



## **Barnsley Market Gate Pedestrian Bridge**

### **Accessibility & Desire-line Assessment**

29<sup>th</sup> August, 2019

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This document has been prepared and checked in accordance with  
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### Comments

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Updated report based on revised lift and parapet design



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## Contents

<b>1. Introduction</b> .....	<b>1</b>
1.1 Assessment Overview.....	1
1.2 Project Overview .....	2
<b>2. Market Gate Footbridge Proposals</b> .....	<b>3</b>
2.1 Existing Site and Operations.....	3
2.1.1 Overview .....	3
2.1.2 Match-Day Crowd Control.....	3
2.2 Pedestrian Bridge and Town Centre Proposals.....	4
<b>3. Survey Data Assessment</b> .....	<b>7</b>
3.1 Pedestrian Survey Overview.....	7
3.2 Survey Analysis.....	8
3.2.1 Desire-Line Analysis .....	8
<b>4. Pedestrian Bridge Capacity Assessment</b> .....	<b>14</b>
4.1 Lift Capacity .....	17
<b>5. Accessibility Review</b> .....	<b>19</b>
5.1 Existing Access and Inclusion Issues .....	19
5.2 Footbridge Accessibility .....	19
<b>6. Construction Period Management</b> .....	<b>22</b>
<b>7. Summary and Conclusion</b> .....	<b>23</b>

## Figures

Figure 1: Site Location Plan .....	1
Figure 2: Indicative Proposals Plan (Aerial View) .....	4
Figure 3: Proposed Structure .....	5
Figure 3: Level Crossing Pedestrian Flows – Tuesday Daily Profile .....	9
Figure 4: Level Crossing Pedestrian Flows – Saturday Daily Profile.....	9
Figure 5: Level Crossing Pedestrian Flows – Match-Day Daily Profile.....	10
Figure 6: Level Crossing Pedestrian Flows – Tuesday Peak .....	11
Figure 7: Level Crossing Pedestrian Flows – Saturday Peak.....	11
Figure 8: Level Crossing Pedestrian Flows – Match-Day Peak.....	12
Figure 9: Lambra Road Pedestrian Flows – Match-Day Peak.....	12
Figure 10: Match Day Bridge Capacity – 2 Metre Minimum Deck and Stair Width .....	15
Figure 11: Match Day Bridge Capacity – Final Design Deck and Stair Width .....	16

## Tables

Table 1:	Pedestrian Survey Scenarios.....	7
Table 2:	Peak Period Summary .....	8
Table 3:	Oakwell Stadium Attendance.....	8
Table 4:	Bridge Capacity Assessment Scenarios .....	14
Table 5:	Existing Demand (Per 5-Minute Period) .....	17
Table 6:	Projected Lift Demand (Per 5-Minute Period).....	17
Table 7:	Lift Capacity .....	18

## Appendices

- A. Barnsley Town Centre Regeneration Masterplan
- B. Public Realm General Arrangement Plan
- C. Oakwell Stadium Attendance Statistics
- D. Capacity Assessment Summary

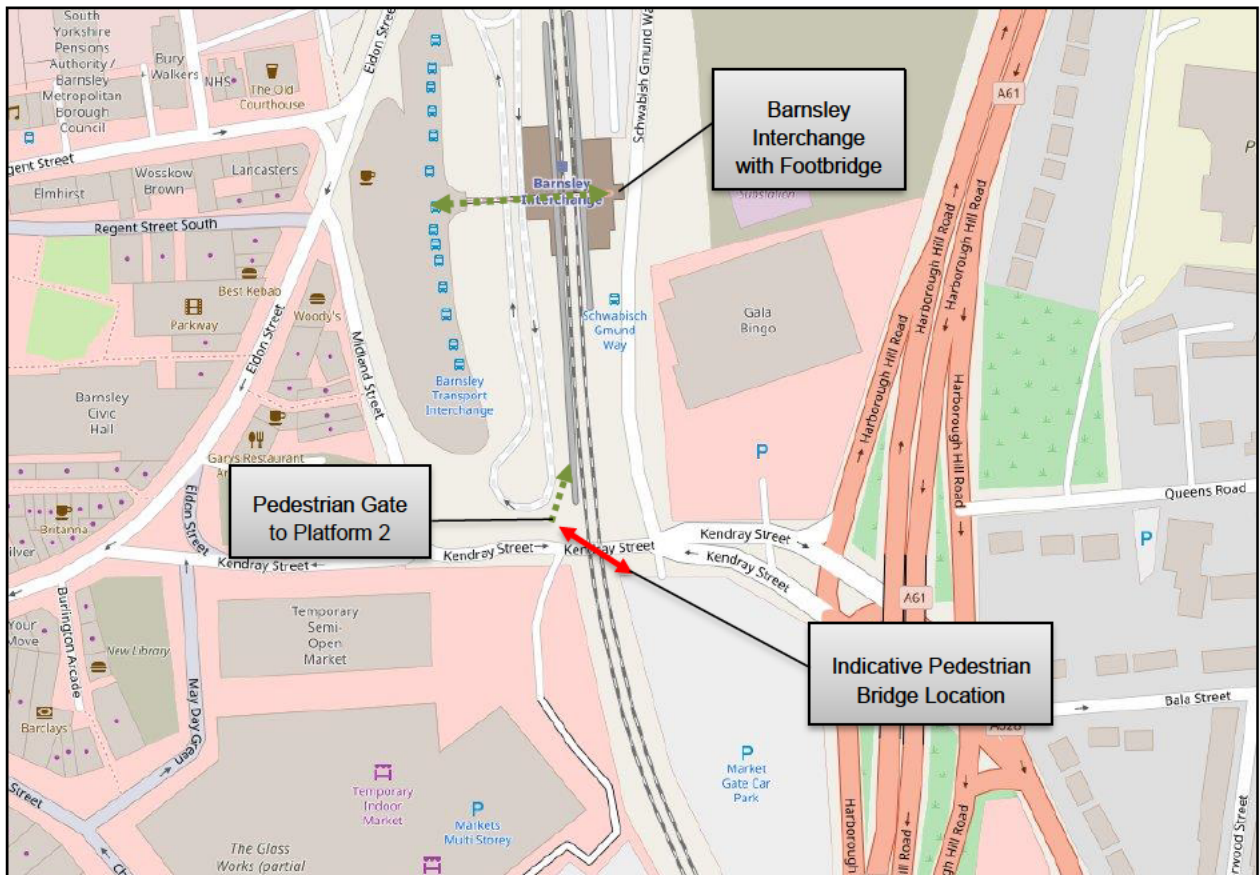
# 1. Introduction

## 1.1 Assessment Overview

Waterman Infrastructure and Environment (WIE) has been commissioned to undertake the structural design of the proposed Market Gate Pedestrian Bridge, which will span over the existing level-crossing at Kendray Street, Barnsley Town Centre.

The site location is shown in the following figure:

Figure 1: Site Location Plan



Source: Openstreetmap.org

As part of the design process, WIE has undertaken an Accessibility & Desire-line Assessment. The overall scope of the report is to undertake an accessibility review together with a desire-line assessment, taking into consideration the existing situation and how pedestrian dynamics will change following implementation of the pedestrian bridge. The report will identify existing mobility issues within the vicinity of the level-crossing, and how such issues may be alleviated with the provision of a dedicated pedestrian bridge.

To summarise, this report will focus on the following:

- Existing access and inclusion issues;
- Pedestrian survey data review and desire-line analysis;
- Footbridge accessibility and capacity design; and

- Construction period management.

The scope of this report has been agreed with Barnsley Metropolitan Borough Council (BMBC) Equity and Inclusion Officers, with reference to the following guidance:

- Design Manual for Roads and Bridges BD29/17 (2017), Design Criteria for Footbridges;
- Department for Transport (2005), Inclusive Mobility; and
- RSSB Report T650: Improving safety and accessibility at level crossings for disabled pedestrians (2011).

## 1.2 Project Overview

In 2014, BMBC announced a £46 million investment into its town centre regeneration plans. The plans involve the Council taking on the role of developer over the next three years, and committing a major programme of work including:

- Demolition of the former county council offices and adjacent shops;
- Redesign and redevelopment of the metropolitan centre and indoor market;
- Redevelopment of the Kendray Street site as a leisure and retail centre;
- Creation of a new public square to accommodate a new open market and town centre events;
- Public realm improvements; and
- Work to attract new retail investment.

The red-line boundary and town centre masterplan is provided within **Appendix A**.

In conjunction with Network Rail, BMBC see the provision of a pedestrian bridge to replace the current level-crossing on Kendray Street as beneficial to the town centre regeneration scheme. The bridge is seen as a landmark feature of the scheme providing a gateway from the existing public transport and parking provisions to the new retail and leisure quarter. Network Rail has requested that the crossing should be decommissioned by March 2019.



## 2. Market Gate Footbridge Proposals

### 2.1 Existing Site and Operations

#### 2.1.1 Overview

The existing Kendray Street level-crossing provides a crossing over the Barnsley and Horbury Station Junction Line (BAH2 Up and Down Main lines) for both vehicles and pedestrians between Barnsley Town Centre and the Oakwell area of the town. Alternative vehicular/pedestrian crossing points are located approximately 400 metres to the north at Eldon Street North, and 550 metres to the south at Lambra Road, although pedestrians also have access over the railway by means of the Barnsley Interchange Footbridge which links the rail station to the east and bus station to the west.

The level-crossing is located approximately 100 metres south of Barnsley Interchange, with access to the rail station via Schwabisch Gmund Way to the north-east. Access to the rail station can also be gained via a gate which leads directly onto Platform 2, situated approximately 30 metres to the north-west. Various access points into the Bus Station are provided to the west, from Midland Street/Eldon Street.

The level-crossing links Kendray Street to Schwabisch Gmund Way (the junction of which is signalised), and to the west of the railway the market servicing area and multi-storey car-park (MSCP) to the new (former CEAG site) surface level car-park to the east of the railway. Puffin crossing points are integrated with the existing signals to facilitate pedestrian movement across Schwabisch Gmund Way and the former CEAG site car-park. Uncontrolled pedestrian crossing facilities are provided across Kendray Street, situated directly to the east of the level crossing which include dropped-kerbs and tactile paving. Dropped-kerbs also facilitate pedestrian movement across the market service yard access and MSCP access, tactile paving is provided to the western side of this crossing point. Further to the east, dropped-kerbs and tactile paving are also provided to both sides of Kendray Street / Pontefract Road to support pedestrian movement across the A61 access/egress ramps.

In order to discourage pedestrian movement outside of the above identified crossing points, guard-railing has been installed along the southern side of Kendray Street, running between the A61 egress ramp and the new car park access.

Dropped kerbs and tactile paving are provided to the west of the level-crossing, to both sides of Kendray Street, with similar facilities in place across Midland Street.

Based on the above, pedestrian movement within the vicinity of the level-crossing is complex and disjointed due to the existing highway layout, and congestion builds when the barriers are lowered at the level-crossing (especially on Barnsley Football Club match-days) for the passage of trains. The level-crossing barriers can be lowered for various periods of time, between one to five-minutes. There are obvious safety issues associated with level-crossings, exasperated due to the volume of pedestrians and the location of the level-crossing within a town-centre, and issues associated with the safe dispersal of crowds once the barriers are raised.

Additional issues relating to safety aspects of level-crossings have been identified by various disability groups, detailed further within **Section 5**.

#### 2.1.2 Match-Day Crowd Control

Due to the relatively close proximity of the Oakwell Stadium, crowd management frequently takes place within the vicinity of the town centre (including Barnsley Interchange and within the vicinity of the level-crossing), and on routes to/from the stadium.

Through consultation with South Yorkshire Passenger Transport Executive (SYPTe) and South Yorkshire Police (SYP), it is understood that crowd dynamics can vary from match-to-match in consideration of kick-off times and expected home/away attendance/derby matches. However, the following measures are usually implemented on most match-days:

- Closure of Schwabisch Gmund Way to vehicular traffic prior to kick-off and following the final whistle;
- Closure of the southern Platform 2 access gate;
- Restriction of pedestrians utilising Barnsley Interchange footbridge (linking the bus station to the west with the rail station to the east); and
- Separation of home and away fans within the vicinity of the interchange and local area.

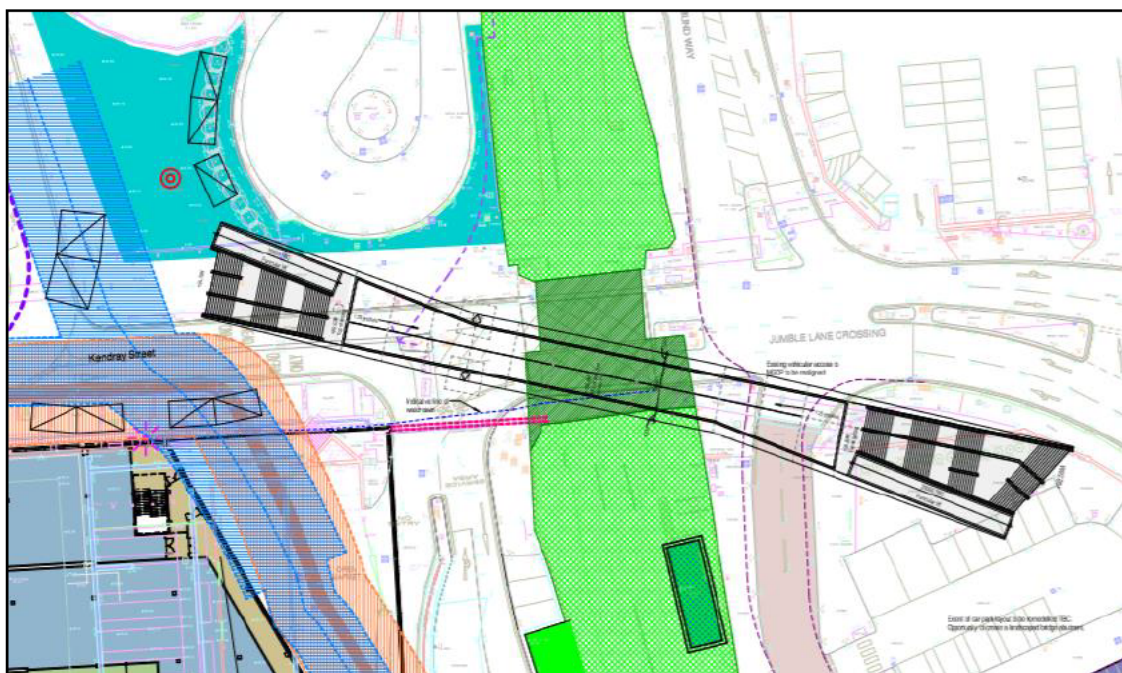
## 2.2 Pedestrian Bridge and Town Centre Proposals

As part of the town centre regeneration proposals, the level crossing will be closed permanently. The proposed pedestrian bridge will be erected alongside local highway works, constituting a Traffic Regulation Order (TRO) which will be implemented to close the existing vehicular/pedestrian level-crossing at Kendray Street. Pedestrian crossing facilities will therefore be altered to suit the new highway layout and public-realm proposals, particularly to the west. Vehicles will be directed to either the Eldon Street North or Lambra Road existing grade separated railway crossing points.

The proposed pedestrian bridge will enable the crossing of pedestrians and cyclists, and has been designed to cater for those with mobility issues/devices and pushchairs with the provision of a 26-person lift. Parapets will also be raised to 1.4m to cater for cyclists, and a cycle wheel-ramp will also run along each side of the steps to the bridge.

The Indicative proposals are shown in **Figures 2 and 3**:

Figure 2: Indicative Proposals Plan (Aerial View)



IBI Drawing No: BGW2-IBI-PB-GF-SK-A-F100-0006



Figure 3: Proposed Structure



BMBC propose to refurbish the public realm of existing town centre retail streets and spaces by providing a high quality pedestrianised environment (whilst accommodating service and emergency vehicles). This will include new paving surfacing, seating structures, water features, tree and shrub planting and permanent market stall structures. The public realm works will be associated with the Glass Works development, but stretch beyond this immediate area to link with the surrounding streets and spaces. Public realm works are planned at various locations within the town centre, and will include the development of the following new squares and streets:

- The new Glass Works Square (approximate footprint of temporary Indoor May Day Green Market);
- Covered Arcade Walkways within Glass Works development; and
- Service Road adjacent western side of the railway line.

Further details of the proposed works, together with an 'Inclusive Design' assessment is provided within IBI Group 'Barnsley (Town Centre Regeneration) Design and Access Statement', (February 2018). For ease of reference, **Appendix B** contains the 'Public Realm General Arrangement Plan'. The 'Barnsley Town Centre Transport Assessment' (AECOM, 2015) has considered the closure of the level-crossing in terms of traffic impact.

As part of public realm proposals, the area to the west of the footbridge will become pedestrianised, including Kendray Street and the existing MSCP/service yard access roads. Midland Street will also be closed to traffic at the northern end (with Eldon Street), with drop kerbs and signage indicating the proposed pedestrian zone (with loading access only).

It is proposed that the gated access to Platform 2 will remain, to continue access to the railway station from Kendray Street. Pedestrians associated with this access will have the opportunity to route around or under the western end of the footbridge, within the identified proposed pedestrianised area.

At this stage, the pedestrian facilities on the eastern end of the proposed bridge will remain as existing. However, the area immediately adjacent to the existing level crossing will become footway in combination of the closure of the level-crossing to both vehicles and pedestrians (see **Appendix B**).



### 3. Survey Data Assessment

#### 3.1 Pedestrian Survey Overview

Pedestrian count surveys have been undertaken within the local area to inform the determination of the proposed pedestrian bridge in terms of both deck-width and the width of the stairways. The data has also been used to undertake a desire-line assessment within the vicinity of the pedestrian bridge.

The surveys were undertaken at the following three locations within Barnsley Town Centre in order to understand the level of pedestrian activity across existing railway crossing-points to the east of the town centre:

- The existing level-crossing point along Kendray Street;
- Lambra Road junction with A628 Pontefract Road; and
- Bus / Railway Station (Barnsley Interchange).

Short interviews were also undertaken at the Barnsley Interchange footbridge to determine the level of pedestrians using the interchange footbridge solely as a pedestrian crossing facility to aid movement between Eldon Street / Midland Street and Schwabisch Gmund Way.

The surveys were undertaken on three separate survey days, as summarised in **Table 1**. The following survey days were identified in order to provide a comparison between standard weekday, non-match and match day Saturday pedestrian movements.

Table 1: Pedestrian Survey Scenarios

Scenario	Survey Date	Survey Time
Standard Weekday	Tuesday 6th February, 2018	07:00 – 18:30hrs
Standard Saturday	Saturday 3 <sup>rd</sup> February, 2018	10:00 – 17:00hrs
Saturday Match-Day	Saturday 10 <sup>th</sup> February, 2018	10:00 – 17:00hrs

Interviews were not undertaken at Barnsley Interchange on match-day, as the interchange footbridge is often closed/managed during busy match-day periods and would not provide representative data.

The surveys were classified using the following classes of pedestrian:

- Adult;
- Child (accompanied – including pushchairs);
- Child (unaccompanied);
- Elderly;
- Pedestrian with Mobility Aid;
- Pedal-cycle; and
- Pedal-cycle with child tow bike/trailer.

## 3.2 Survey Analysis

The surveys were summarised into 5-minute periods. In terms of pedestrians using the existing Kendray Street level-crossing, peak pedestrian flows were identified as follows:

Table 2: Peak Period Summary

Survey Day	Peak 5 min Period	Level Crossing Flows
Standard Weekday	15:25 – 15:30	65
Standard Saturday	12:40 – 12:45	89
Saturday Match-Day	14:20 – 14:25	1217

All of the presented flows include all pedestrians and cyclists included in the identified survey classifications.

It can be seen that the match-day peak period pedestrian flows are considerably higher in comparison to standard weekday/Saturday flows, thus providing the worst-case baseline flows. The peak pedestrian flow across the existing level crossing took place on a match-day (post-match at 14:20hrs), although maximum flows were also derived for the standard weekday and standard Saturday, for comparison purposes.

It should be noted that the match-day survey was undertaken when Barnsley Football Club (FC) played Sheffield Wednesday, expected to be one of the most popular games in terms of attendance. A comparison of attendance at the Oakwell Stadium is summarised below, also including the Leeds Utd fixture which is also expected to attract a high level of attendance:

Table 3: Oakwell Stadium Attendance

Match	Attendance	Stadium Capacity
Average attendance (2016/17 season)	13,735	59%
Leeds Utd: Saturday 25 <sup>th</sup> Nov 2017	16,399	70%
Sheffield Wed: Saturday 10 <sup>th</sup> Feb 2018 (Survey)	16,858	72%

Match-day attendance for the 2017-2018 season is provided within **Appendix C** (based on available data). An assessment of historic attendance statistics suggests that the surveyed match-day pedestrian flows are likely to provide a robust data-set in comparison to average attendance figures and similar popular matches such as derby games.

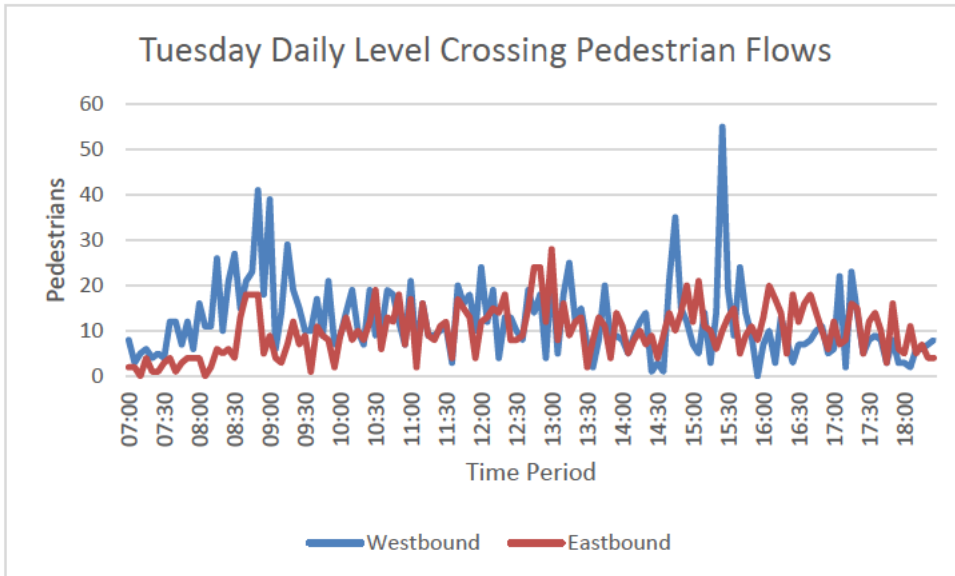
### 3.2.1 Desire-Line Analysis

The desire-line analysis uses the recorded pedestrian data and information gathered during a site visit to allow study of pedestrian desire-lines within the vicinity of the level-crossing, and how such routes are likely to change through the provision of the proposed pedestrian bridge and surrounding town centre regeneration plans.

**Section 2.1** has detailed the existing pedestrian facilities within the vicinity of the level-crossing, whilst **Section 2.2** outlined pedestrian improvements associated with the surrounding public realm works.

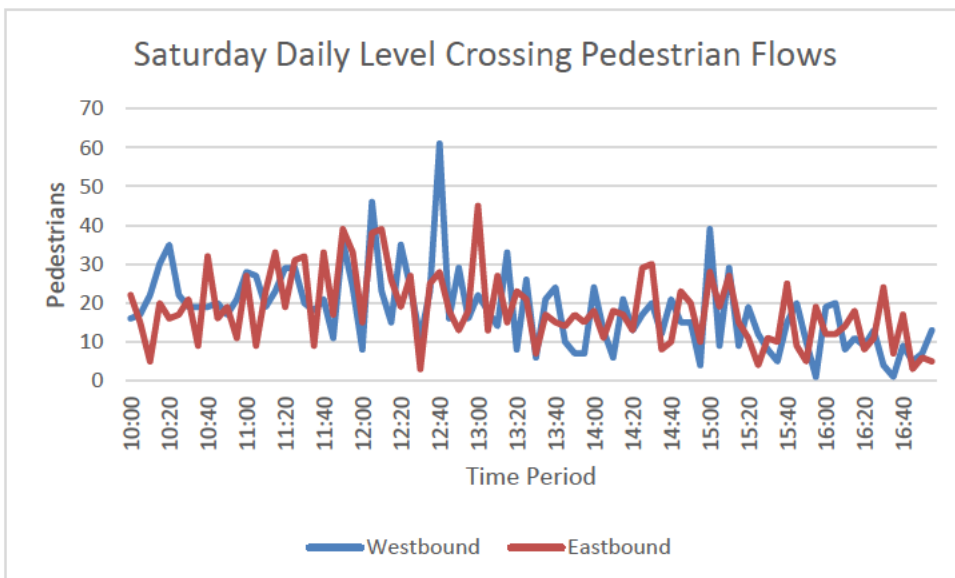
In terms of the daily profile of pedestrian movement within the vicinity of the level crossing, the following figures demonstrate how westbound and eastbound pedestrian movements can vary throughout the day:

Figure 4: Level Crossing Pedestrian Flows – Tuesday Daily Profile



A total of 1675 pedestrians were observed to travel westbound (towards the town centre) during the 11-hour weekday survey period, with 317 less (1358) travelling in an eastbound direction (away from the town centre). The above demonstrates that westbound movements appear to show a morning and afternoon peak (at around 09:00hrs and 15:30hrs), whilst eastbound movements appear slightly more skewed towards the noon/afternoon periods. This demonstrates an expected tidal movement between the town centre and the residential areas to the east of the railway.

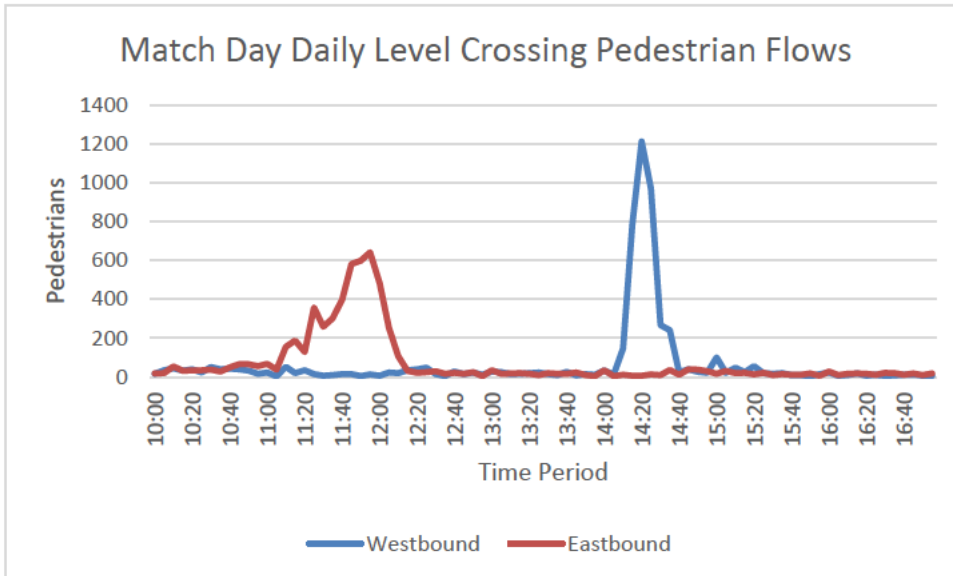
Figure 5: Level Crossing Pedestrian Flows – Saturday Daily Profile



A total of 1521 pedestrians were recorded travelling westbound, with a slightly higher level (1533) crossing towards the east. Saturday pedestrian movement in both directions appears to vary throughout the day, with westbound peaks observed at around 12:40hrs and again at 15:00hrs. The peak eastbound

flows are shown to occur at around 13:00hrs.

Figure 6: Level Crossing Pedestrian Flows – Match-Day Daily Profile



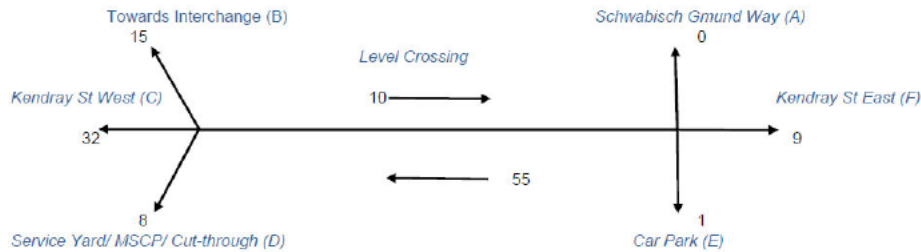
A total of 5337 pedestrians crossed the level crossing in a westbound direction during the match-day survey period, with a higher figure (6063) travelling eastbound. Although it is recognised that the survey data will include both fans and other pedestrians associated with the town centre, the above demonstrates a clear tidal profile which can be associated with the flow of pedestrians routing towards the Oakwell Stadium prior to kick-off (eastbound movements), and those departing following the final-whistle (westbound movements).

It appears that fans travel towards the stadium across a wider timeframe, whilst the sharp increase in westbound movement takes place across a more condensed 20 to 30-minute period. A high number of fans will be required to route across the level crossing when arriving by public transport (mainly by bus – with the bus station situated to the eastern side of the interchange), or utilising the high level of car parking provision towards the town centre (to the west).

Whilst the above diagrams show how pedestrian flows across the level-crossing vary by each direction during the course of the surveyed days, detailed analysis of the identified 5-minute peak-period has been undertaken to identify the key pedestrian routes. The pedestrian flows within the vicinity of the existing level-crossing are presented below:



Figure 7: Level Crossing Pedestrian Flows – Tuesday Peak

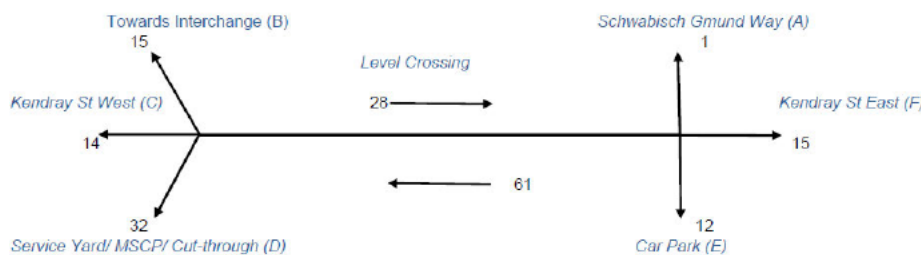


With reference to the above Tuesday flows, it has been demonstrated that majority of pedestrians (55) move westbound across the level crossing during the peak 5-minute period. Of those travelling in this direction, most (32 / 58%) continue ahead along Kendray Street West, with 15 (27%) turning right towards the interchange. The remaining 8 (15%) bare left towards the service yard/MSCP/cut-through route.

Ten pedestrians were observed to travel eastbound across the level crossing, with the vast majority (9 / 90%) continuing ahead along Kendray Street East. Pedestrian flows in the CEAG site car-park are minimal, with no flows observed northbound along Schwabisch Gmund Way.

It should be noted that pedestrian flows associated with Arm B (the interchange) also include pedestrians routing to/from the gated access to the railway station (Platform 2). However, this gate was closed during the match-day survey (Figure 7).

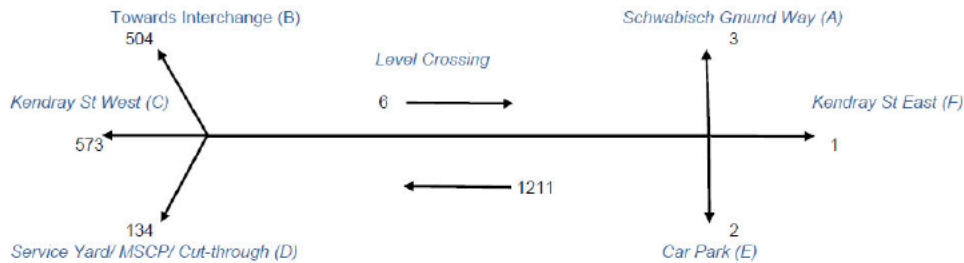
Figure 8: Level Crossing Pedestrian Flows – Saturday Peak



In-line with the Tuesday survey, the majority of pedestrians (61) move westbound across the level crossing during the peak period. However, most of these pedestrians (32 / 53%) head towards the service yard/MSCP/cut-through route. Fifteen (25%) then travel towards the interchange with the remaining 14 (23%) continuing ahead along Kendray Street West.

Of the 28 pedestrians travelling eastbound, 15 (54%) continue ahead along Kendray Street East and 12 (43%) turn right into the former CEAG site car-park. Again, minimal flows (1 / 3%) were recorded towards Schwabisch Gmund Way).

Figure 9: Level Crossing Pedestrian Flows – Match-Day Peak

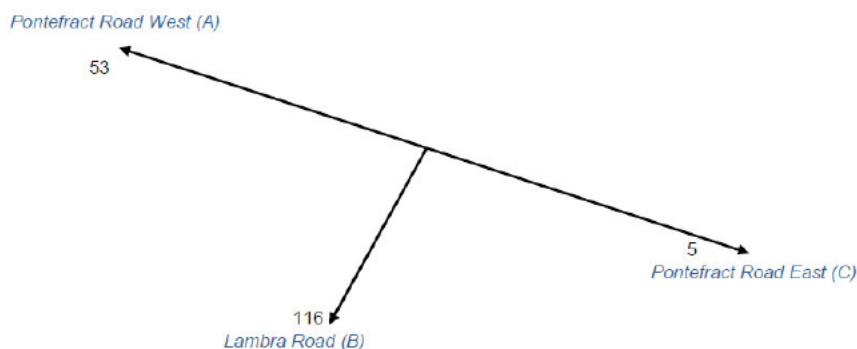


As shown in the above, a total of 1211 pedestrians travel westbound across the level crossing within the peak-period, coinciding with the timing of fans departing the Oakwell Stadium. The distribution of fans is split relatively evenly between Kendray Street West (573 / 47%) and the interchange (504 / 41%), with 134 (11%) walking towards the towards the service yard / MSCP / cut-through route.

As expected, eastbound pedestrian movement during this time period is minimal, totalling 6 pedestrians. Post-match eastbound pedestrian movement is likely to be restricted due to the significant number of pedestrians moving in the opposing direction. Of the six pedestrians moving east, 3 (50%) head northbound along Schwabisch Gmund Way, 2 (33%) route towards the CEAG site car park and one (7%) continues ahead along Kendray Street east.

Pedestrian movement within the vicinity of the Lambra Road junction has been observed to be very low during the non-match survey days, however, such flows rise considerably during the match-day peak-period:

Figure 10: Lambra Road Pedestrian Flows – Match-Day Peak



The above shows that a total of 169 pedestrians arrive from Pontefract Road East, with the vast majority assumed to be fans departing the Oakwell Stadium. The majority (116 / 69%) turn left to travel along Lambra Road, with 53 (31%) continuing along Pontefract Road.

It is expected that the 53 travelling north along Pontefract Road would continue onto Kendray Street due to the limitation of alternative routes. Those wishing to travel further to the west would be required to cross the level-crossing, with those wishing to travel towards the eastern side of the interchange (the railway station) crossing Kendray Street at some point to route along Schwabisch Gmund Way.

As detailed within **Section 4**, pedestrian flows across the proposed pedestrian bridge are likely to increase in the future due to various factors. It is anticipated that the town centre regeneration proposals will increase local pedestrian demand, further amplified by the attractiveness of the proposed pedestrian bridge as a railway crossing facility (i.e. a diversion of pedestrians may take place from other crossing facilities including the interchange to the north and Lambra Road to the south). However, it is noted that proposals are being considered to either close Lambra Road to vehicular traffic, or to signalise the junction including controlled pedestrian crossing facilities (as outlined within the Barnsley Town Centre Transport Assessment, 2015). Depending on the town centre proposals within the vicinity of the Lambra Road / Pontefract Road junction, this may continue as a popular pedestrian route, particularly on match-days.

In consideration of the proposed pedestrian bridge, the findings of the pedestrian desire-line assessment are as follows:

- Match-day pedestrian flows show a clear tidal profile with the majority of pedestrian movement travelling eastbound prior to kick-off, and westbound following the final whistle. This demonstrates that the desire-line of a considerable number of fans will continue across the proposed pedestrian bridge, with a safer environment provided by the wider pedestrianised area to the west. However, this desire-line may change with a review of town centre parking availability and any change in crowd management techniques.
- Pedestrian flows associated with the MSCP / service yard / cut-through (to the west) will be restricted with the town centre regeneration works. However, the pedestrianisation of Kendray Street West together with the formation of 'Glass Works Square' will provide a safe environment for the majority of westbound pedestrians wishing to access this part of the town centre from the pedestrian bridge, and those travelling towards the bridge from this area.
- Desire-lines to / from the western side of the Barnsley Interchange will not be affected as pedestrians will still be able to access the Platform 2 gate (excluding match-days). The pedestrian environment routing towards the various interchange access points along Midland Street will be greatly improved with the formation of the pedestrian only zone.
- To the east of the pedestrian bridge, some pedestrians (continuing ahead) would not conflict with the CEAG site car-park access as the bridge will continue over this access. However, those wishing to travel north towards Schwabisch Gmund Way (and towards the railway station access) would be required to follow-back the alignment of the bridge at street-level and cross the car park access to route along the western side of the highway. The retention of guard-railing along the southern side of Kendray Street would prohibit the crossing of pedestrians at this difficult and dangerous location.
- It is expected that pedestrian crossing facilities to the east of the proposed pedestrian bridge would remain to be perceived as fragmented due to the nature of the highway layout and volume of traffic routing along Kendray Street / Pontefract Road. Although it is recommended that pedestrian flows to / from the stadium will still require a level of crowd management along Bala Street and Pontefract Road South, there is an opportunity for pedestrian crossing facilities and footways to be improved directly to the east of the proposed pedestrian bridge in order to cater for pedestrians generally associated with the town centre.



## 4. Pedestrian Bridge Capacity Assessment

The following assessment scenarios have been taken forward to determine the projected pedestrian demand across the proposed pedestrian footbridge, to determine the minimum requirements in terms of deck-width and stair-width. All scenarios consider the peak-period pedestrian flows as summarised in Table 2:

Table 4: Bridge Capacity Assessment Scenarios

Scenario	Detail
A	2018 baseline pedestrian flow data.
B	100% of interchange 'through' movements to the proposed bridge (excluding match-day) and 50% of recorded Lambra Road movements.
C	100% Interchange transfer + 50% Lambra Road transfer + Increase in match-day flows assuming 100% stadium attendance
D	100% Interchange transfer + 50% Lambra Road transfer + Increase in match-day flows assuming 100% stadium attendance + 10 years population growth
E	100% Interchange transfer + 50% Lambra Road transfer + Increase in match-day flows assuming 100% stadium attendance + town centre growth
F	100% Interchange transfer + 50% Lambra Road transfer + 10 years population growth
G	100% Interchange transfer + 50% Lambra Road transfer + town centre growth

\*Note population growth and town centre growth factors are interrelated.

The above assessment scenarios have been based on the following assumptions:

- Pedestrians utilising the existing Barnsley Interchange footbridge solely as a crossing facility have been observed to be minimal. However, 100% of these pedestrian trips have been transferred to the proposed footbridge in the relevant scenarios (excluding match-days when this movement is restricted), as it is anticipated that the proposed bridge may attract a transfer of trips due to increased safety perceptions, and the removal of restricted movements associated with the level-crossing barrier control.
- Minimal Lambra Road pedestrian movement has been recorded during the weekday/standard Saturday surveys, increasing significantly during match-days. Accordingly, 50% of match-day pedestrian flows to/from Lambra Road have been transferred to the projected pedestrian bridge flows due to the attractiveness of the crossing as outlined above.
- Scenarios C, D and E consider 100% occupancy of the Oakwell Stadium on match-days by factoring assumed pedestrian 'fans' to replicate 100% stadium capacity.
- BMBC population growth predictions (March 2016) have been used to determine a 10-year timeframe from 2018 – 2028; and
- Town centre growth has been based on a 70% increase in town centre pedestrians (movement



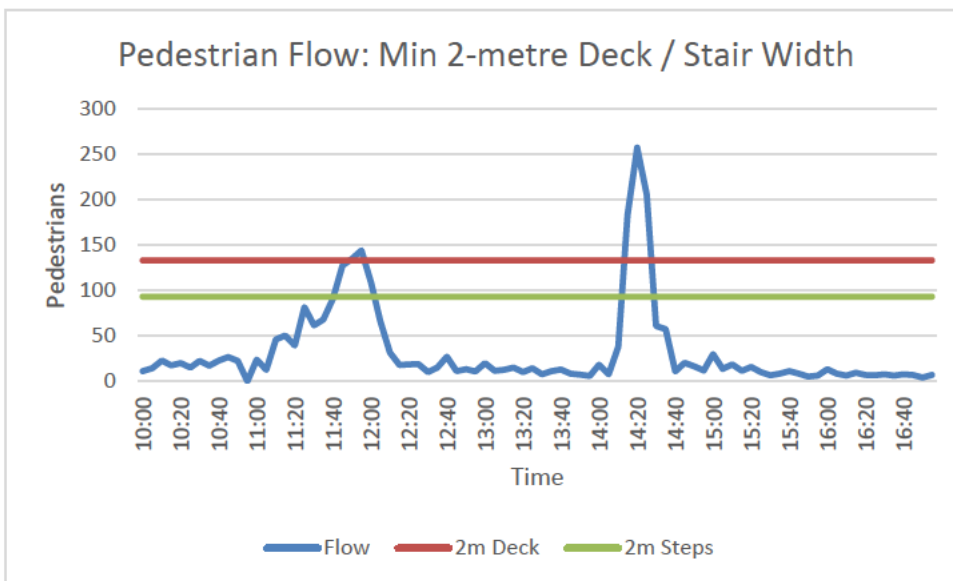
assumed to be associated to/from the Glass Works site) based on the 2015 Barnsley Town Centre Transport Assessment.

A table detailing each assessment scenario for each of the three assessment days is provided within **Appendix D**, together with the resultant minimal widths required for the bridge-deck and stairs (based on DMRB BD29/17). It can be seen that the minimum 2-metre deck width and stair width (based on BD29/17 minimums) would comfortably accommodate the peak pedestrian flows for all weekday and non-match Saturday assessment scenarios. However, requirements increase up to 5.5-metres deck-width and 7.9-metre stair-width for the worst-case scenario (Scenario E - Baseline + Interchange + Lambra Rd + 100% Stadium Attendance + Town Centre Growth).

Based on discussions with BMBC and with reference to historical match-day attendance statistics, it is understood that 100% Oakwell Stadium occupancy can be considered to be a very rare occurrence (if ever), and as such, **Scenario G (Baseline + Interchange + Lambra Rd + Town Centre Growth)** has been taken forward as robust, yet realistic assessment as this takes into account the 72% stadium attendance with reference to the match-day assessment scenarios.

The following graphs provide a comparison of daily match-day assessment flows in relation to the 2-metre deck/stair width minimums and the finalised bridge design widths:

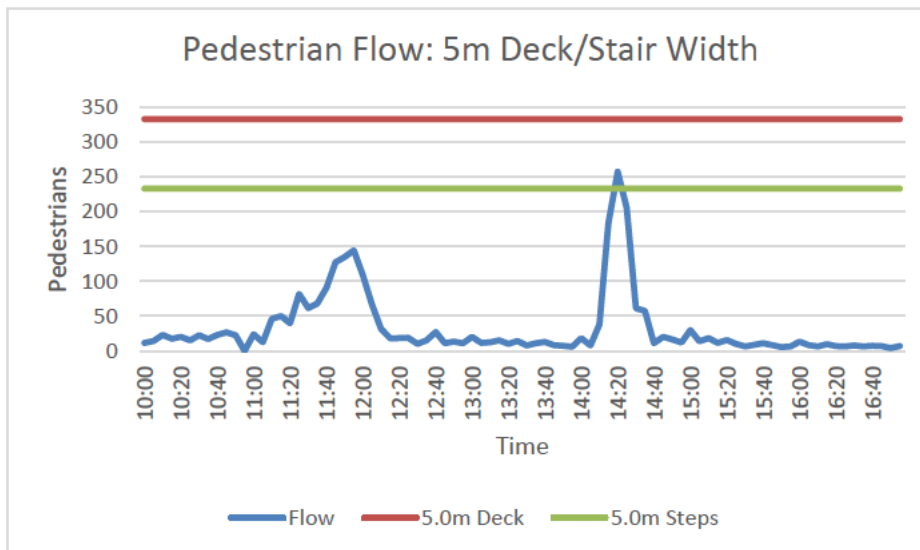
Figure 11: Match Day Bridge Capacity – 2 Metre Minimum Deck and Stair Width



The above graph demonstrates that a pedestrian bridge constructed to the minimum requirements in terms of deck and stair widths would accommodate pedestrian flows throughout the majority of the day. However, pedestrian flows would exceed the stair capacity for 20-minutes and deck capacity for 10-minutes (prior to the match kick-off), and for 15-minutes in consideration of both deck and stair capacity, following the final whistle.

With reference to the proposed design widths (with both the minimum stair width and full clearance across the bridge at 5 metres), pedestrian flows would slightly exceed the stairway capacity for a short period of time, during the 5-minute peak period between 14:20 – 14:25. The bridge deck would comfortably accommodate all pedestrian flows throughout the day:

Figure 12: Match Day Bridge Capacity – Final Design Deck and Stair Width



Further analysis indicates that the stair width capacity would be exceeded by 24 persons over the 5-minute peak period, equating to 4 - 5 pedestrians per minute. However, it should be noted that:

- The pedestrian survey data is based on a stop-start flow over the level-crossing whilst the level crossing is opened and closed. A constant flow of pedestrians would therefore be permitted with the proposed pedestrian bridge and as such, a build-up of pedestrians would be unlikely;
- The forecast flows are based on robust assessment (Scenario G), taking into account a transfer of pedestrians from both the Interchange pedestrian bridge and Lambra Rd together with future Town Centre Growth;
- Along the majority of the proposed stairways, widths will generally be wider, starting at 7.5m to the west and 9.7m to the east and tapering down to 5 metres upon approach to the bridge deck for a short distance; and
- A proportion of pedestrians would utilise the adjacent lift facility rather than the stairs (see Section 4.1). At the identified peak period where the stair width capacity would be exceeded, it is estimated that 9 pedestrians would require access to the bridge deck via the lift rather than the stairs.

Based on both the minimum requirements and the proposed design, the pedestrian bridge would comfortably cater for general pedestrian movement during the week and non-match Saturdays. Match-day demand is shown to peak considerably over two relatively short time-periods. Whilst it has been shown that the bridge deck design would accommodate match-day pedestrian flows, initial analysis indicates that the stairways may operate in excess of capacity during one of the identified 5-minute peak period. Due to the additional factors bulleted above, it is considered that the existing stair width design would not give rise to any operational or safety concerns, however, it may be necessary to continue a level of crowd management within the vicinity of the proposed footbridge (and stairways) during these busy times.

## 4.1 Lift Capacity

In order to understand potential demand for the lift, consideration has been given to those pedestrians who may be more inclined to use the lift facility rather than the pedestrian bridge stairways:

- Child (accompanied – including pushchairs);
- Elderly;
- Pedestrian with Mobility Aid; and
- Pedal-cycle with child tow bike/trailer.

In order to provide a robust assessment, it has been assumed that 100% of pedestrians with a mobility aid and 100% of cyclists with a child tow bike/trailer would use the lift. Fifty percent of the pedestrians within the remaining two categories have also been taken forward to provide the following lift demand (based on the 2018 survey data):

Table 5: Existing Demand (Per 5-Minute Period)

Survey Day	Max Demand Eastbound	Max Demand Westbound
Tuesday	6	8
Saturday	4	7
Match Day	13	34

The above maximum demand for the eastbound and westbound lifts do not necessarily correlate to the same 5-minute period. It should also be noted that average demand over the three survey days is relatively low at 1 – 2 pedestrians per 5-minute period.

In terms of future lift demand, consideration has been given to the Scenario G (Baseline + Interchange + Lambra Rd + Town Centre Growth) pedestrian flow data.

Table 6: Projected Lift Demand (Per 5-Minute Period)

Survey Day	Max Demand Eastbound	Max Demand Westbound
Tuesday	9	14
Saturday	7	11
Match Day	16	38

As shown in the above the above table, the maximum lift demand takes place on a match-day, with 38 users wishing to travel westbound and 16 wishing to travel eastbound.

The proposals include the provision of a 26-person, 2000kg capacity lift to both ends of the bridge. The internal lift car dimensions are 1500mm x 2700mm. This lift car size has been chosen to cater for bicycles, tandems, pushchairs and mobility scooters.

The anticipated 5-minute lift capacity has been calculated in accordance with CIBSE Guide D, Transportation Systems in Buildings, as follows:

Table 7: Lift Capacity

Person access time = 1.2s per person	Assume up to 40 seconds
Door closing time	3 seconds
Speed = 1 metre per second	5 metre height = 5 seconds
Door opening time	2.5 seconds
Person egress time = 1.2s per person	Assume up to 40 seconds
Total (one way)	91 seconds

Each lift would be capable of accommodating up to 85 persons per 5-minute period in both directions (eastbound and westbound), equating to circa. 42 people in each direction. The proposed lift would therefore accommodate all scenarios, including peak match-day demand.



## 5. Accessibility Review

### 5.1 Existing Access and Inclusion Issues

As discussed, pedestrian movement within the vicinity of the level-crossing appears to be complex due to the various roads, railway lines and access points pedestrians have to negotiate within a confined area. Such difficulties are amplified by the temporary obstruction to pedestrian when the barriers are lowered at the level-crossing to allow trains to pass, which can give rise to crowding on either side of the barriers, especially on (home) match-days (with the Oakwell Football Stadium situated only 550 metres to the east). It has also been noted that corduroy surfacing is also absent on the footway approach to the level-crossing which would provide advice to visually impaired people of the potential hazard ahead.

There are obvious safety issues associated with level-crossings, exasperated due to the location of the level-crossing in a town-centre setting, and associated issues with the safe dispersal of crowds once the barriers are raised.

For pedestrians with a disability, using a level crossing can be a challenge:

*“Level crossings present pedestrians with a variety of visual and audible messages, and require users to cross a surface that may pose physical challenges due to its structure, gradient and exposure to the track. Pedestrians with sensory, physical or cognitive impairments may be less able to cross safely because of these factors.*

*For example, pedestrians who are blind may not know that they are approaching a level crossing whilst pedestrians who are deaf may be unable to hear the audible warnings that signal when a crossing is about to close. Wheelchair users and pedestrians with other mobility problems may find it difficult to cross the railway when there are gaps present (i.e. the flangeways that create an open passage through the crossing surface for train wheels to pass). These concerns were raised by the Disabled Persons Transport Advisory Committee for Rail (DPTAC Rail) together with the Joint Committee on the Mobility of Blind and Partially Sighted People (JCMBPS).” (RSSB, 2011).*

Level-crossings can also pose a safety issue for cyclists due to the gaps between and the material of the rails, especially when travelling diagonally. Similar issues may also be experienced by pedestrians with a pushchair across the level-crossing.

With reference to the above, it is clear that level-crossings are perceived by many pedestrians as being dangerous, with the local user-groups identifying issues potential concerns in relation to the proposed pedestrian bridge. Such issues will be alleviated with the provision of a dedicated footbridge which will be designed in-line with mobility consideration standards (see **Section 3.3**), and provision of a dedicated lift.

Barnsley’s Town Centre Equality Group (‘In Town Group’) have been consulted on the proposals. Overall, the group are in favour of the proposals and can see that the new bridge and associated highway works will improve safety and access to the town centre. The group have asked that careful consideration be made to the the balustrades, the bridge deck camber, appropriate seating areas (including wheelchair spaces) and impacts on accessibility within the wider area.

### 5.2 Footbridge Accessibility

In light of discussions with BMBC Access and Inclusion Officers, Barnsley’s ‘In Town Group’ and in consideration of the existing issues associated with various pedestrians and the level-crossing, it is fundamental that the proposed pedestrian bridge must work to promote and encourage pedestrian movement within the local area:

*The principal purpose of footbridges is to facilitate and encourage walking and cycling whilst ensuring*

*safety for all road users. The design of crossing provided shall therefore be such as to encourage people to use it, addressing the needs of all likely users, taking account of likely pedestrian flows and movements, and to encourage people to regard walking or cycling as an acceptable mode of transport.*

*The design shall address the needs of all users, including access for wheel chairs and mobility scooters, and people with prams and buggies.” (DMRB BD29/17, 2017).*

With reference to the above, the design and bridge structure has been developed in order to cater everyone.

Firstly, the proposed lift will provide a level platform at both ends of the pedestrian bridge to enable the movement of pedestrians (including those with pushchairs and mobility-aids) between street-level and the bridge deck.

As discussed, each lift will have a maximum capacity of 26-persons (although it is noted that additional space will be taken by users with pushchairs/mobility-aids and bikes with trailers), being able to transport approximately 39 users to/from the bridge deck per 5-minute period. Based on the pedestrian data assessment, it has been shown that the facilities will cater for the majority of peak demand requirements. However, it is anticipated that some queuing may take place during match-day peak periods and as such, it is recommended that a level of management takes place within the queuing area where it may become very busy with passing crowds. However, lift demand within the five-minute periods before and following the identified peak are minimal and so it is expected that any queuing would dissipate fairly quickly.

In the event that either of the lifts were to become temporarily out-of-service, pedestrians who are unable to use the bridge steps would be required to utilise the existing Barnsley Interchange footbridge, which can be accessed via lifts from street-level on both sides of Barnsley Interchange. It noted that this would be an inconvenience due to the Barnsley Interchange bridge being situated approximately 100 metres to the north and away from initial desire-lines. However, it is anticipated that this would be an infrequent occurrence.

In terms of the bridge structure, accessibility standards have been applied which also take into consideration the majority of concerns raised by Barnsley’s ‘In Town Group’. A summary of the appropriate standards is provided as follows:

- Access stairs to footbridges shall comply with the dimensional and safety requirements of BS 5395 for ‘public’ stairs, except as amended within BD29/17.
- The number of risers in a single flight shall not be more than 13.
- A maximum of three successive flights may be used in line, provided any adjacent flights provide a change in direction of at least 30 degrees.
- The risers and treads of each step in a flight of stairs shall be uniform and risers shall not be variable in height over their width. The risers shall be not more than 150mm.
- The tread width shall be not less than 300mm and not greater than 350mm.
- Landing lengths shall be not less than 2 metres, or not less than the width of the stairs, (whichever is the greater).
- Handrails should be provided on both sides of stairs, designed in accordance with BS 8300. Additional central handrails shall be provided where the width of the stairs exceeds 3 metres.
- Handrails should be of a contrasting colour to the parapet to which it is attached to aid those with visual impairment.
- The bridge deck/walkway surfacing system should address resistance to slip. Exposed gaps in walkway surfaces shall not be in excess of 12mm in width with cover plates and joints set flush to prevent tripping.

- All bridge spans, ramps and stairs shall be provided with parapets, conforming to TD19 (DMRB 2.2.8), or when implemented, by EN1317 Part 6.
- Illumination of the footbridge shall be bright and constant to ensure that all walkway surfaces, stairs and handrails are visible.

The pedestrian bridge will be designed with a slight camber (no steeper than 1:25), which would be comfortable for wheelchair users or those with mobility issues. In order to assist the visually impaired, corduroy surfacing will be implemented at both street-level and bridge deck upon approach to the steps and lifts.

Upon approach to the pedestrian bridge, cyclists will be required to dismount. Although cyclists will have the opportunity to utilise the bridge's lifts, manual wheel-ramps will be installed along the steps to each aspect of the pedestrian bridge which should act as an easier and more direct alternative to the lifts. The wheel-ramps will be installed as close as possible to the parapets and will be of a bright contrasting colour in consideration of visually impaired pedestrians.

In consideration of the associated highway works which are to take place to facilitate the pedestrian footbridge, it is anticipated that area will become more 'pedestrian friendly' due to the surrounding pedestrianised areas with less opportunity for pedestrian/vehicles conflict. The local pedestrian environment will also be improved by the provision of the integrated (street-level) seating areas to each aspect of the bridge and other town-centre activities which may take place, particularly to the western end of the bridge.

## **6. Construction Period Management**

Network Rail require that the level-crossing is to be closed to both pedestrians and vehicular traffic from March 2019. Network Rail has therefore designed and procured a temporary pedestrian bridge structure which will facilitate pedestrian movement following closure of the level-crossing and up to a point when the new pedestrian bridge is commissioned.

Vehicle access into the CEAG site car-park will also be closed during the construction period, with parking diverted to alternative car-parks within the town centre. Pedestrians associated with such vehicles would therefore temporarily relocate elsewhere.



## 7. Summary and Conclusion

Waterman Infrastructure and Environment (WIE) has been commissioned to undertake the structural design of the proposed Market Gate Pedestrian Bridge, which will span over the existing level-crossing at Kendray Street, Barnsley Town Centre.

As part of the design process, WIE has undertaken an Accessibility & Desire-line Assessment. The overall scope of the report is to undertake an accessibility review together with a desire-line assessment, taking into consideration the existing situation and how pedestrian dynamics will change following implementation of the pedestrian bridge. The report has identified how existing mobility issues within the vicinity of the level-crossing are likely to be alleviated with the provision of a dedicated pedestrian bridge.

This report has also provided an overview of the management of pedestrians following closure of the level-crossing and during the pedestrian bridge construction period. An assessment of bridge capacity design has also been provided.

In consideration of the pedestrian survey data, it is clear that the existing level-crossing is, and will continue to be a popular route for pedestrians due to the town centre and its associated facilities. This is further amplified by the proximity of the crossing to the Oakwell Stadium, Barnsley Interchange and the future Barnsley Town Centre regeneration proposals.

It is anticipated that the public-ream works which will be implemented alongside the proposed pedestrian bridge will work in partnership to create a safe and pleasant environment for all. However, it has been noted that pedestrian facilities to the east of the proposed bridge are somewhat fragmented, and do not meet current pedestrian desire-lines. It is therefore recommended that such facilities are improved in the future, especially in consideration to routes to the Oakwell Stadium.

A number of future-year assessment scenarios have been presented to inform the deck-width and stair-width minimum requirements of the proposed pedestrian bridge. It has been shown that the standard minimum requirements would cater for general pedestrian traffic, although there may be short time periods during match-days when pedestrian demand may marginally exceed capacity, particularly in relation to the stair-widths. However, it should be noted that the assessments have been based on a robust assessment as detailed herein, mainly with reference to the stop – start nature of the pedestrian survey data and associated build-up of pedestrians when the level-crossing barriers are lowered.

Based on the pedestrian data assessment, it has been shown that the proposed lifts will cater for all of the peak demand requirements.

The report has demonstrated that level-crossing facilities can be perceived as a danger by some, especially by those with a disability. Although the proposed pedestrian bridge will work to provide a safe, dedicated crossing facility at a location currently with some associated dangers, constructing the bridge in consideration of accessibility standards is of paramount importance.

Alternative pedestrian routes have been identified for the period in-between the closing of the level-crossing and the opening of the new pedestrian bridge which will be coupled with appropriate signage and media coverage.

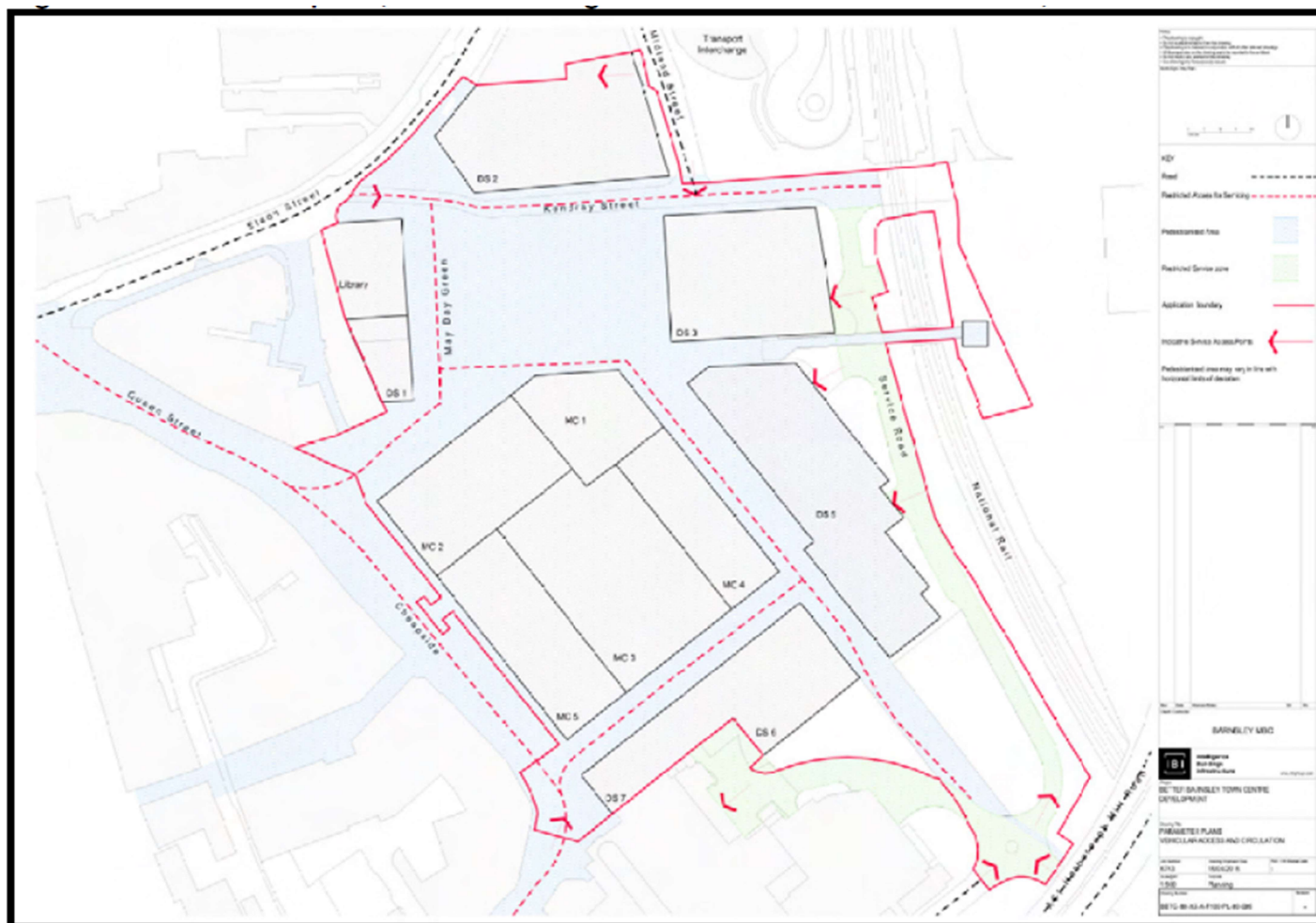
To conclude, it is clear that the proposed pedestrian bridge will cater for all users, due to a number of accessibility considerations which will feed into the surrounding public-realm improvements.

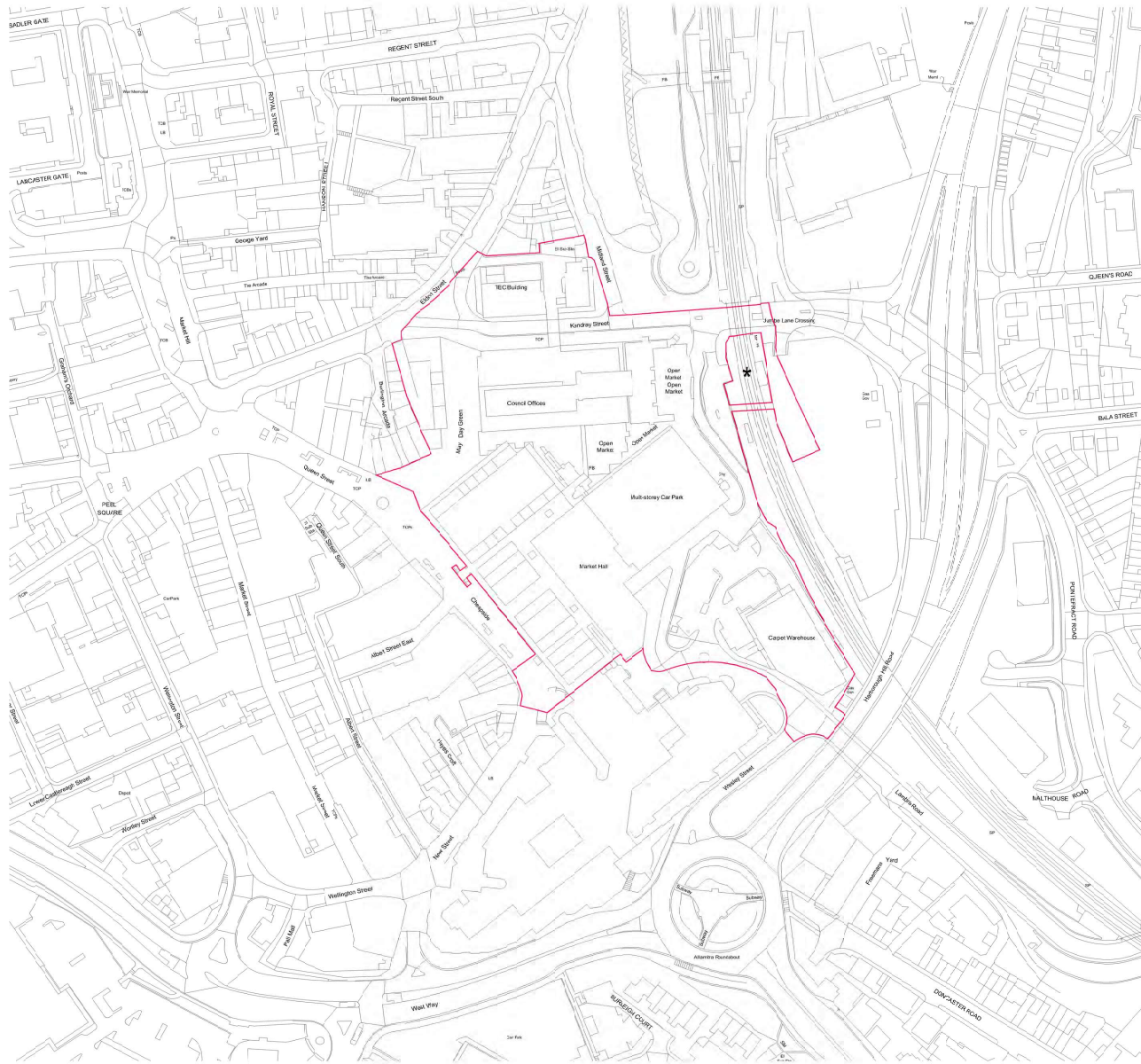


## **APPENDICES**

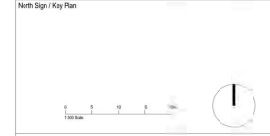


## **A. Barnsley Town Centre Regeneration Masterplan**





Notes:  
 - This drawing is copyright  
 - Do not scale dimensions from this drawing  
 - This drawing is to be used in conjunction with all other relevant drawings  
 - All discrepancies on this drawing are to be reported to the architect.  
 - Do not modify any element of this drawing.  
 - Use drawing only for purposes(s) listed.



**KEY**

Site Application Boundary —

For the avoidance of doubt this area of land is excluded from the application ★

Rev	Date	Revision Notes	Dr	Rv

Client / Contractor

**BARNSELY MBC**



Project  
**BETTER BARNSELY TOWN CENTRE DEVELOPMENT**

Drawing Title  
**LOCATION PLAN**

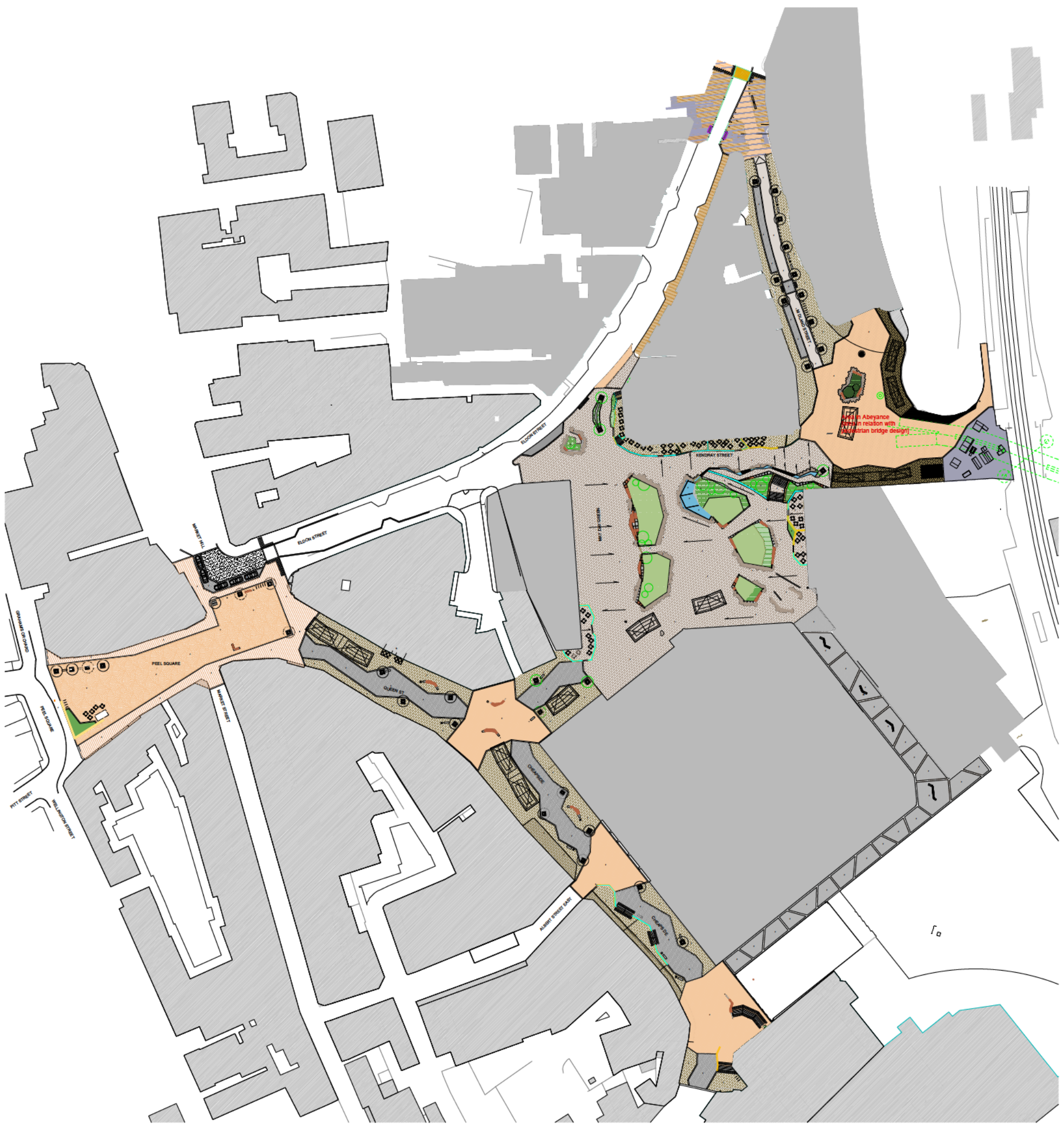
JOB Number	Drawing Originated Date	PAS / 100/ British Code
6743	15/04/2015	-
Scale/Alt	purpose	
1:1250	Planning	

Drawing Number	Revision
BBTC-IBI-XX-A-F100-PL-00-001	-



## **B. Public Realm General Arrangement Plan**





- LEGEND**
- Planning Application Boundary**
- EXISTING HARD SURFACES**
- Existing paving retained: Peal Square - Ke-ler paving
  - Existing paving retained: Eldon Street Market Hill - Southmoor paving
  - Existing paving bands retained: Eldon Street - Southmoor paving
- EXISTING KERBS**
- EK1 Kerb Type 1
  - EK2 Kerb Type 2
  - EK3 Kerb Type 3
  - EK4 Kerb Type 4
  - EK5 Kerb Type 5
- PROPOSED HARD SURFACES**
- P1 Paving Type 1: Tactile Hazard Warning Conduity Flags - Black Colour Flamed Finish Stack Bond
  - P2 Paving Type 2: Tactile Blister Flags - Black Colour Flamed Finish Stack Bond
  - P3 Paving Type 3: Natural Coated Concrete Setts - Grey & Buff Coours 2no. Finishes Stretcher Bond
  - P4 Paving Type 4: Natural Coated Concrete Flags - Grey & Buff Coours 2no. Finishes Stretcher Bond
  - P5 Paving Type 5: Yorkstone Flags - Grey/Blue Colour Wire Sawn Finish Stretcher Bond
  - P6 Paving Type 6: Granite Setts - Silver Grey Colour Cropped Finish Stack Bond
  - P7 Paving Type 7: Granite Flags - Warm colours Bush Hammered Finish Stretcher
  - P8 Paving Type 8: Indian Sandstone Flags - 4 no. Colours Sawn Finish Stretcher bond
  - P9 Paving Type 9: Granite structure - Mid Grey Colour TBC
  - P10 Paving Type 10: Steel Mesh Crate - Dials to TBC
  - P11 Paving Type 11: Granite Flags to sides and base of Water Rill - Mid Grey Colour Cropped
  - P12 Paving Type 12: Natural Coated Concrete Flags - Warm Colours 2 to 3 Fin shes
  - P13 Paving Type 13: Hot Rolled Asphalt with Chippings - Black coloured Asphalt with Buff Chippings
  - P14 Paving Type 14: Fan Pattern Granite setts - Warm colours Flamed and Bush Hammered Finish Bogen
  - P15 Paving Type 15: Yorkstone setts - Grey/Blue Colour Wire Sawn Finish Stretcher Bond
- SOFT SURFACES**
- G1 Grass Type 1 - Artificial
  - PL1 Planting Type 1 - See Planting Plan
- TREES**
- Proposed Tree
- PROPOSED STEPS / KERBS / TRIMS**
- S1 Step Type 1: Solid Granite Steps - Grey Colour with black contrasting colour band Flamed Finish
  - K1 Kerb Type 1: 300mm wide Flush Granite Kerb - Black Colour Flamed Finish
  - K2 Kerb Type 2: 300mm wide 125mm Upstand Granite Kerb - Black Colour Flamed Finish
  - K3 Kerb Type 3: 150mm wide 150mm Upstand Granite Kerb - Grey Colour Flamed Finish
  - K4 Kerb Type 4: 300mm wide 50mm Upstand Granite Kerb - Black Colour Flamed Finish
  - T1 Trim Type 1: 500mm wide Flush Granite Trim - Black Colour Flamed Finish
  - T2 Trim Type 2: Double row of Granite setts - Warm Colour Flamed Finish
  - T3 Trim Type 3: Single row of Granite setts - Silver Grey Colour to match acid rail Flamed Finish
  - E1 Edging Type 1: Laser Steel Edging - Grey Colour
- PROPOSED WALLS**
- W1 Wall Type 1: Solid Granite Seating Walls - Height Varies Grey Colour Cropped front face flamed top finish
  - W2 Wall Type 2: Clad Granite Walls - Height Varies Grey Colour Cropped Finish
  - W3 Wall Type 3: Low Brick wall - Buff Colour to match buildings Brick on Edge Coping
  - CSA Balustrade: Glass Balustrade - 900mm High with steel posts and handrail (fixed to W3 Wall)
  - W4 Wall Type 4: Granite Clad Structure top and walls - Polished Top Cropped Sides
- STREET FURNITURE**
- TG1 Tree Grille Type 1
  - HR1 Handrail Type 1 - Powder coated steel
  - Be1 Bench Type 1 - Wall mounted timber tops
  - Be2a Bench Type 2a - Timber bench - Concave
  - Be2b Bench Type 2b - Timber bench - Convex
  - Se1 Seat Type 1 - Timber & Steel Seat
  - Se2 Seat Type 2 - Timber & Steel Seat
  - RPL1 Raised Planter Type 1 - Steel Raised Planter with Artificial Plants
  - LB1 Litter Bin Type 1 - Steel Litter Bin
  - LB2 Litter Bin Type 2 - Steel & Timber Litter Bin
  - B1 Bollard Type 1 - Stainless Steel Fixed Bollard
  - B2 Bollard Type 2 - Stainless Steel Removable Bollard
  - CS1 Cycle Stand Type 1 - Stainless Steel Cycle Stand
  - FP1 Finger Post Sign - see wayfinding signage strategy
  - Outdoor Dining Furniture - Indicative only
- LEVELS**
- Existing Level retained
  - Proposed Indicative Level

**Revisions**

1	26/10/17	Initial design created - 1st of the weekend	DM	DM
2	26/10/17	Initial design created - 1st of the weekend	DM	DM
3	26/10/17	Initial design created - 1st of the weekend	DM	DM
4	26/10/17	Initial design created - 1st of the weekend	DM	DM
5	26/10/17	Initial design created - 1st of the weekend	DM	DM
6	26/10/17	Initial design created - 1st of the weekend	DM	DM
7	26/10/17	Initial design created - 1st of the weekend	DM	DM
8	26/10/17	Initial design created - 1st of the weekend	DM	DM
9	26/10/17	Initial design created - 1st of the weekend	DM	DM
10	26/10/17	Initial design created - 1st of the weekend	DM	DM

**Client Comments**

**IBI Intelligence Buildings Infrastructure** www.ibigroup.com

**BETTER BARNSELY TOWN CENTRE**

Drawing Title: **PUBLIC REALM GENERAL ARRANGEMENT PLAN - WHOLE SITE**

Job Number: 50035	Drawing Date: 26/10/17	Project Name: PRELIMINARY
Scale: 1:500	Author: [Name]	Check: [Name]
Drawing Number: BBTC_IBI_XX_L_6700_PL_00_02	Sheet: 1 of 1	Scale: E







## **C. Oakwell Stadium Attendance Statistics**

Date	Opponent	Attendance			
12/08/2017	Ipswich Town	12009	Total stadium capacity	23287	
15/08/2017	Nottingham Forest	13883	Ped Survey stadium capacity	16858	0.72 %
26/08/2017	Sunderland	15697	Average stadium capacity	13431	0.58 %
12/09/2017	Derby County	7163			
16/09/2017	Aston Villa	14633			
26/09/2017	Queens Park Rangers	10920			
14/10/2017	Middlesbrough	17163			
21/10/2017	Hull City	13624			
04/11/2017	Birmingham City	12946			
21/11/2017	Cardiff City	11051			
25/11/2017	Leeds United	16399			
09/12/2017	Derby County	13973			
26/12/2017	Preston North End	14014			
30/12/2017	Reading	11945			
13/01/2018	Wolverhampton Wanderers	16050			
27/01/2018	Fulham	12147			
10/02/2018	Sheffield Wednesday	16858			
20/02/2018	Burton Albion	11774			
13/03/2018	Norwich City	11508			
17/03/2018	Millwall	13041			
30/03/2018	Bristol City	12236			
07/04/2018	Sheffield United	16041			
14/04/2018	Bolton Wanderers	14138			
28/04/2018	Brentford	13137			

## **D. Capacity Assessment Summary**

Pedestrian Bridge Width Calculations

Scenario		Max Ped Flows Per Min		
		Tuesday	Sat	Match Day
A	Base Flows (Stadium @ 72%)	13	18	243
B	Base + Interchange + Lambra (Stadium @ 72%)	14	19	255
C	Base + Interchange + Lambra +Stadium @100%	14	19	350
D	Base + Interchange + Lambra +Stadium @ 100% + Pop Growth	14	20	350
E	Base + Interchange + Lambra +Stadium @ 100% + Town Ctr Growth	22	25	369
F	Base + Interchange + Lambra + Pop Growth (Stadium at 72%)	14	20	255
G	<b>Base + Interchange + Lambra + Town Centre Growth (Stadium @ 72%)</b>	<b>22</b>	<b>25</b>	<b>258</b>

20

14

Bridge Width (mm)			Step Width (mm)		
Tuesday	Sat	Match Day	Tuesday	Sat	Match Day
195	267	3651	279	381	5216
207	283	3825	296	404	5464
207	283	5246	296	404	7495
214	293	5250	306	419	7500
327	382	5535	467	545	7907
214	293	3828	306	419	5469
<b>327</b>	<b>382</b>	<b>3863</b>	<b>467</b>	<b>545</b>	<b>5518</b>

\* Minimum width @ 2 metres

\* Max peds for 2m width deck 133 = 67

\* Max peds for 2m width stairs 93 = 47

\* Max Peds for 5.0 m width deck 333

\* Max peds for 5.0 m width stairs 233

# UK and Ireland Office Locations

