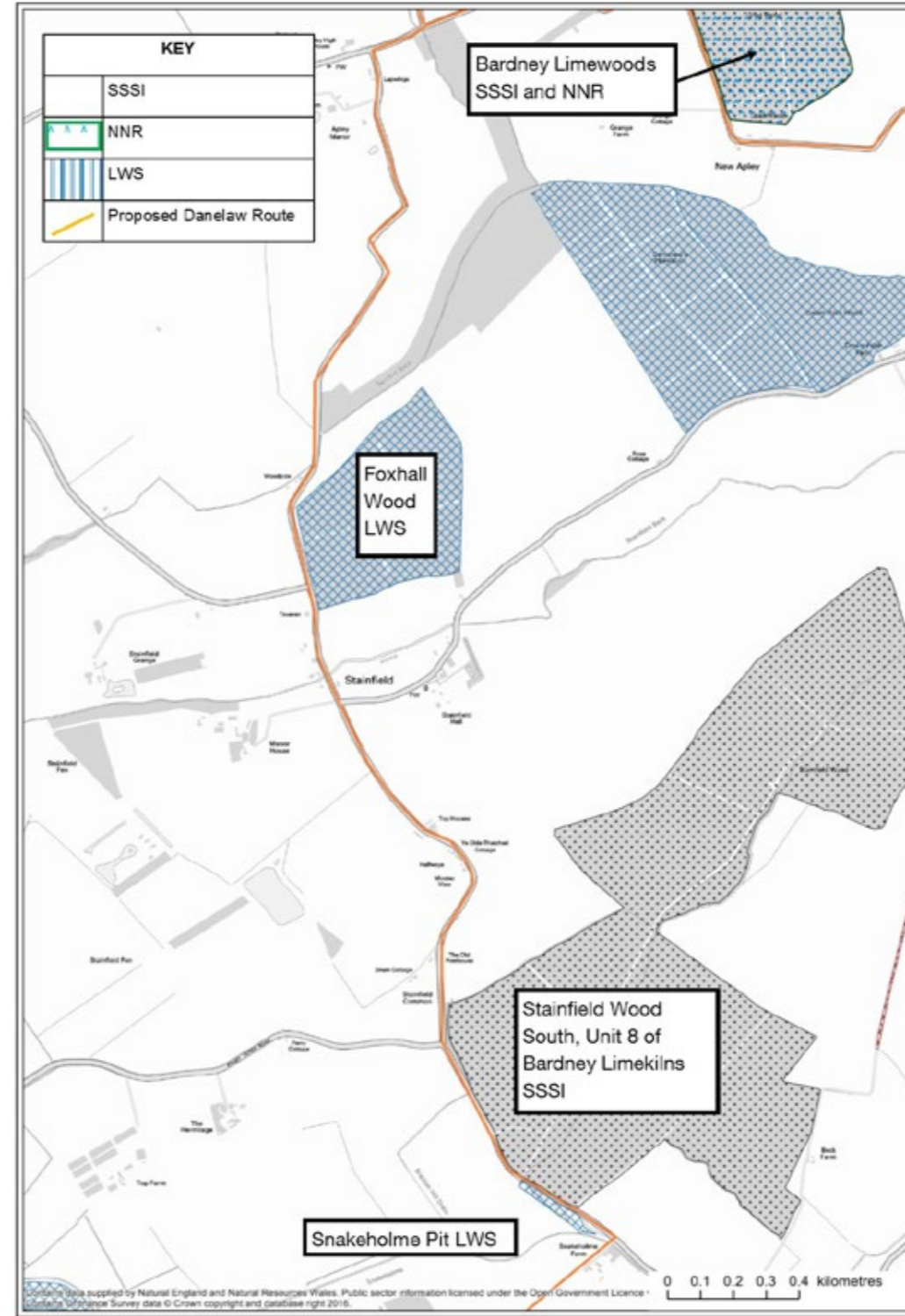
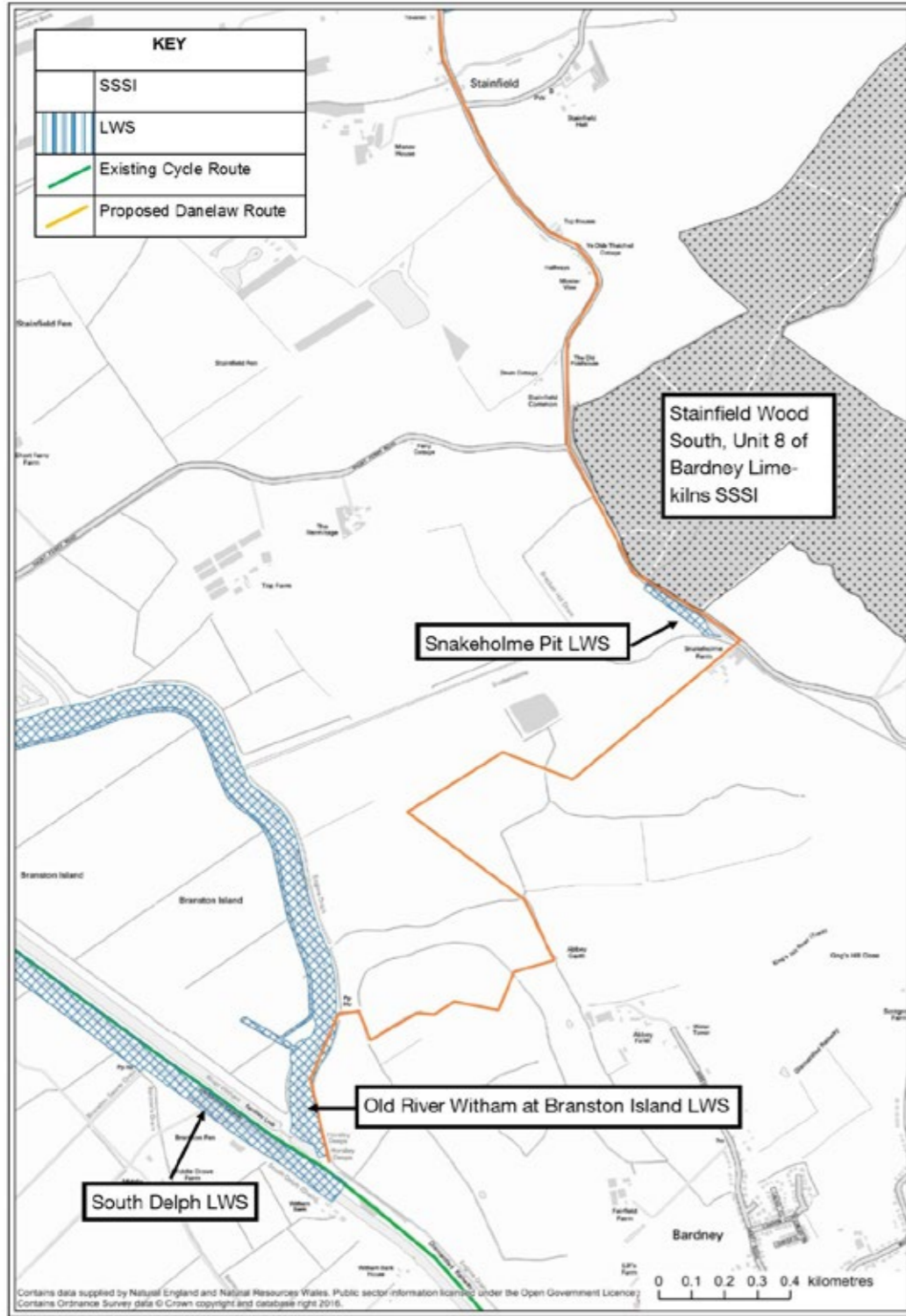
Table A1.3: Designated nature conservation sites situated 50m – 1000m from the proposed route (continues)

Name	Proximity	Location	Description
Scrivelsby Spinnry LWS	TF263668	670m	5.6Ha broadleaved woodland with varied ground flora. Wetter areas are present and a stream runs through the woodland. Badger <i>Meles meles</i> are noted to be active in this wood.
Withcall Road Verges South LWS	TF 292 835	700m	Calcareous grassland.
Hatton Wood (Unit 11 of Bardney Limewoods SSSI and NNR)	TF 164 749	700m	This is a unit of the Bardney Limewoods SSSI and NNR (previously described). Hatton Wood is considered to be in favourable condition, partly due to its low original interest as it had previously been cleared. This is managed on a low intervention basis and has no veteran trees.
Moor Farm SSSI and LWT	TF 221 637	700m	A 47Ha site containing the only lowland raised Sphagnum bog in Lincolnshire. Other uncommon habitats on this site include wet heath and acid marshes. Dry heath and woodland are also present. Various notable plant and invertebrate species are present in this site.
Brick Pits Plantation SNCI	TF 178 803	800m	Deciduous woodland
Black Plantation Springs SNCI	TF 282 850	800m	Deciduous woodland
Whitepits Plantation SNCI	TF 187 816	800m	Deciduous woodland
Kirkby Moor Plantation LWS and Kirkby Low Wood LWT	TF219633	810m	A 21Ha woodland dominated by coniferous plantation. The rides support a damp grassland flora, heathland and seasonally wet areas. The site is good for reptiles, with both adder and slow worm recorded on site and common lizard was noted on adjacent road verges.
Mere Balk Plantation SNCI	TF 223 722	850m	Woodland and green lane.
East Barkwith Ponds SNCI	TF 163 816	900m	Standing ponds with neutral damp grassland.
River Bain northeast of Market Station LWS	TF 233 818	900m	A section of river with good quantities of marginal vegetation, a botanically diverse marsh, semi-improved grassland with a good range of species and woodland.
Hallington Top Road Verges LWS	TF 280 854	900m	Calcareous grassland.
Newcroft Lane LWS	TF 370 971	900m	Moderately diverse grassland, ditches and hedges in verge.
Chamber Plantation LWS	TF152740	950m	190.1 ha Site includes Minting Park and Long Ride dominated by woodland and grassland. Woodland supports a diversity of ferns and the only colony of great wood-rush recorded in the Limewoods project in 2004. Most of the good grassland and wetland habitat within the wood is along the rides. Nightingale and turtle dove have been recorded here.
River Bain Hemingby Bridge to Shearmans Wath Bridge SNCI	TF 249 719	950m	River with limited aquatic flora when surveyed in 1977. Some willow <i>Salix sp.</i> present along the edge but generally the adjacent fields were noted to extend to the bank top when surveyed.
Hemingby Meadow SNCI	TF 236 742	950m	Wet meadow comprising improved grassland bisected by a stream. Likely to be of value to overwintering birds.
Coultas Wood LWS	TF153757	950m	An 8.4 ha replanted woodland with a natural structure. The site also includes field edges sown with neutral grassland
Bardney Meadows SNCI	TF 114 693	970m	Waterlogged horse paddocks, overgrazed at time of survey in 1983.
Cow Lane Verge SNCI	TF 179 746	970m	Verges with neutral grassland with wet areas that include water avens <i>Geum rivale</i> and goldilocks <i>Ranunculus auricomus</i> .

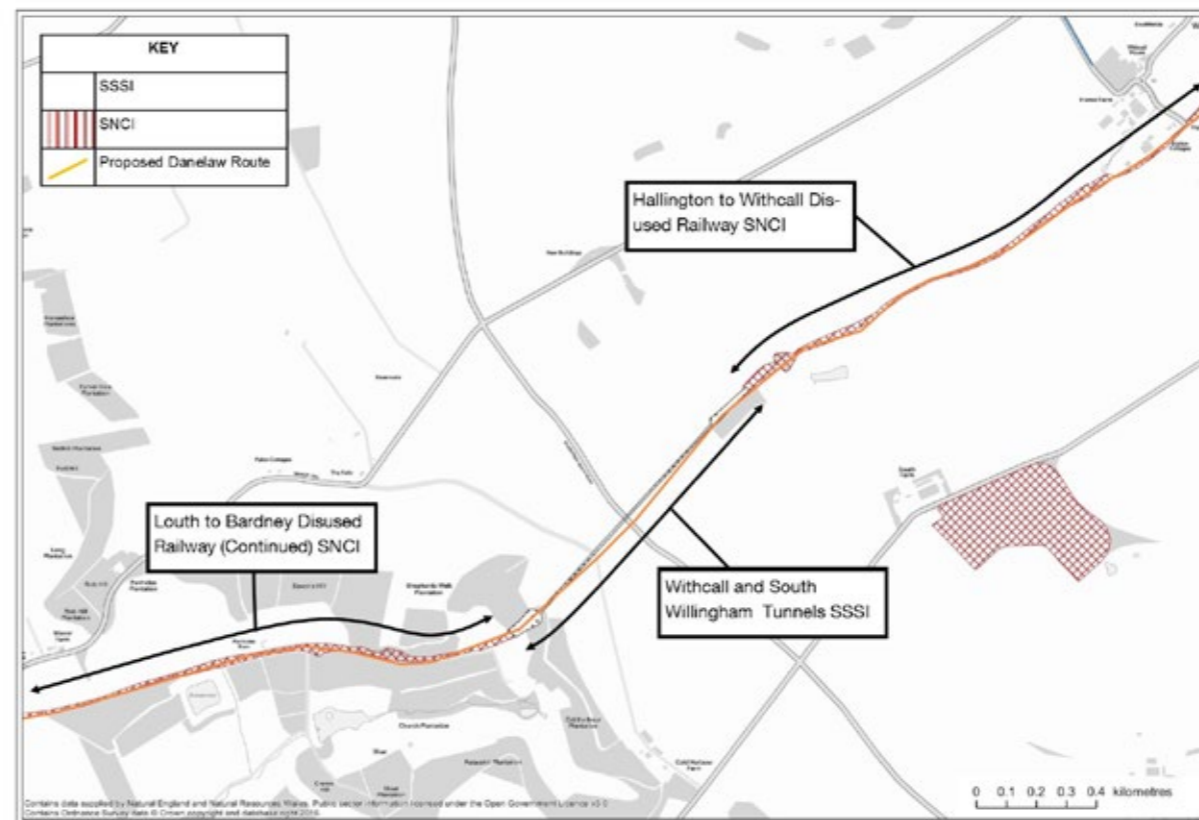
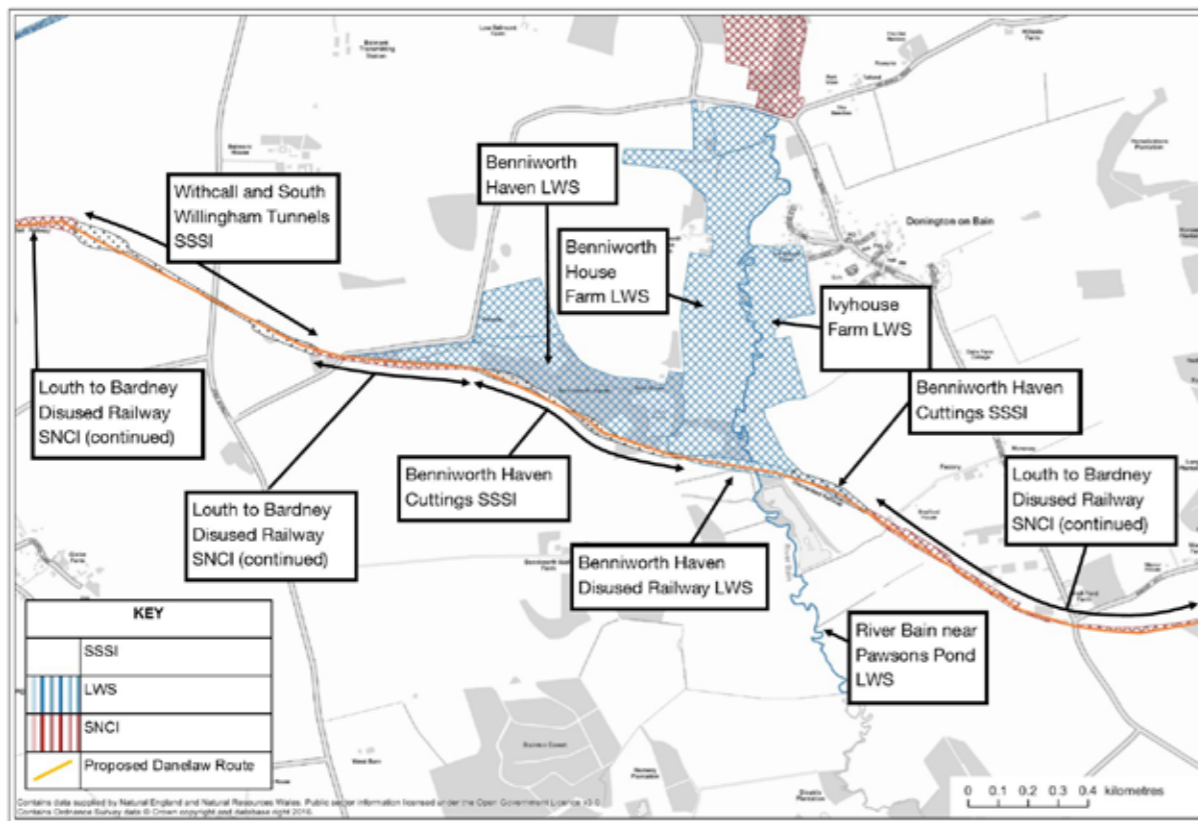
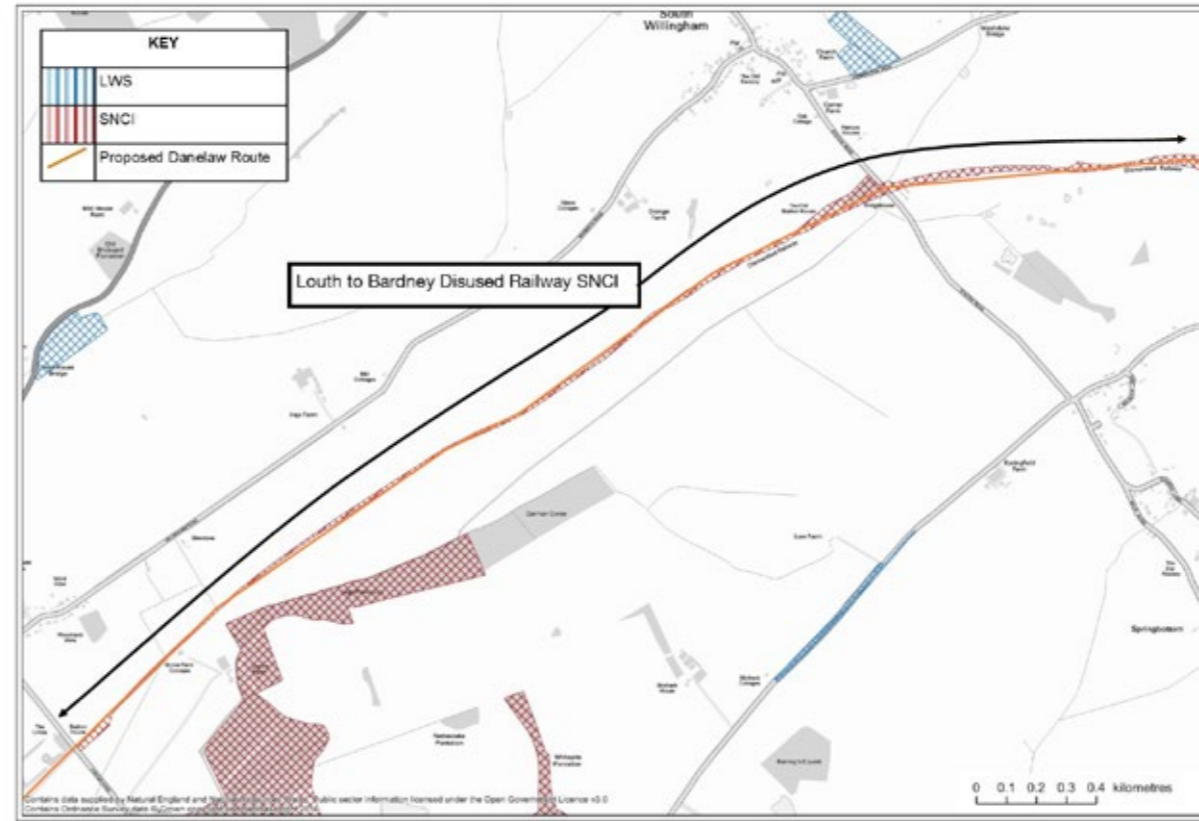
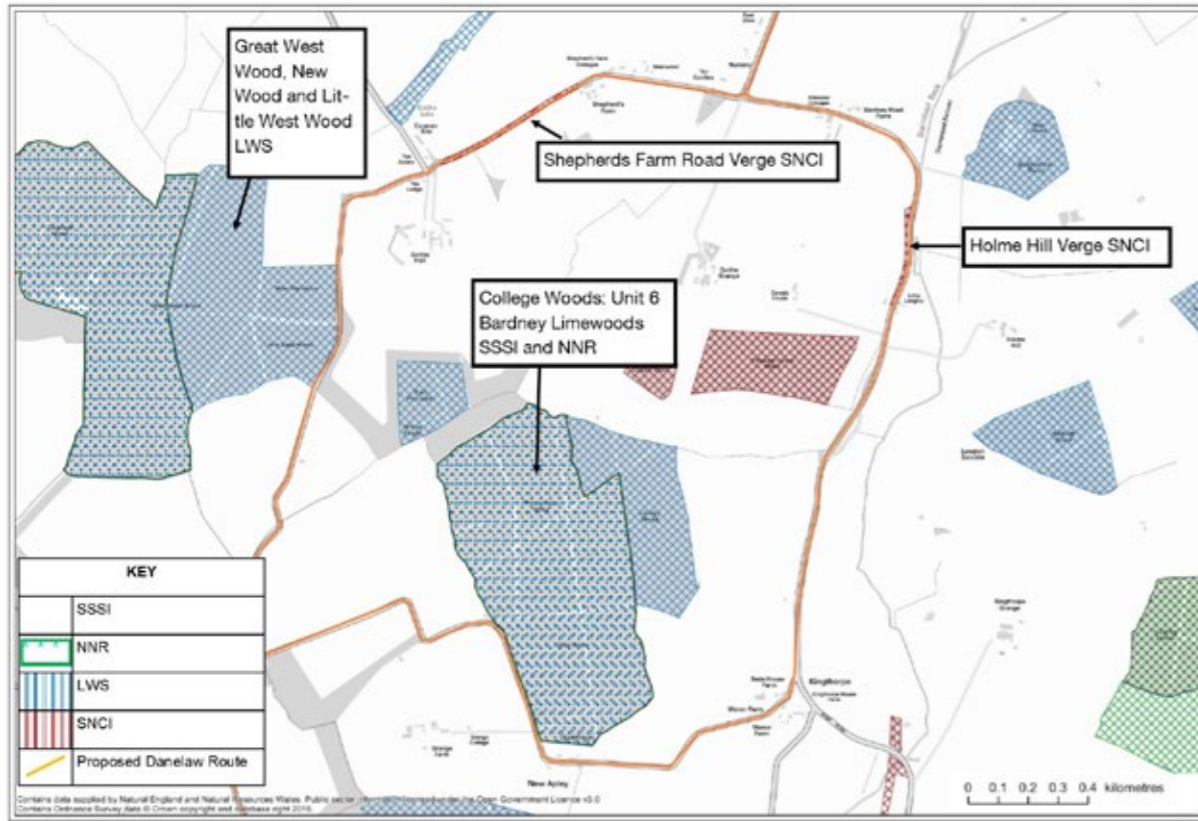
Table A1.3: Designated nature conservation sites situated 50m – 1000m from the proposed route (continued)

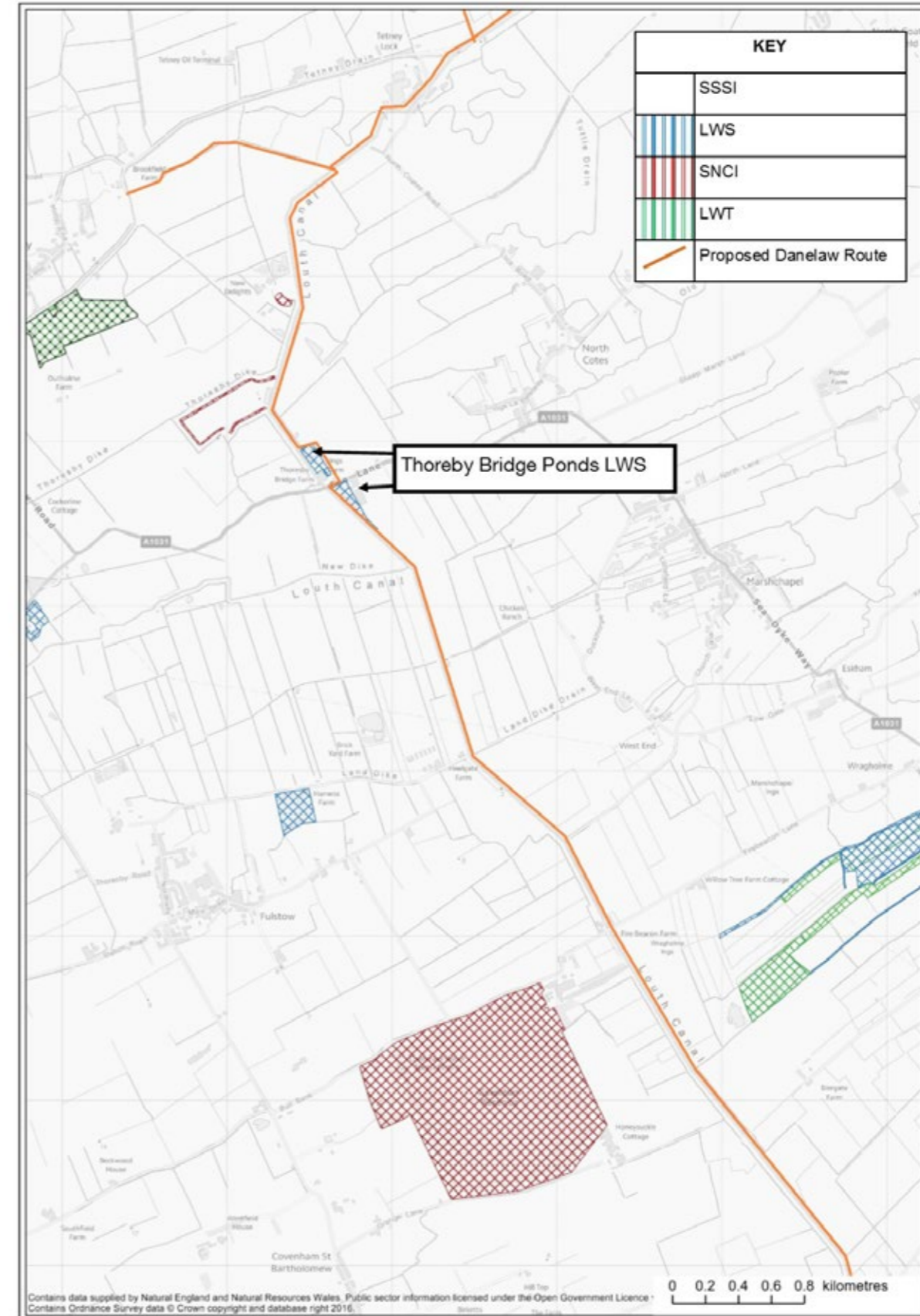
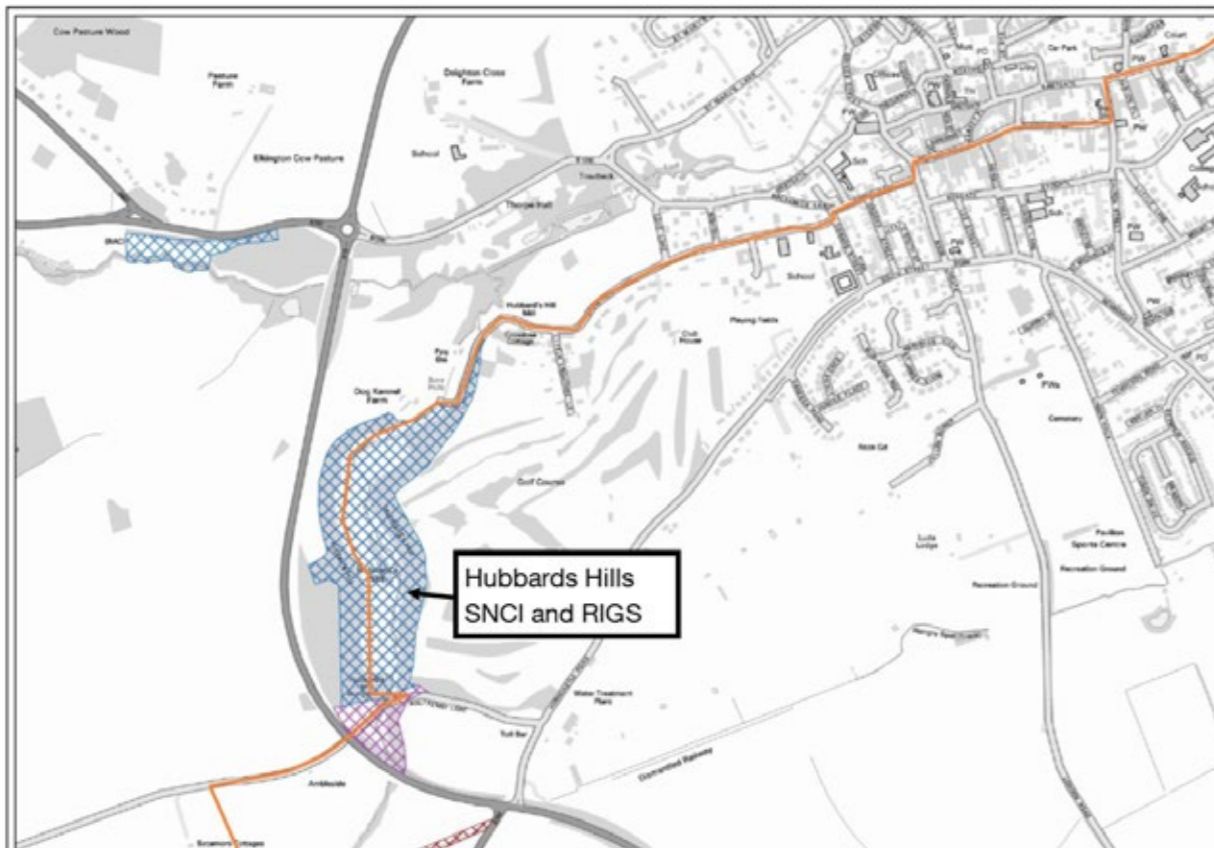
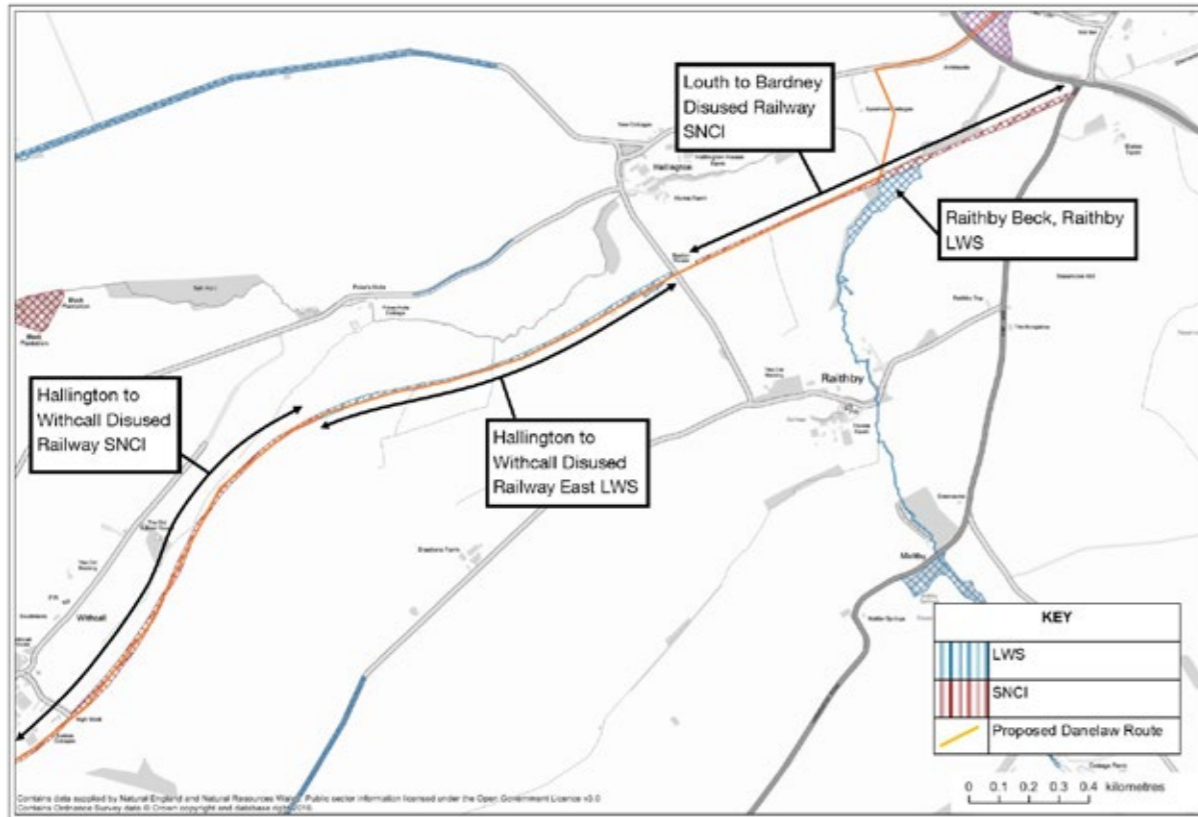
Name	Proximity	Location	Description
Timberland Delph LWS	TF155601	1000m	A 5km drain surrounded by rough grassland with scattered scrub. The drain supports diverse aquatic flora including frogbit <i>Hydrocharis morsus-ranae</i> a species very rare in Lincolnshire. The banks are considered to be botanically poor.
Goslings Corner LWT and LWS	TF 142 749	1000m	Permanent pasture with neutral semi-improved grassland and developing woodland adjacent to the Goslings Corner SSSI.
Goslings Corner SSSI, LWT.	TF 142 753	1000m	A maple <i>Acer campestre</i> , ash <i>Fraxinus excelsior</i> and lime woodland with coppice and standards. The woodland has mildly calcareous for the most part with wetter areas and more acidic soils along the western end of the woodland. Very rich ground flora that includes water avens, goldilocks and pignut <i>Conopodium majus</i> .
Beck House Bridge Field LWS	TF 171 824	1000m	Damp, semi-improved, neutral grassland with a shaded stream with no flora of note and boundary hedges that contain veteran/pollard trees.
Bracken Mound Field LWS	TF 202 843	1000m	A large area of damp grassland with dryer patches supporting bracken or heath-like vegetation.
Gravel Pit Plantation LWS	TF 201 841	1000m	Wet woodland with some veteran trees present.
Benniworth North Fields LWS	TF 231 833	1000m	Large semi-improved riverside field with marshy patches.
Red Hill LWT	TF 267 805	1000m	Steep chalk escarpment and grassland.
Red Hill Road Verge LWS and RNR	TF 265 806	1000m	Road verges with scrub and grassland that includes plants typical of good chalk grassland. (the RNR and LWS boundaries are not concurrent)
Fulstow Pit LWS	TF 334 977	1000m	A large fishing pond with associated marginal vegetation. Trees and a garden bound the lake.
Tetney Blow Wells SSSI and LWT	TA 321 006	1000m	Reedbeds with base-rich fern and swamp vegetation associated with calcareous artesian springs. These 'blow wells' were once numerous in East Lincolnshire but many have been lost. Site is in unfavourable condition but is recovering.
Cleethorpes Country Park and LNR	TA 304 067	1000m	A country park comprising woodland, wildflower grassland and a lake.

Designated sites maps

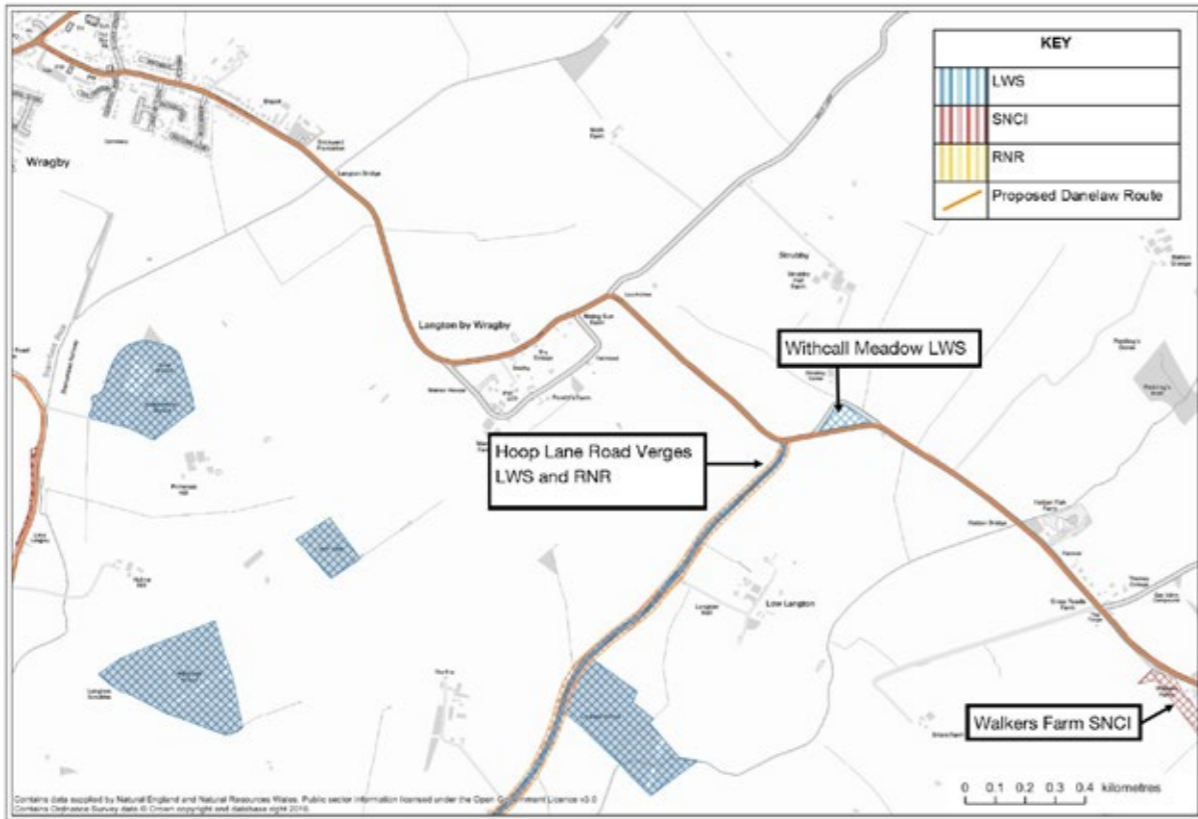
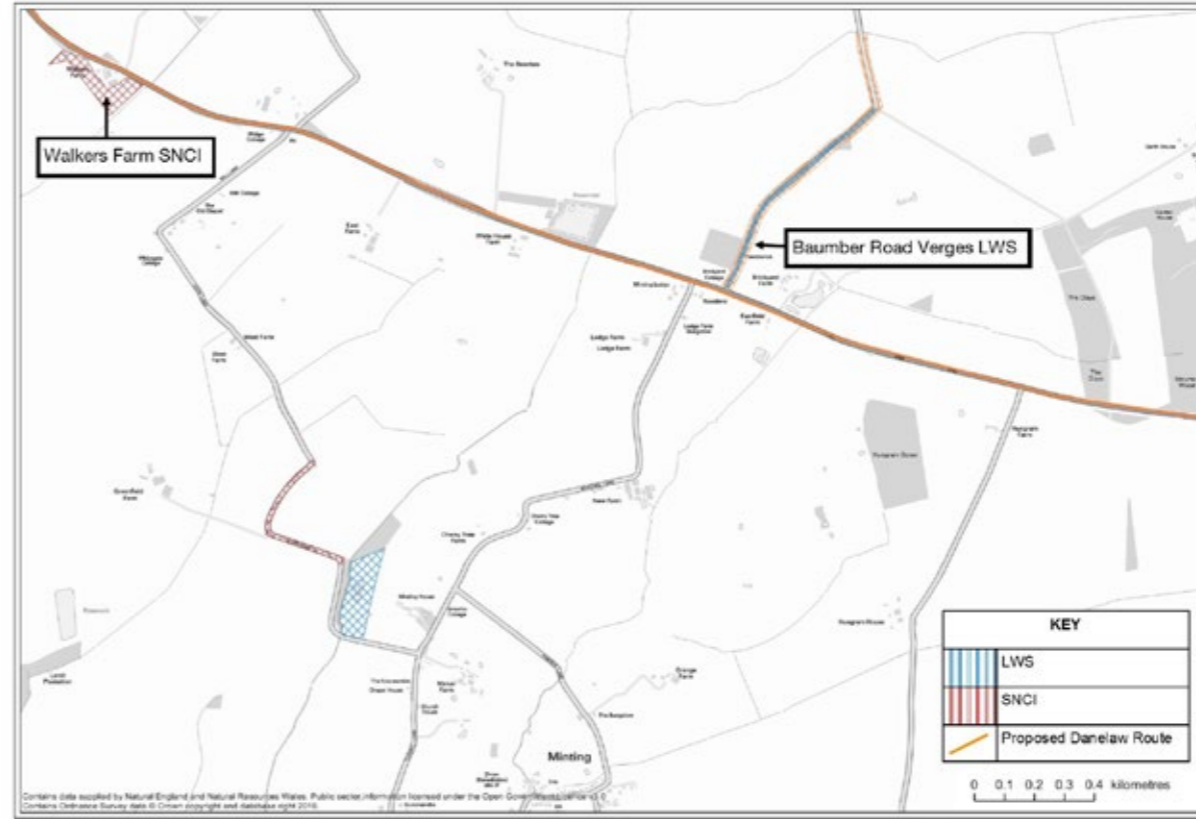
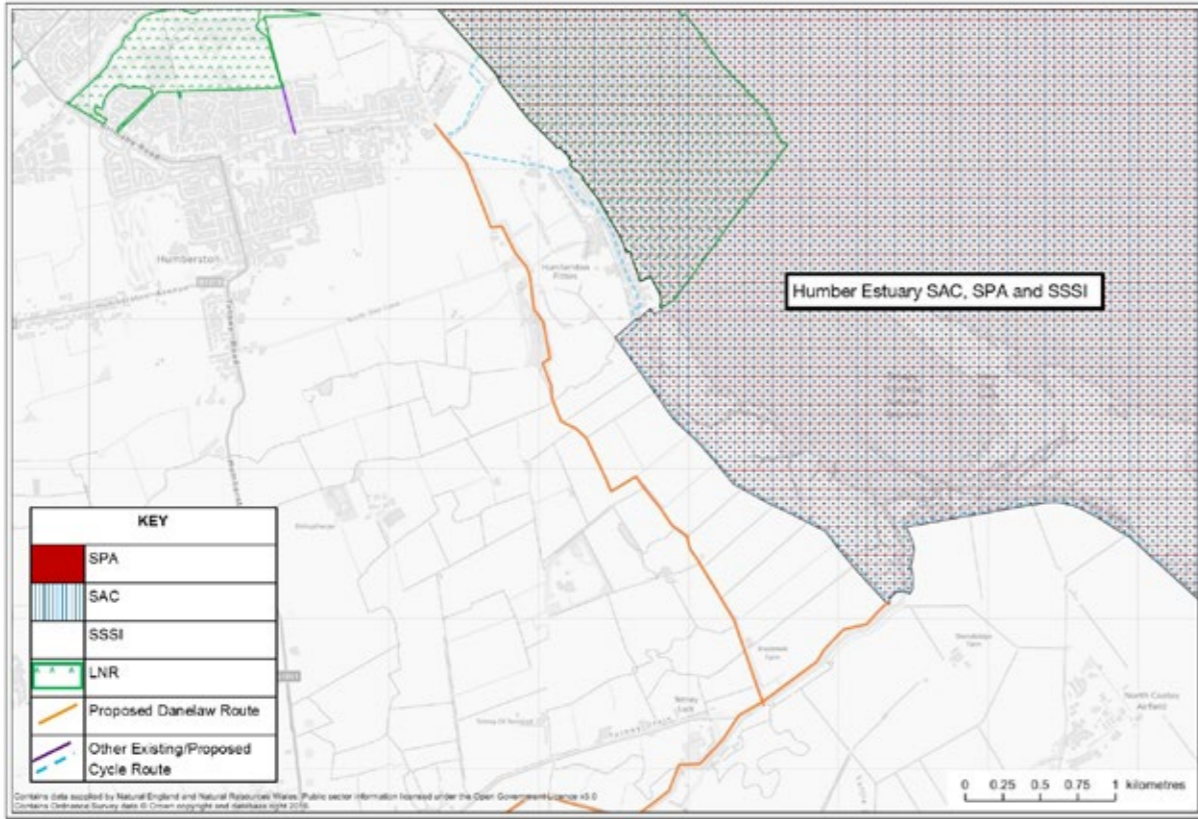


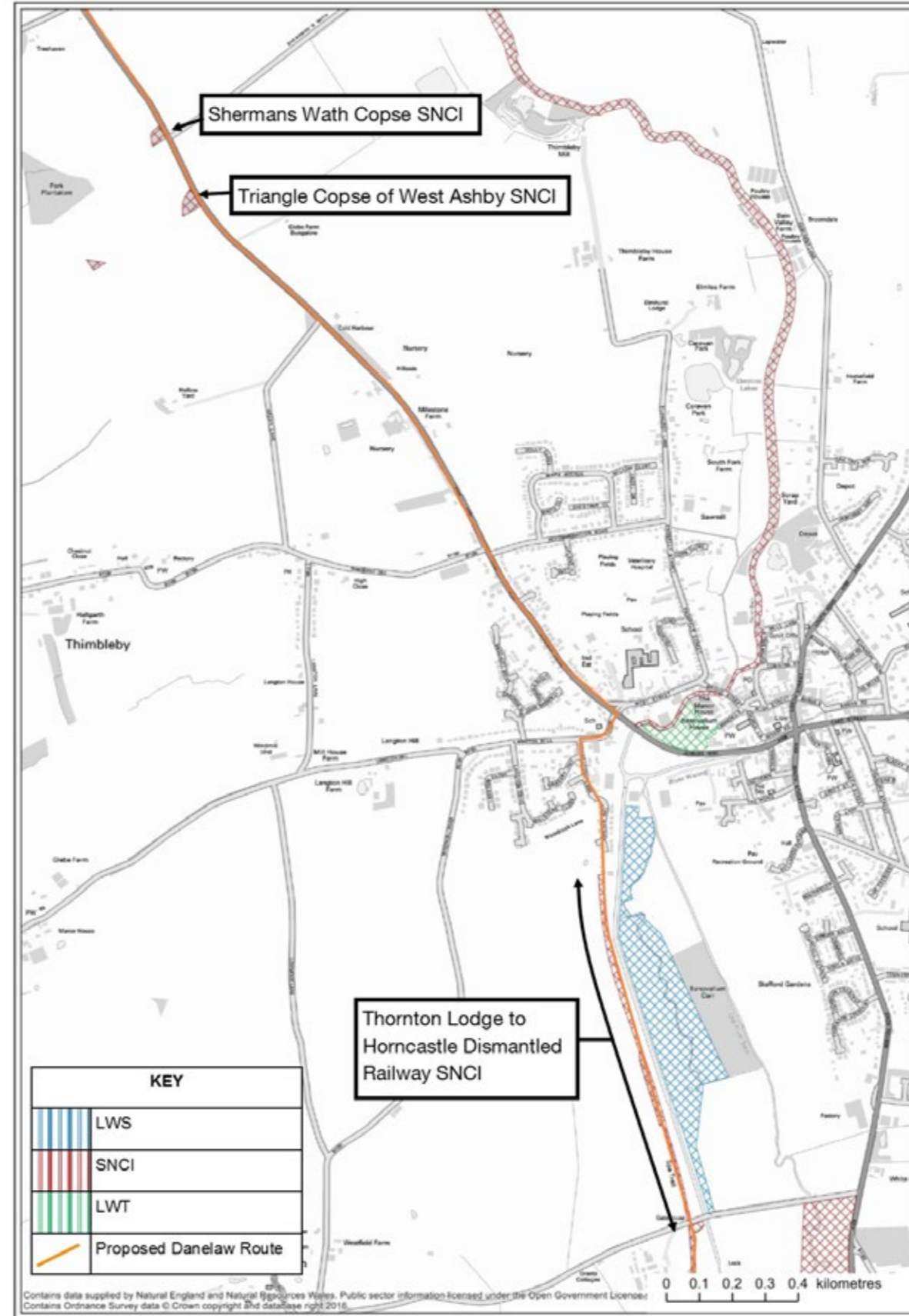
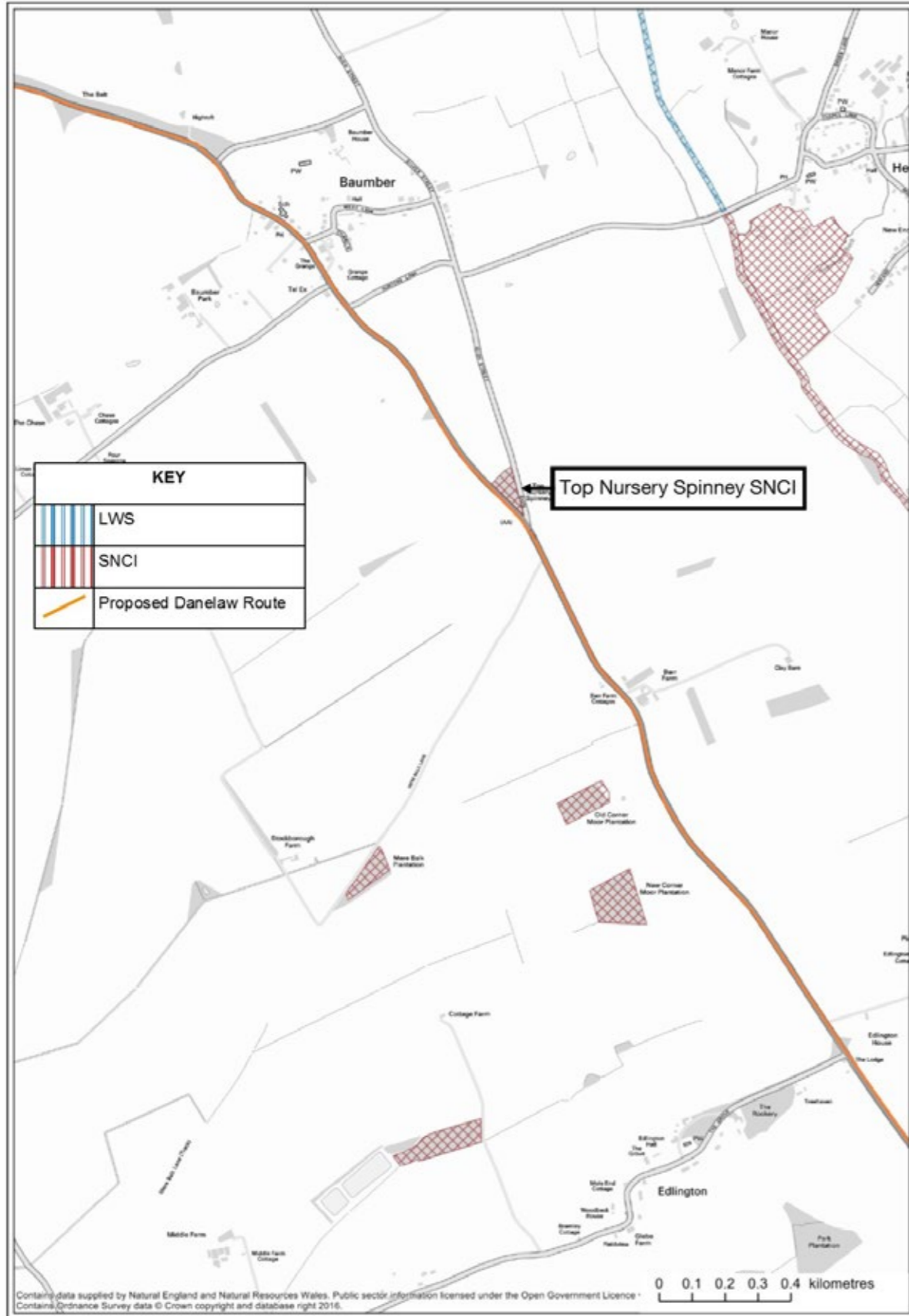
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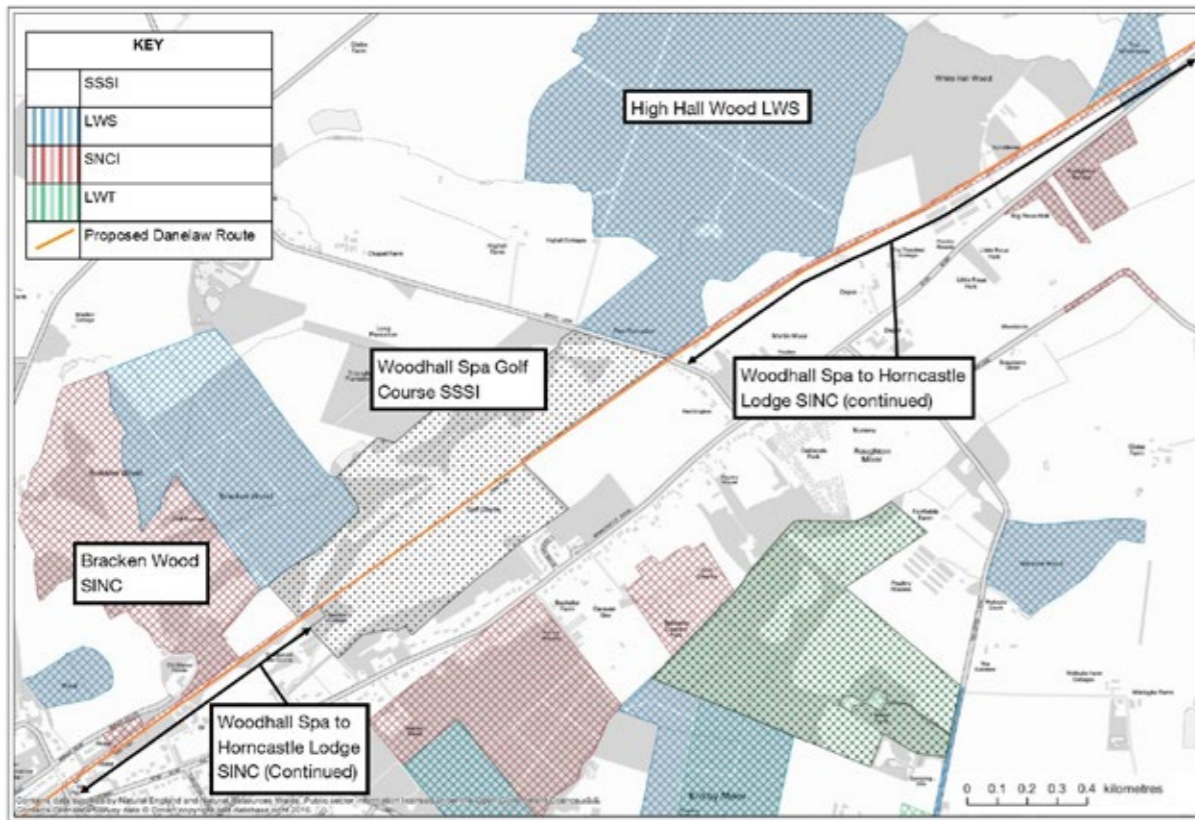
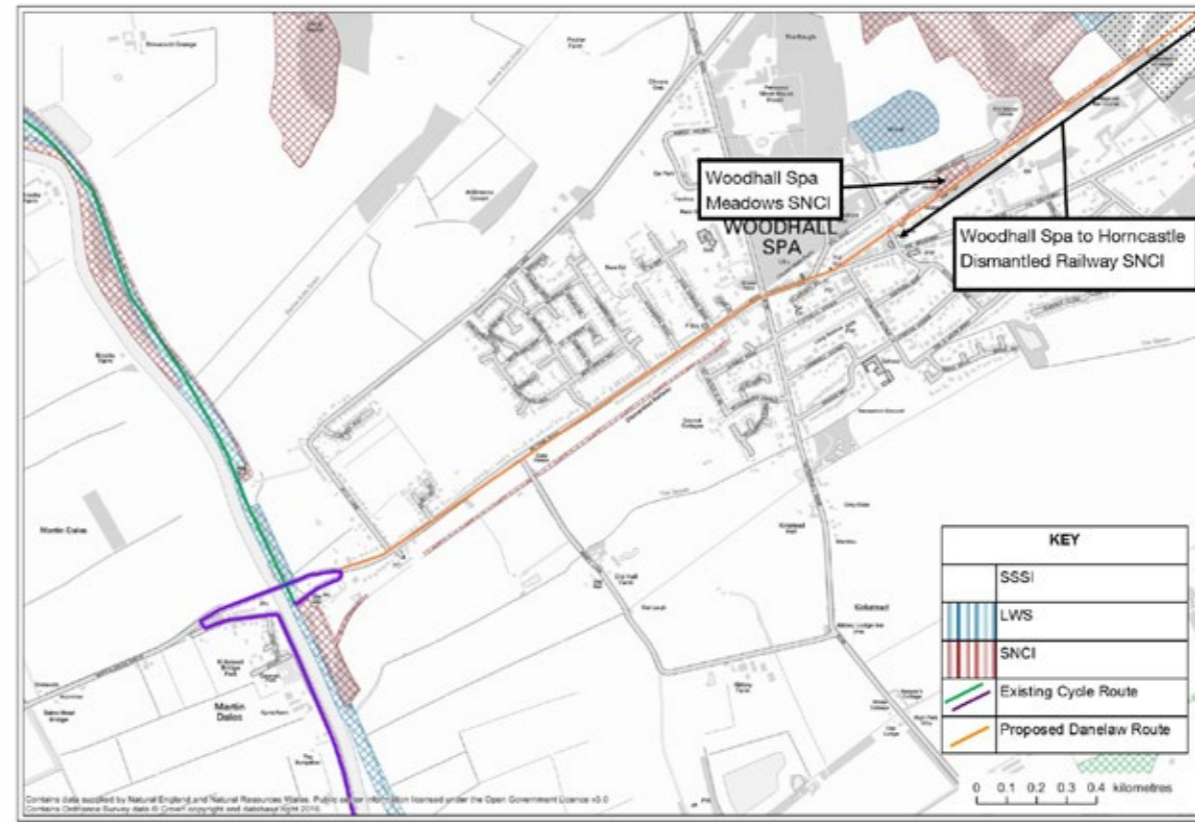
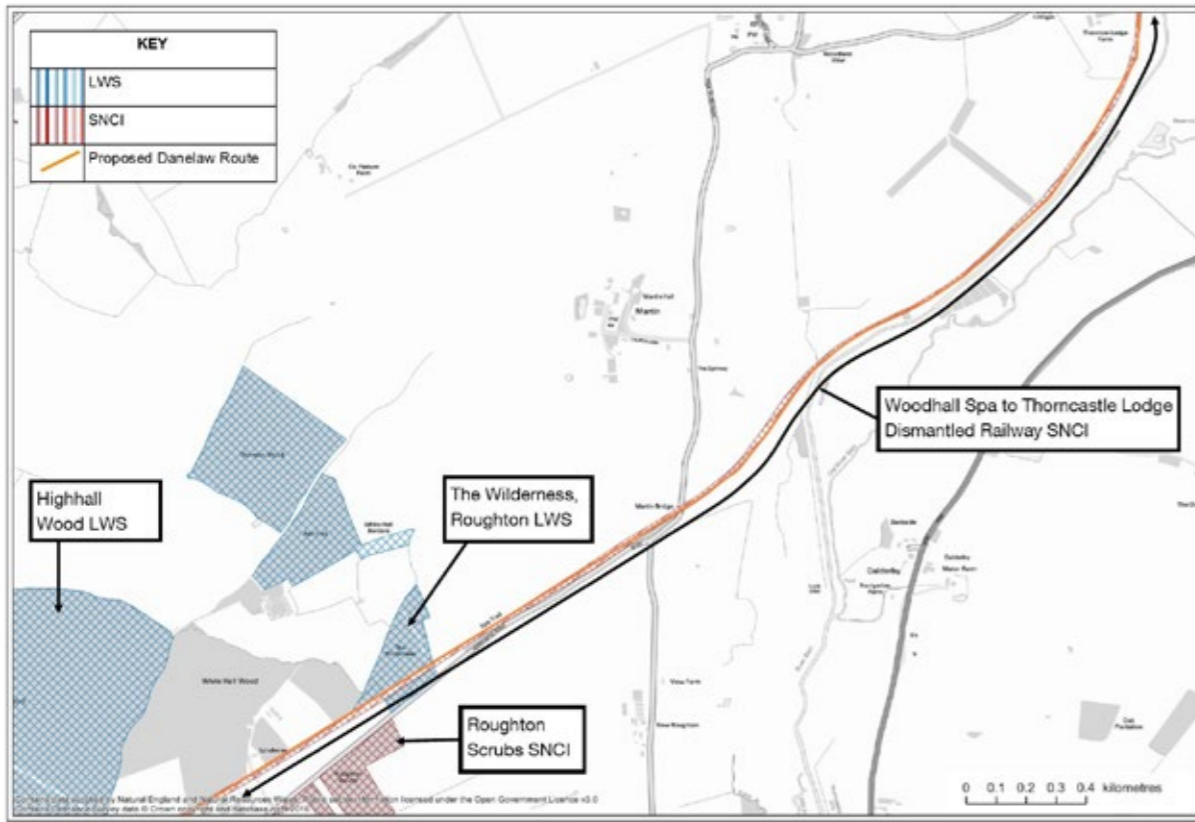




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Appendix B - Funding Matrix

Funding source	Definition	Recommendation
LEADER	<p>Local people have a better knowledge of local challenges that need to be addressed and the resource and opportunities available</p> <p>They are able to organise local resources for the development process in a way that does not happen with traditional 'top-down' approaches</p> <p>This gives local people a greater sense of ownership and commitment to the projects, which in turn allows them to make the best of their local assets</p> <p>The approach can help develop trust and positive working relationships amongst the local community and businesses</p>	To apply for LEADER funding to deliver the Danelaw multi-user Route, by putting together a package of measures in a phased approach, showing how each element will provide economic growth
Beehive	The charity funds established organisations with a track record of delivering services directly to beneficiaries. They are looking for organisations that are embedded within their communities and are addressing local needs	<p>Apply for funding in a phased approach that would enable:</p> <ul style="list-style-type: none"> - People from across the community to participate in activities which improve connectedness, opportunities and wellbeing - People who are excluded, vulnerable or facing other forms of hardship to have access to community-based services that support positive lasting change - A stronger, active, more engaged community - Grants available for between £20,000 and £180,000 - Awards grants for up to 3 years
DEFRA	Rural Development funding helps to improve the competitiveness of farming and forestry, to protect the environment and the countryside, to improve the quality of life, to diversify the rural economy and to support locally-based approaches to rural development	To use funding to create more wildlife habitats along the route
LEP	Local Enterprise Partnerships (LEPs) are responsible for designing the EU investment strategies for the delivery of EU funding in England for 2014-2020	Apply for LEP funding to encourage growth in businesses; and support build a Multi-user route in partnership with other external bodies. Greater Lincolnshire allocation is £133m is oversubscribed, however, a full business case should be worked up in case any additional announcements are made
Heritage Lottery Fund	Heritage support all kinds of projects, as long as they make a lasting difference for heritage, people and communities	Apply for funding to provide historical guided sustainable tours along the coast
Grange Wind Farm Community Fund	Projects that contribute to community cohesion, energy efficiency or benefit young or old people	£5 - £28k
Big Lottery – Reaching Communities	see the link here: https://www.biglotteryfund.org.uk/global-content/programmes/england/reaching-communities-england)	The approach would be to break the project into phases. Between £10k - £500k

Appendix C - Public Consultation Results



Danelaw Project - We need Your Views

Proposed Route - Community Consultation

East Lindsey District Council has commissioned Sustrans to carry out the feasibility and business case development to support the delivery of a Multi-User Path (MUP) which extends from the East Lindsey coastline along the Louth Navigation and then connects with the Water Rail Way MUP (potentially via the disused GNR Louth to Bardney train line), providing access for pedestrian, cycle, equestrian and disabled users and would bring multiple economic, social and environmental benefits to local residents and visitors to the area.

Consultation with user groups is vital and Sustrans do not just want to limit the route to cyclists. We want to include working with local horse riding groups and other potential users of such a route. This will allow Sustrans and East Lindsey District Council to get a better understanding of people's transport needs when it comes to sustainable modes, from Tetney Lock via Louth, Wragby, Bardney, Horncastle, Woodhall Spa and linking you up to the Water Rail Way Cycle path.

In order for this study to be completed Sustrans need your ideas, expert local knowledge and input to any proposal. We would therefore appreciate it if you could spare a few minutes of your time to complete the following questionnaire. Closing date for submission of responses 31 January, 2017.

If you require any further information, please contact gwyneth.mcminn@sustrans.org.uk

If a non-motorised (traffic free) multi-user route from Tetney Lock via Louth Canal linking Louth to Wragby, Horncastle, Woodhall Spa and Water Rail Way was made available, would you use it?

96.1% Yes 3.9% No

Why not?

100.0%

Which of the following user groups do you consider you fit in to? (Please tick all that apply)

60.9% Walker 63.7% Cyclist 29.3% Horse-rider 14.0% Other

Please state

100.0%

Which of the following do you consider may be an issue when accessing the multi-user path? (Please tick all that apply)

64.5% A continuous route 65.2% Access Points 54.7% Parking
30.2% Land ownership 15.9% Current highway speed limits 4.9% Other

Please state

100.0%

From the list below, please tell us what facilities should be included if a multi-user path is created? (Please tick all that apply)

53.8% Cafe/s 22.7% Public Art 64.4% Parking
12.3% Places to stay 14.2% Interpretation 21.4% Cycle pack information
35.9% Secure cycle parking 49.2% Seating 10.6% Other
21.3% Bike hire 78.2% Destination sign posting

Please state

100.0%

Do you support the creation of a multi-user path?

95.7% Yes 4.3% No

Why not?

100.0%

If there is any other information you consider may be useful to us when creating the route of a multi-user path, please tell us in the box below.

100.0%

If you would like any further information on the progress of this study, please provide your contact details in the boxes provided below.

Name 100.0%

100.0%

Address including
postcode

Email Address 100.0%

Telephone 100.0%
Number

All information given will remain confidential and will be processed in accordance with relevant legislation, in particular the Data Protection Act 1998. This information will only be used as part of this exercise and will not be passed on to any other organisation.

**This survey is complete
Please press submit now**

Appendix D – Engineering example photographs



Map signing layouts where bicycle users are expected to join a section of shared path in order to make a right turn movement.

Tetney Lock, links through Louth and Horncastle.



VAS warning signs on roads where the proposed corridor crosses A and B roads, detection loops triggered by bikes will set these signs flashing.

Tetney Lock, Fen Lane, Bull Bank / Firebeacon Lane, Donington on Bain, Horncastle (Hemmingby Lane), Wragby (Horncastle Road).



Gated access points with long handled gate and adjacent cattle grid.

Various locations where vehicle access or livestock control is not necessary.



Single or double bollards to prevent vehicle access, unless demountable options are installed.

Various locations along both canal and railway corridor.



Road centre line removal and replacement with advisory cycle lanes.

Tetney Lock, North Coates Road, routes through Louth and the link from Hubbard's Hills, Donington on Bain – Horncastle various sections of road, diversion routes for Withcall and High Street tunnels, alternative routes around Woodhall Spa.



Warning signing and coloured surfacing on minor road crossings.

Kings Street, Highbridge Road, Lock Road, Keddington, Halfpenny Lane Louth, Station Road South Willingham.



Gated access points with a series of farm gates designed to allow stock or farm machinery movements, with temporary closure of the main path. Side gate and cattle grid access. Various locations.



Lightweight structures using green oak timbers and a “marine decking” surface around a simple steel frame can produce aesthetically pleasing structures.

Various locations, up to 15m span length, including across River Bain at north of Horncastle.