

# **BARTON-UPON-HUMBER SOUTHERN ACCESS ROAD, NORTH LINCOLNSHIRE FEASIBILITY DESIGN ASSESSMENT - SUMMARY NOTE**

## **1.1 Introduction**

- 1.1.1 Local Transport Projects (LTP) has been commissioned by North Lincolnshire Council (NLC) to develop a feasibility design and produce budgetary cost estimates for a potential access road alignment to the south of Barton-upon-Humber, North Lincolnshire.
- 1.1.2 This note summarises the work undertaken to determine the initial feasibility of constructing the scheme and includes the following:
- feasibility design drawings of the proposed highway scheme including key features and dimensions plus Swept Path Analysis at proposed junctions;
  - summary of the design principles used within the proposed scheme including a commentary on how the designs align with the relevant highway standards;
  - assessment of roundabout junction operations in relation to traffic and development forecasts for 2036 (i.e. 16 years); and
  - a budgetary cost estimate for the proposed scheme.

## **1.2 Proposed road alignment and feasibility design**

- 1.2.1 The proposed access road would connect the A1077 Barrow Road at its junction with Falkland Way to the B1218 Brigg Road some 100m south of the existing extents of the Barton-upon-Humber settlement. The highway scheme proposals include roundabout junctions at both the A1077 and B1218 together with the formation of priority junctions and access points at Caistor Road and Eastfield Lane. From initial investigations there would appear to be no requirement for any major bridging or structural engineering work as part of the proposed highway scheme although this would need to be confirmed through detailed surveys and investigations undertaken as part of further design development.
- 1.2.2 The design proposals are presented as a series of 7 No. feasibility design drawings as follows:
- LTP/3628/P1/01.01 – Southern Access Road Overview;
  - LTP/3628/P1/02.01 - B1218 Brigg Road Roundabout;
  - LTP/3628/P1/02.02 - Barton Southern Access Road (West) Between Brigg Road and Eastfield Road;
  - LTP/3628/P1/02.03 - Eastfield Road Junction;
  - LTP/3628/P1/02.04 - Caistor Road Staggered Crossroads Junction;
  - LTP/3628/P1/02.05 – Southern Access Road between Caistor Road and A1077 Barrow Road; and
  - LTP/3628/P1/02.06 - A1077 Barrow Road Roundabout.

- 1.2.3 In addition, Swept Path Analysis (SPA) has been undertaken at the proposed junctions to test the movement of a 16.5m Articulated Heavy Commercial Vehicle (HCV) at these locations.

### **1.3 Design Principles**

- 1.3.1 The proposed feasibility design layout has been based on the guidance laid out in the following documents within the Design Manual for Roads and Bridges as follows:
- CD 109 – Highway Link Design;
  - CD 116 – Geometric Design of Roundabouts; and
  - CD 123 – Geometric Design of At-Grade Priority and Signal-Controlled Junctions.

### **1.4 Design Parameters Access Road**

- 1.4.1 Design speed selected for route 40mph and design speed 70A/B from CD 109.
- 1.4.2 Main carriageway to consist of a 7.3 metre wide (2 x 3.65 metre) running lane with 225 millimetre edge strips and kerbs to either side (i.e. 7.75 metre total width carriageway).
- 1.4.3 Main carriageway to be flanked on both sides by two 3 metre width shared use footway cycle tracks and then 2 metre wide verges.
- 1.4.4 Centre line curvature on all bends to be 255 metres in line with CD 109 Table 9.23N2 Horizontal curve design (non-overtaking sections).
- 1.4.5 Right turn ghost island junctions on the Southern Access Road designed to include 3no. 3.5 metre wide lanes through junctions with 225 millimetre edge strips.
- 1.4.6 Ghost islands to be formed by widening carriageway on both sides equally with a 1 in 20 taper for 70A/B design speed as noted in CD 123 Table 6.1.1.
- 1.4.7 Ghost island deceleration and direct taper lengths for 70A/B design speed taken from CD 123 Table 5.22. Turning length as prescribed by paragraph 6.4 of CD 123.
- 1.4.8 Back to back right turn lanes at Caistor Road junction to have minimum spacing of 50 metres with pedestrian refuge island between junctions as recommended by paragraph 2.23 of CD 123.

### **1.5 B1218 Brigg Road Roundabout**

- 1.5.1 Proposed roundabout to have an inscribed circle diameter (ICD) of 50 metres.
- 1.5.2 Proposed entry / exit widths on B1218 Brigg Road, Potential Extension Stub Arm and New Access Road to be 7.5 metres to accommodate two approach lanes.
- 1.5.3 Circulatory carriageway width to be 9 metres which requires this width to be 1.0 to 1.2 times the largest entry width in line with Paragraph 3.6 of CD 116.
- 1.5.4 Entry path radius on all arms < 100m as required by paragraph 3.26 of CD 116.

## **I.6 Eastfield Road Junctions**

- 1.6.1 Eastfield Road northern junction to be formed using 15 metre radii as stated in paragraph 5.6.3 of CD 123 . A left turn taper 1 metre wide over 30m is provided at the junction to allow large vehicles to join the Access Road from Eastfield Road. Swept path analysis of the junction shows the largest 16.5m articulated heavy commercial vehicle (HCV) can make the manoeuvre without encroaching over the Access Road centre line.
- 1.6.2 Central refuge islands 2.5 metres in width set back 5.6 metres from the junction to accommodate swept paths of large articulated heavy commercial vehicles (HCV's).
- 1.6.3 Minor road approach width to be 4.0 metres in line with paragraph 5.7 of CD 123.
- 1.6.4 Minor road exit width to be 4.5 metres in line with paragraph 5.9 of CD 123.
- 1.6.5 Minor roads to taper to existing road widths over a distance of 55 metres from the rear end of the pedestrian refuge island (taper of 1 in 20).
- 1.6.6 Eastfield Road southern junction forms the access to Eastfield Farm and one other residential property. It is therefore proposed that this should become a farm access track. The junction would not require a formal right turn facility and would be formed by two 10 metre radii. A left turn taper 1 metre wide over 30m is provided at the junction to allow large vehicles to join the Access Road from the farm access track. The road width at the junction would be approximately 8.5 metres to accommodate any articulated HCV deliveries to the farm. The road width would then taper over 44 metres to a 6 metre road width. Centre line radii on the two bends approaching the existing track alignment would be 30 metres. The track would taper to existing widths in the approximate vicinity of the dwelling on the western side to the north of Eastfield Farm.

## **I.7 Caistor Road Junction**

- 1.7.1 Caistor Road is to be realigned to create a staggered junction with a 50 metre stagger between the north south alignments of the proposed road centrelines.
- 1.7.2 Centre line radii on Caistor Road to be 127 metres in line with Figure 9.23N2 of CD 109 which equates to a 30mph design speed (50KPH). This equates to 2 steps below the standard for a 70A/B design speed and is required to reduce the area of land take required on the approach to the new junction. On the north side junction this can be accommodated by extending the Barton 30mph speed limit to the proposed junction. On the south side options available are to install a 30/40mph speed limit buffer on the approach to the realigned junction or redesign based on 100kph design speed which required a 510 metre centre line radius.
- 1.7.3 Both junctions to be formed using 15 metre radii as stated in paragraph 5.6.3 of CD 123 . A left turn taper 1 metre wide over 30m is provided at both junctions to allow large vehicles to join the Access Road from Eastfield Road. Swept path analysis of the junction shows the largest 16.5m articulated heavy commercial vehicle (HCV) can make the manoeuvre without encroaching over the Access Road centre line.
- 1.7.4 Central refuge islands 2.5 metres in width set back 5.6 metres from the junction to accommodate swept paths of large articulated heavy commercial vehicles (HCV's).
- 1.7.5 Minor road approach width to be 4.0 metres in line with paragraph 5.7 of CD 123.

- 1.7.6 Minor road exit width to be 4.5 metres in line with paragraph 5.9 of CD 123.
- 1.7.7 Minor roads to taper to existing road widths over a distance of 57 metres from the rear end of the pedestrian refuge island (taper of 1 in 20).

## **1.8 Side Road and Private Drive Connections on Caistor Road**

- 1.8.1 Extension of existing residential cul-de-sac Princess Drive to tie-in to new alignment of Caistor Road. Extension to tie-in to Caistor Road perpendicular to the proposed Caistor Road Carriageway. Carriageway width to be approximately 6 metres with 6 metre radii at the junction with the new carriageway on Caistor Road.
- 1.8.2 Two new private drive extensions required on the western side of Caistor Road northern arm to provide access to the highway for 106 Caistor Road and 1 Princess Drive. Both driveway extensions to be 4 metres wide and be provided with dropped kerbs.
- 1.8.3 Adjustments to the new kerb line of Caistor Road northern arm to provide driveway access to the highway for 102 and 104 Caistor Road. Requires to relocation of dropped kerbs to tie in with the proposed new kerb line.
- 1.8.4 Provision of a new works access road for the reservoir on the eastern side of the southern arm of Caistor Road. Access to be 5 metres wide with 10 metre radii at its junction with Caistor Road. Access road to be kerbed on both sides along its entire length.

## **1.9 A1077 Barrow Road Roundabout**

- 1.9.1 Proposed roundabout to have an inscribed circle diameter (ICD) of 60 metres.
- 1.9.2 Proposed entry / exit widths on Falkland Way, A1077 Barrow Road East and Southern Access Road to be 7.5 metres to accommodate two approach lanes.
- 1.9.3 Proposed entry width on A1077 Barrow Road West to be 7.5m. Exit width to be 6.3 metres to avoid third party land intrusion as far as is practicable.
- 1.9.4 Circulatory carriageway width to be 9 metres which requires this width to be 1.0 to 1.2 times the largest entry width in line with Paragraph 3.6 of CD 116.
- 1.9.5 Entry path radius on all arms < 100m as required by paragraph 3.26 of CD 116.

## **1.10 Swept Path Analysis (SPA)**

- 1.10.1 SPA has been undertaken for a 16.5m articulated HCV for all key movements at the proposed roundabout and priority junctions on the access road. The SPA is provided in the following 12 No. drawings:
- LTP/3628/P1/03.01-04 : A1077 Barrow Road Roundabout (4 No. drawings);
  - LTP/3628/P1/04.01-02 : Caistor Road Junctions (2 No. drawings);
  - LTP/3628/P1/05.01-02 : Eastfield Road Junctions (2 No. drawings); and
  - LTP/3628/P1/06.01-04 : B1218 Brigg Road Roundabout (4 No. drawings).

- 1.10.2 The SPA indicates that, with the exception of the Eastfield Road southern junction, the 16.5m articulated HCV should be able to manoeuvre around the junctions within the scheme within its own traffic lane.
- 1.10.3 At the Eastfield Road southern junction it is considered that number of traffic movements at this location will be minimal and that the proposed access layout is appropriate.

## 1.11 Traffic assessment

- 1.11.1 A traffic assessment has been undertaken of the proposed roundabouts at B1218 Brigg Road and A1077 Barrow Road to confirm that the proposed sizing of the access road infrastructure is appropriate for the likely future traffic demands resulting from general traffic growth and potential development proposals. Outline housing development proposals for Barton-upon-Humber have identified an aspirational target of 1,089 dwellings that might be constructed to the south of the existing settlement and accessed by the proposed Southern Access Road. For the purpose of this traffic assessment it has been assumed that these housing developments would be delivered over a 16 year period resulting and, as a consequence, 2036 has been selected as the assessment year for this traffic assessment.
- 1.11.2 The traffic assessment has been undertaken using the JUNCTIONS9 traffic model for the AM and PM traffic peaks. The traffic flows used within the models are based on the following data and assumptions:
- B1218 Brigg Road base flows have been taken from the Automatic Traffic Count (ATC) of June 2019 obtained by LTP for an earlier part of this study work;
  - A1077 Barrow Road/Falkland Way base flows have been taken from the Junction Turning Count of May 2019 provided as part of the Transport Assessment for Planning Application PA/2019/1147;
  - Existing through traffic movements between B1218 Brigg Road and A1077 Barrow Road (West) and vice-versa will divert to the proposed access road. The proportion and quantity of traffic doing this has been informed by the results of the Origin–Destination of June 2019 obtained by LTP for an earlier part of this study work;
  - Traffic flows on B1218 Brigg Road, A1077 Barrow Road and Falkland Way will increase by 14.6% between 2019 and 2036 as forecast with TEMPro v7.2b;
  - Traffic generation associated with the potential 1,089 dwelling housing developments will be as forecast in the TRICS trip end model and will result in some 560 two way trips in both the AM and PM peaks.
  - All traffic associated with the potential housing development will utilise the proposed access road in the following proportions:
    - 20% towards A1077 Barrow Road (West);
    - 30% towards A1077 Barrow Road (East) and Barton town centre;
    - 20% towards B1218 Brigg Road (South); and
    - 30% towards B1218 Brigg Road (North) and Barton town centre.

1.11.3 The results of the assessment are provided below.

**B1218 Brigg Road /Southern Access Road**

	AM					PM				
	Set ID	Q (PCU)	Delay (s)	RFC	LOS	Set ID	Q (PCU)	Delay (s)	RFC	LOS
<b>Proposed Layout - 2036 Future Year</b>										
1 - Brigg Road (N)	D1	0.2	2.89	0.18	A	D2	0.3	3.10	0.23	A
2 - Southern Access Road		0.2	2.74	0.15	A		0.1	2.55	0.08	A
3 - Brigg Road (S)		0.2	2.87	0.16	A		0.2	2.78	0.16	A
4 - Potential Future Residential Access		0.0	0.00	0.00	A		0.0	0.00	0.00	A

**A1077 Barrow Road/Southern Access Road/Falkland Way**

	AM					PM				
	Set ID	Q (PCU)	Delay (s)	RFC	LOS	Set ID	Q (PCU)	Delay (s)	RFC	LOS
<b>Proposed Layout - 2036 Future Year</b>										
1 - Falkland Way	D1	0.1	2.83	0.12	A	D2	0.5	4.04	0.33	A
2 - A1077 (E)		0.6	3.68	0.35	A		0.6	4.13	0.36	A
3 - Southern Access Road		0.2	3.11	0.17	A		0.1	2.86	0.07	A
4 - A1077 (W)		0.8	4.84	0.42	A		1.1	5.45	0.51	A

1.11.4 The results indicate that all modelled junction arms operate with a Ratio of Flow to Capacity (RFC) of less than 85% being the threshold below which it is generally considered satisfactory traffic operations will take place.

**1.12 Budgetary cost estimate**

1.12.1 A budgetary cost estimate for the proposed Barton Southern Access Road is provided in the table below and identifies a capital construction cost for the works in the order of £10 million.

1.12.2 The cost estimate:

- is based on prices and value provided in Spon's Civil Engineering and Highway Works Price Book: 2020 (34<sup>th</sup> Edition);
- adopts what are considered to form robust assumptions in the absence of detailed information on the existing topography and ground conditions along the route alignment;
- excludes land acquisition and legal/other fees associated with land transfer or conveyance;
- excludes Statutory Undertakers costs that will need to be obtained from the affected service providers through the issue of C3/C4 Notices; and

- includes the addition of Optimism Bias of 44% that has been added to reflect the preliminary design stage of the Access Road proposals. This value is consistent with DfT WebTAG guidance on local roads scheme costings at preliminary design stage. The value of Optimism Bias may be reviewed following review of Statutory Undertaker budget estimates, geotechnical and environmental information at detailed design.

Manual of Contract Documents for Highway Works:		Cost Estimate (£)
Series No.	Description	
S100	Preliminaries (7.5% of works value)	575,000
S200	Site Clearance	11,000
S300	Fencing	150,000
S500	Drainage	2,650,000
S600	Earthworks	1,500,000
S700	Pavements	1,900,000
S1100	Kerbs, Footways and Paved Areas	650,000
S1200	Traffic Signs and Road Markings	30,000
S1300/1400	Road Lighting	475,000
	<b>Sub-total</b>	<b>7,941,000</b>
	Regional variation for Yorkshire & Humber (86%)	6,829,260
	Optimism Bias at 44%	3,004,874
	<b>Grand Total:</b>	<b>9,834,134</b>
	<b>Budgetary Cost Estimate:</b>	<b>10,000,000</b>

### 1.13 Summary

- 1.13.1 A feasibility design assessment of the proposed Barton Southern Access Road has been undertaken to determine a potential layout/alignment of the scheme including the type and sizing of road junctions and a budgetary cost estimate of the scheme.
- 1.13.2 The feasibility design indicates how the road might be constructed between the B1281 Brigg Road and A1077 Barrow Road at Falkland Way to provide access to the land south of the existing Barton settlement area that may potentially be subject to significant future housing development.
- 1.13.3 The design notes provided indicate how the proposed access road has been designed in accordance with national highway design standards. Swept Path Analysis of the proposed junctions on the route indicate how the designs can accommodate movements by a 16.5m Articulated Heavy Commercial Vehicle.
- 1.13.4 A traffic assessment has been undertaken on the two roundabout on the proposed access road that provide the key connections with the local highway network. The assessment considers traffic movements and flows for a future assessment year of 2036 at which time it is assumed that potential housing development to the south of Barton would be complete. The assessment indicates that, on the basis of the assumptions on traffic generation, assignment and growth that have been made, the proposed roundabout unfractured is of an appropriate size.

A budgetary cost estimate has been developed for the feasibility design that identifies a potential construction cost of £10 million for the proposed access road. This estimate does not include for land acquisition, legal fees or utilities diversions and includes broad estimates of earthworks requirements made in the absence of detailed topographic and geotechnical data. The estimate is based on current prices/values for highway works taking account of regional variations and include Optimism Bias at 44% as per WebTAG guidance.

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