

South Drive Footpath Level Crossing

Level Crossing Risk Assessment





B91246-RAS-LXG0001

P04

Final

March 2017

Authorisation Sheet	
Client:	Miller Homes
Project Title:	South Drive Footpath Level Crossing
Address:	Nautilus House, Redburn Court, Earl Grey Way, Royal Quays, North Shields, NE29 6AR
Prepared By:	
Name:	Michael Westwood
Signature:	
Position:	Senior Design Manager
Date:	10/03/17
Checked By:	
Name:	John Lowe
Signature:	
Position:	Associate Director (Level Crossings)
Date:	10/03/17
Authorised By:	
Name:	John Lowe
Signature:	
Position:	Associate Director (Level Crossings)
Date:	10/03/17

Notice:

It should be clearly understood that this document is the intellectual property and copyright of TSP Projects Limited trading as TSP Projects. It may not be used by any person for any other purpose other than that specified without the express written permission of TSP Projects. Any liability arising out of use by a third party of this document for purposes not wholly connected with the above shall be the responsibility of that party who shall indemnify TSP Projects against all claims, costs, damages and losses arising out of such use.

Document History					
Version No.	Approved by Date	Description	Prepared By	Reviewed By	Approved By
P01	27/02/17	Draft issue for client comment	MW	JL	JL
P02	01/03/17	Updated to client comments but issued as 'Draft' awaiting key information from Network Rail and Nexus	MW	JL	JL
P03	09/03/17	Updated to include key information from Network Rail and Nexus	MW	JL	JL
P04	10/03/17	Updated to client comments	MW	JL	JL

Table of Contents

	Page No.
1.0 Reference Documents	4
2.0 Scope of Works	5
3.0 Methodology	6
3.1. Site Visit	6
4.0 Site Description.....	7
4.1. Crossing Details.....	7
4.2. South Drive Approach.....	10
4.3. Crossing Area.....	19
4.4. Riverside Park Approach	23
4.5. Rail Approaches	30
5.0 Crossing Usage	35
5.1. Census of Rail and Pedestrian Users	35
5.2. Incident History.....	36
5.3. Sun Glare	37
6.0 Future Developments.....	39
6.1. Railway.....	39
6.2. Non Railway	40
7.0 Crossing Options	42
7.1. Network Rail All Level Crossing Risking Model (ALCRM)	42
7.2. Possible Effect of Proposed Development	42
7.3. Options considered.....	43
7.3.1. Closure of Crossing via Diversionary Route	43
7.3.2. Close Crossing and Provide Footbridge	43
7.3.3. Close Crossing and Provide Underpass	44
7.3.4. Relocate Crossing to Achieve Minimum Sighting	44
7.3.5. Existing Crossing Type with Localised Safety Improvements	44
7.3.6. Provide Telephones at Existing Crossing	44
7.3.7. Provide Supplementary Audible Warning Device (SAWD).....	45
7.3.8. Upgrade to Footpath Crossing with Miniature Stop Lights	45
7.4. Option Selection Summary	46
8.0 Conclusions and Recommendations.....	49

1.0 Reference Documents

The following documents have been utilised to understand the potential future requirements of South Drive Footpath Level Crossing:-

- Network Rail Route Specifications 2016 London North Eastern and East Midlands
- Network Rail Long Term Planning Process: Freight Market Study October 2013
- Nexus – Metro Strategy 2030
- 9 Day Census of Rail and Pedestrian Users (undertaken by Nationwide Data Collection on behalf of TSP Projects).

TSP Projects has also liaised with David Guy (Network Rail Level Crossing Manager) and Ken Herries (Nexus Principal Engineer – Signalling) to understand any site specific queries that have arisen as part of the Risk Assessment process.

2.0 Scope of Works

TSP Projects have been commissioned by Miller Homes to prepare a suitable and sufficient Risk Assessment for South Drive Footpath Level Crossing. This Risk Assessment not only considers the existing arrangement and usage of the level crossing, it also assesses how any proposed developments (including the Miller Homes development) and projected future rail usage may impact on the crossing and whether the current arrangements are likely to remain suitable for future use during the intended life of the crossing.

3.0 Methodology

In order to produce the Level Crossing Risk Assessment (compliant with the requirements of RSP-7 Appendix G), TSP Projects have undertaken the following activities:-

- Reviewed site specific data such as census information, incident data and planning proposals in the surrounding area.
- Requested and reviewed existing All Level Crossing Risk Model (ALCRM) results from the Network Rail Level Crossing Manager.
- Requested existing train schedules from Network Rail and any foreseen increase in train numbers.
- Requested existing train schedules from Nexus and any foreseen increase in train numbers.
- Requested and reviewed any previous Risk Assessments for South Drive Footpath Crossing.
- Assessed the effects of any planned maintenance works or route upgrades within the crossing locality.
- Assessed and reviewed the options of alternative level crossing types (including opportunities for closure).
- Requested additional ALCRM runs from the Network Rail Level Crossing Manager to assist in the analysis of any possible proposed crossing types.
- Produced a preliminary Risk Assessment report for comment by Miller Homes.
- TSP will collate the comments and update the Risk Assessment.

3.1. Site Visit

TSP Projects Risk Assessment staff visited site on 08th February 2017 to assess the crossing and the surrounding area. The weather during the site visit was cold, cloudy with light rain and a stiff breeze.

4.0 Site Description

4.1. Crossing Details

South Drive is a footpath crossing protected by self-closing gates approximately 1.5m wide (in theory being of sufficient width to allow a pedestrian to walk through whilst pushing a bicycle). The crossing is not classed as permitting vehicles or equestrian use. The crossing surface is formed from a mixture of concrete and proprietary rubber Holdfast deck panels. There are “Stop, Look and Listen” signs on each side of the level crossing.

The crossing is provided with whistle boards on the rail approaches (no telephones or other audible or visual warnings for users) and the crossing is located approximately 1030m on the Pelaw side of Hebburn station.

It has been confirmed by David Guy (Network Rail Level Crossing Manager) that the maintenance responsibilities are split between Network Rail and Nexus depending on which line the asset is on.

Crossing Name	South Drive Footpath Crossing
Level Crossing Type	Public footpath with self-closing gates
Network Rail Line of Route/Nexus line of route	Jarrow Branch/Newcastle & Shields
NR Engineers Line Reference (ELR)	JAW1
OS Grid Reference	NZ 303 637
Post code	NE31 1RB
Road Name	South Drive
Local authority	South Tyneside Council
Supervising Signal box	NR Tyneside Nexus South Gosforth
Number of running lines	Three (Network Rail one, Nexus two)
Maximum speed	Network Rail 15mph (24kph) Nexus 34 mph (55kph) Out Shields, 37mph (60kph) In Shields
Current electrification	Nexus Overhead 1.5 kV DC : Network Rail none
Proposed electrification	None known
Trains per day	Nexus: 166 (average Mon-Sat) Network Rail : 1

Figure 1: Crossing Details

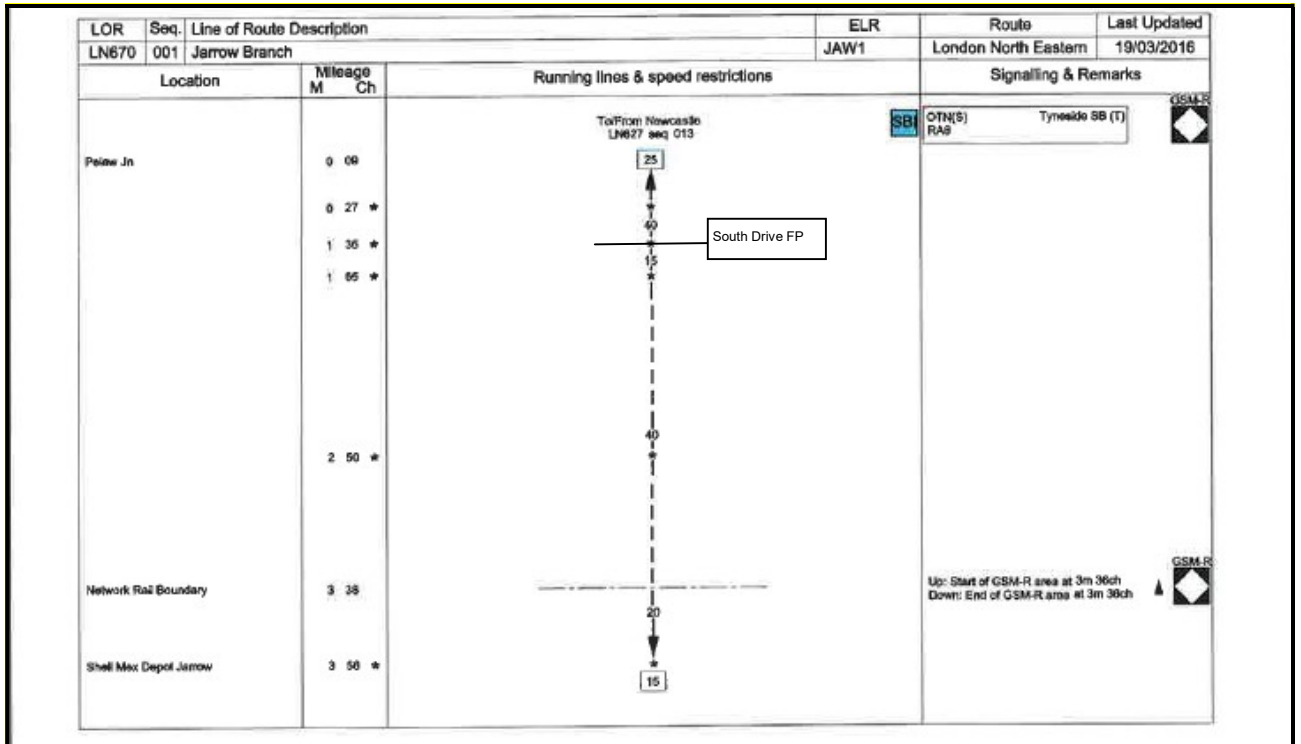


Figure 2: Sectional Appendix showing the location of South Drive Footpath Level Crossing



Figure 3: South Drive Footpath Level Crossing (circled) in relation to proposed development site (bottom right), allotments and Riverside Park (top left).



Figure 4: Extract from OS Map illustrating crossing in relation to surrounding area.

4.2. South Drive Approach

The approach towards the crossing along South Drive is by an adopted and illuminated road with made up footpaths. The following photographs depict the key risks and issues uncovered during the Risk Assessment site visit.



Figure 5: Direction to cycleway sign – no signs at crossing to instruct cyclists to dismount. There is a risk that cyclists could attempt to open the gates and traverse the crossing without getting off the bicycle. Use of the crossing by mounted cyclists was confirmed by the Census of Pedestrian and Rail Users.



Figure 6: Entrance to Hebburn Sports and Social Club – possibility of increased traffic (both vehicular and foot) on match days.



Figure 7: Access into residential properties on Parkside – entrance is opposite the entrance to the Hebburn Sports and Social Club.



Figure 8: Public parking spaces on approach to South Drive Footpath Level Crossing – on site visit it was witnessed that these spaces were utilised by dog walkers and users of the allotments. Vehicles parked in the spaces and the occupants used the crossing to gain access to the Riverside Park area. It is also thought that this area may be used as informal parking for the nearby Hebburn Sports and Social Club during peak times. This parking area appears to be part of the land to be redeveloped by the Miller Homes scheme. Therefore, it can be expected that any vehicles currently utilising this parking area will park on the kerbside, potentially reducing the usable width of the carriageway. It is likely that vehicles may then utilise the area designated as ‘visitor parking’ (for the Miller Homes development) adjacent to the crossing for turning vehicles around which could increase the risks to users of the crossing. The alternative route for vehicles to access the allotments and/or fields (refer to figure 28) is via the Siemens complex as described in Figures 29, 30 and 32. There are a number of vehicular parking spaces available in Riverside Park for dog walkers to utilise as an alternative. This parking area is a 1.5 mile diversion from the existing parking area on South Drive (approximately 6 minutes by car).



Figure 9: A manhole cover was missing in the south east corner of the crossing – although members of the public are unlikely to utilise this area, there is still a significant risk of physical harm to members of the public. This was subsequently reported to South Tyneside Council via their website reporting system.



Figure 10: Pedestrian access towards the crossing from Woodvale Drive. The asphalt path provides good underfoot conditions and is illuminated by street lighting provided by South Tyneside Council. The railway boundary fence appears to be in good condition and of a suitable height/type to deter unwanted access.



Figure 11: South Drive Footpath Level Crossing is illuminated by lighting provided by the railway. It appears to be sodium based lighting. The lux levels across the deck were not tested during the site visit so it is unknown whether the existing level of illumination is compliant across the whole footway surface.



Figure 12: The designated footway on South Drive is of concrete construction and slopes towards the carriageway. It is also overhung by trees from the adjacent property, reducing available head room to pedestrians. Both of these factors contribute to forcing pedestrians to walk in the carriageway.



Figure 13: Despite the provision of a drainage gully, surface water pools on the entrance to the crossing. In freezing temperatures, this will become icy and result in hazardous underfoot conditions. There is a Road/Rail Access Point (RRAP) adjacent to the crossing gate. It is assumed that the RRAP will only be utilised with the appropriate safe system of work, therefore the increased risk to crossing users is thought to be negligible. As confirmed with David Guy (Network Rail Level Crossing Manager) on 17th February 2017, the RRAP is for the use of Nexus staff only as no vehicular deck is present on the Network Rail freight line.



Figure 14: There is evidence of a previously installed height gauge above the RRAP – presumably to provide a safe height for vehicles due to the presence of existing overhead electrification equipment. There is an existing post and bracket installed on each side of the vehicular access

gates but the actual height gauge itself is missing. This increases the risk of tall vehicles contacting live overhead cables although it is assumed that any use of the RRAP will be supported by a safe system of work.



Figure 15: There is a large amount of evidence to suggest that the crossing is in a high vandalism area – there is a proliferation of graffiti around the site.



Figure 16: The crossing lies on the documented route of the South Tyneside Heritage Trail, the route that encompasses the crossing is known as 'The Hebburn Stroll'. On the route map, there is a hazard triangle and the following text "...cross the stile and across the Metro Line, (Care must be

taken when crossing) this will bring you out on to South Drive.” The guidance is out of date as the stiles have been replaced at the crossing – perhaps the guidance could be improved to inform the users of how to use the crossing safely.



Figure 17: The existing sign infers a high usage of the crossing by dog walkers. During the site visit, a dog on an extendable lead walked off the decking and into the four foot of the Network Rail line. The 9 day Census of Rail and Pedestrian Users concluded that an average of 63 dog walkers use the crossing per day (maximum of 106 on Monday 4th February 2017).

4.3. Crossing Area

The existing crossing area itself is made up of a concrete surface and proprietary Holdfast deck panels. The following photographs depict the key risks and issues uncovered during the Risk Assessment site visit.



Figure 18: Temperatures on the day of the site visit were very low. The crossing surface had been recently salted which gives a good indication of regular maintenance attendance. It may also point to a history of hazardous underfoot conditions in freezing temperatures. The white lining over the deck itself on the left side of the photo is beginning to wear off. It is not clear who is responsible for salting the deck, an operation which in itself is presumably subject to an agreed method of working.

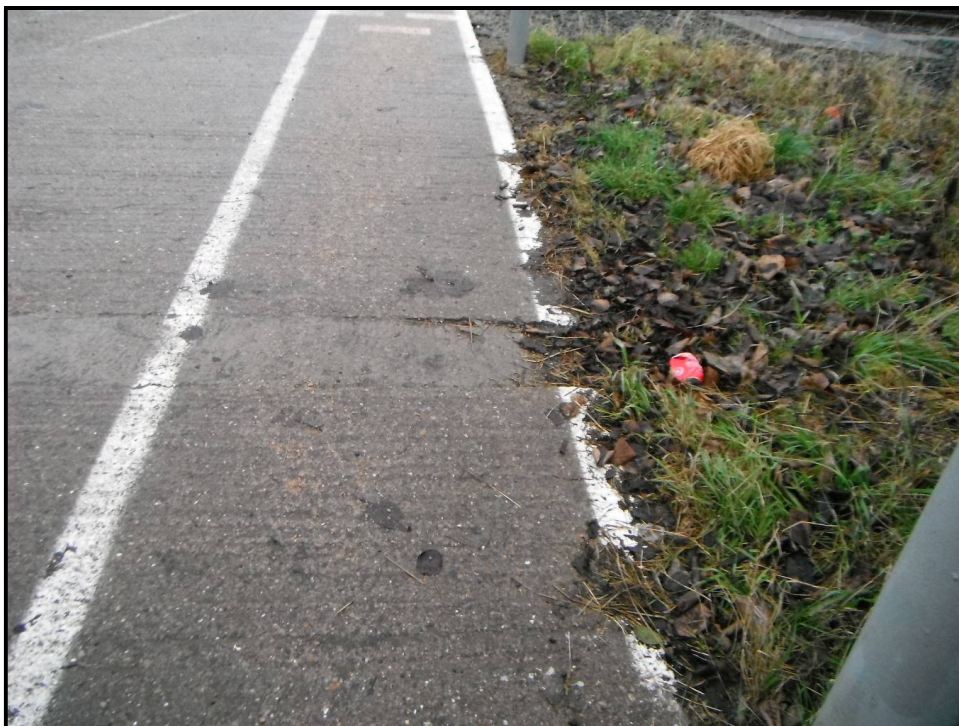


Figure 19: There is an existing trip hazard in the footway where the concrete surface has been patched. The white lining on the right of the photo that demarcates the outermost edge of the footway is on the edge of the concrete surface itself. It is beginning to be overgrown by vegetation and there is a chance of someone walking close to the edge of the footway and stumbling off the

crossing surface. The severity of this is increased where the concrete surface meets the deck on the South Drive side of the crossing as there is a greater drop from the concrete to the surrounding land level. A pushchair wheel could easily drop off the concrete surface if the user is startled by an errant dog.



Figure 20: There are two decision points marked on the footpath which could be confusing to users. As the gate is located in the boundary fence, approximately 6.0m from the crossing guidance signage/decision point, there is a risk that users look both ways to ensure no trains are approaching as they open the gate but then continue to cross without any further checks. At a traverse speed of 1.2m/s, it would take approximately 5 seconds to walk from the gate to the decision point. The signage also physically overhangs the footpath white lining, increasing the likelihood of users heads contacting the edge of the signs. During the site visit, it was noted that the view from the decision point was obscured by the overhead line stanchions when looking towards Pelaw.



Figure 21: The presence of graffiti below the speed board in the ten foot shows that there are instances of trespass, most likely accessed from the crossing itself. No anti-trespass guards are installed at the crossing to act as a deterrent.



Figure 22: Holdfast deck panels are installed up to the crossing gate on the Riverside Park side of the crossing. The surface is anti-slip but it is uneven and the edges of the panels present a trip hazard to users. The footway appears to be of sufficient width (based on the width of the crossing gates) with sufficient distance from the white lining to the edge of the deck surface. However, the white lining that demarcates the footway and the decision point is beginning to wear off.



Figure 23: If stood at the marked decision point on the Riverside Park side of the crossing (which has predominantly worn off), the crossing guidance signage is directly in the line of sight when looking in a southern direction towards Pelaw (to the right of the photo) which could prevent safe usage of the crossing. The word 'trespass' has been spelled incorrectly on both sides of the crossing. The crossing guidance signage itself is not as depicted in The Private Crossings (Signs and Barriers) Regulations 1996 although it can be argued that they convey the same message. David Guy (Network Rail Level Crossing Manager) has confirmed that this is to ensure consistency with other crossings on the route, although there is a shared safety responsibility at the crossing (between Network Rail and Nexus). The signs themselves have recently had graffiti removed that obscured the instructions (this obscuration was noted during a previous site visit on 24th January 2017).

4.4. Riverside Park Approach

The approach from Riverside Park is by a made-up footpath which is lit. The following photographs depict the key risks and issues uncovered during the Risk Assessment site visit.



Figure 24: There is a significant trip hazard formed by the edge of the outermost deck panel. This edge is normally obscured by the closed gate which increases the likelihood of tripping. The overspill from the gate post concrete also presents a trip hazard to crossing users.



Figure 25: During strong winds it was noted that the access gate did not fully close, despite being self-closing. This has been reported to Network Rail (reference: 170213-000138). In light winds, the self-closing mechanism was found to work correctly.



Figure 26: The immediate approach to the crossing is un-metalled, uneven and slopes down towards the river. There is an increased likelihood of slips, trips and falls for members of the public.

Although the level crossing is accessible for all mobility impaired persons from South Drive, users who have difficulty taking a step of more than 12-15cm would be unable to use the Riverside Park access gate.



Figure 27: The un-metalled footpath surface leads to the main allotment access gates, where the footpath becomes metalled. The footpath is illuminated by street lighting provided by South Tyneside Council. There is an abundance of graffiti that reinforces the assumption that the crossing is in a high vandalism area.



Figure 28: The un-metalled access track that runs in parallel with the railway shows signs of vehicular use. This is most likely to gain access to the adjacent fields. Horses were in the fields at the time of the site visit. Vehicular use of the access track is an additional risk for users of the crossing. The Census of Rail and Pedestrian Users records daily use of the crossing by someone with a wheelbarrow moving horse feed to this side of the railway.



Figure 29: Locked access gates to the allotments – there are approximately 96 individual plots. Vehicular access is via the Siemens complex which then gives two alternative routes to access the allotments (dependant on the location of the plot). It is thought that the gates above would rarely be

unlocked for vehicular use as the alternative route is ungated. Fresh manure is evident in the photo so the gates are likely to be unlocked more regularly for wheelbarrow use.



Figure 30: Ungated alternative vehicular access to the allotments. The area appears to have an issue with fly-tipping.



Figure 31: The approach to the crossing is via a long, steady incline. The footpath is metalled. Having traversed the crossing from the South Drive direction, the footpath leads to the main area of Riverside Park, the River Tyne and National Cycle Network number 14. The path is also part of the South Tyneside Heritage Trail.



Figure 32: The primary road access to the allotments is from North Farm Road, through the Siemens site and then exiting via a gate giving access to the Riverside Park. By definition, it would be possible for Siemens staff to walk over the level crossing, via the Riverside Park and then through the gates to the Siemens site. It is not known how much this route is used by Siemens staff given there is a large staff car park on the site.

4.5. Rail Approaches

The two Nexus lines at the level crossing form a passing loop for trains between Pelaw and Hebburn Stations and are electrified using a 1.5kV DC overhead line system. The Network Rail line is not electrified and is only used by occasional freight services to Jarrow Freight terminal.

Nexus trains currently operate on a standard track-circuit-based fixed-block signalling system with 2 or 3 aspect lit signals (inherited from the former heavy rail network on which it is based). From observation, the Nexus lines appear to be bi-directionally signalled. It is assumed this facility is used by exception, with the normal use being left hand running.

The line speeds are 55kph (34mph) in the Hebburn to Pelaw direction and 60kph (37mph) in the Pelaw to Hebburn direction. The current permissible speed is 15mph (24kph) in both directions for the freight line.

When viewed from the crossing, both rail approaches are curved which is to the detriment of sighting from the crossing itself. It is suspected that the required sighting distances from the decision points are non-compliant, as there are whistle boards provided on the Nexus lines (for normal direction running only) and whistle boards in both directions for the freight line. No signal controls are provided.

On a typical weekday there are 168 Nexus Metro trains. There is less than one freight train per day as this service runs only occasionally.

As per Railway Safety Publication 7 (RSP-7) clause 2.160 and Network Rail Standard NR/L2/SIG/11201/Mod X01 clause 14.1.4, the warning time at a footpath crossing shall be greater than the time required by the user to cross between the decision points. As the surface of the crossing is nominally level, the assumed walking speed can be taken as 1.2m/s. Using an approximate distance between decision points of 14.2 metres, this equates to a crossing time of approximately 11.8 seconds. The existing Nexus whistle boards from the Pelaw side of the crossing give approximately 12.0 seconds warning whilst those from the Hebburn side of the crossing give approximately 18.0 seconds. Therefore, the whistle boards appear to be in compliant positions. However, these warning times assume that train drivers sound their horn, that users are not hard of hearing or wearing headphones and are not distracted by background noise or dogs.

Approximate warning times i.e. the time from when an approaching train can be first heard or seen to subsequent arrival at the crossing, are recorded below. Note that sighting distances are taken from the Network Rail ALCRM data as accurate distances can only be established by standing at the decision points and using specialist measurement equipment.

	Trains Approaching From Pelaw Station Side	Trains Approaching From Hebburn Station Side
Signed Line Speed	60kph	55kph
Approximate Distance of Whistle Board from Crossing	238 metres	347 metres
Approximate Warning Time From Hearing Horn to Train Arriving at Crossing (recorded during site visit on 08/02/17)	12 seconds	18 seconds
Approximate Warning Time From Seeing Train to Train Arriving at Crossing (recorded at crossing gates during site visit on 08/02/17)	07 seconds from South Drive Gate 21 seconds from Riverside Park Gate	10 seconds from South Drive Gate 19 seconds from Riverside Park Gate
Approximate Warning Time From Seeing Train to Train Arriving at Crossing (recorded 3.5m from rail during site visit on 24/01/17)	25 seconds from South Drive Side 25 seconds from Riverside Park side	11 seconds from South Drive Side 13 seconds from Riverside Park side
Approximate Warning Time From Seeing Train to Train Arriving at Crossing (recorded at decision point during site visit on 24/01/17)	Zero seconds (sight line obscured by sign)	Not recorded

Figure 33: Summary of Sighting Times and Warning Times From Site Visits

To assess the sighting times from the decision points, the values have been taken from the Network Rail ALCRM report:

	Trains Approaching From Pelaw Station Side	Trains Approaching From Hebburn Station Side
Approximate Sighting Distance at South Drive Decision Point (taken from Network Rail ALCRM report)	780 metres	317 metres
Approximate Sighting Distance at Riverside Park Decision Point (taken from Network Rail ALCRM report)	585 metres (TSP Projects believes this distance was measured before the signage was relocated to the decision point)	417 metres

Figure 34: Summary of Sighting Times From Network Rail's ALCRM Report



Figure 35: View from South Drive side decision point looking towards Pelaw Station (photograph provided by Network Rail) – Network Rail’s ALCRM report records the sighting distance as 780 metres.



Figure 36: View from South Drive side decision point looking towards Hebburn Station (photograph provided by Network Rail) – Network Rail’s ALCRM report records the sighting distance as 317 metres.



Figure 37: View from Riverside Park side decision point looking towards Pelaw Station (photograph provided by Network Rail) – Network Rail’s ALCRM report records the sighting distance as 585 metres. TSP Projects believe this photograph and sighting distance was taken before the crossing signage was relocated to the decision point. Currently, the sighting at the decision point is obscured by the crossing signage.



Figure 38: View from Riverside Park side decision point looking towards Hebburn Station (photograph provided by Network Rail) – Network Rail’s ALCRM report records the sighting distance as 417 metres.

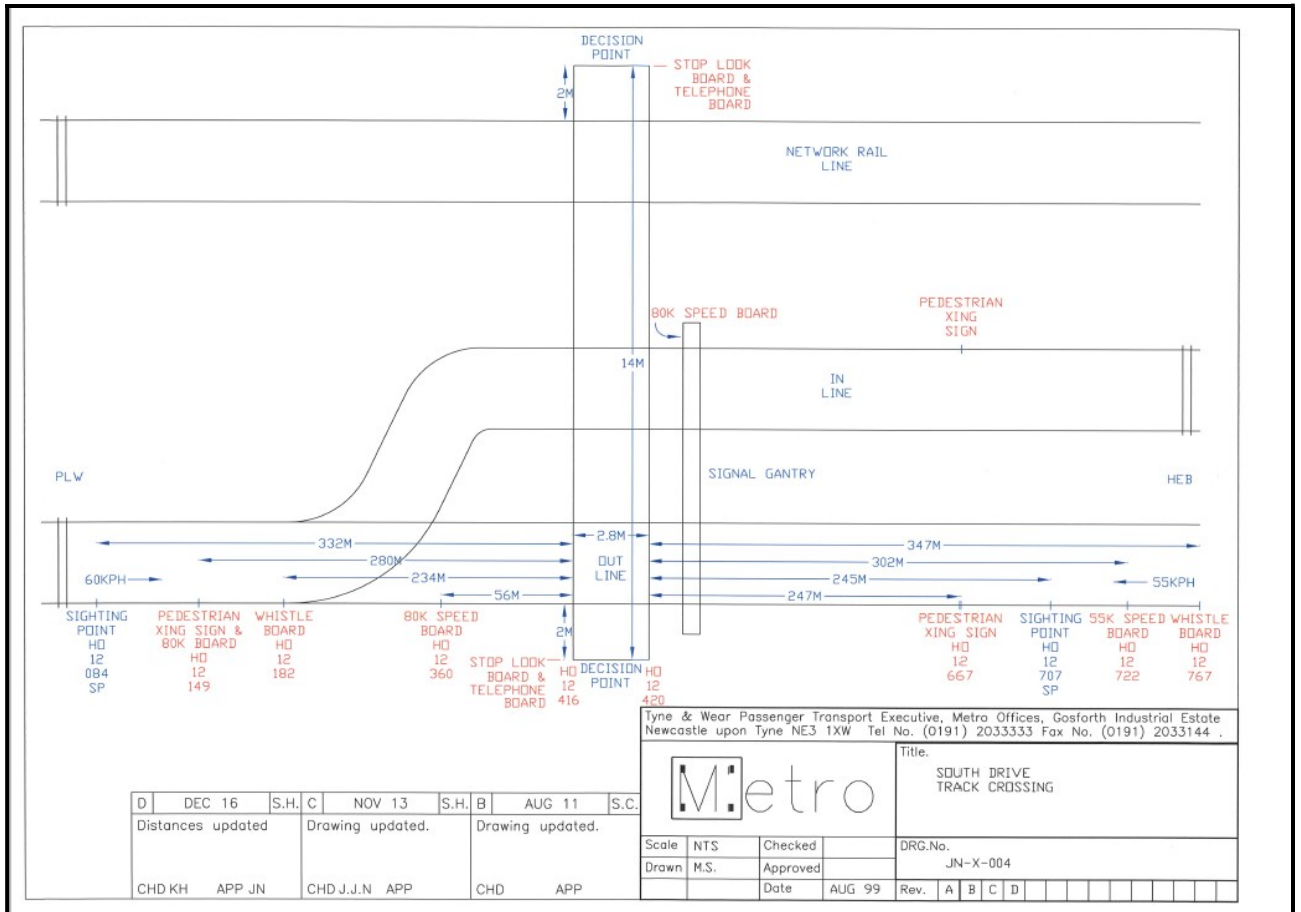


Figure 39: Summary of designed protection arrangements at the crossing (drawing provided by Nexus on 6 March 2017). The Network Rail ALCRM data infers that the actual sighting distances at the decision points are greater than those recorded in the above design. It should also be noted that the design drawing states 'STOP LOOK BOARD & TELEPHONE BOARD' on each side of the crossing but no telephones are installed on site.

5.0 Crossing Usage

5.1. Census of Rail and Pedestrian Users

The latest Network Rail Census (available on the Network Rail website) states that an average of 12 pedestrians use the level crossing on a daily basis.

Nationwide Data Collection (NDC) was commissioned by TSP Projects to undertake a Census of Rail and Pedestrian Users at South Drive Footpath Level Crossing, Hebburn. The census was undertaken at the level crossing by telescopically mounted cameras that were installed over 9 consecutive days from Saturday 4th February 2017 to Sunday 12th February 2017 over the hours 06:00 – 24:00 each day (Tuesday 7th February 2017 re-placed with Tuesday 14th February 2017 due to loss of footage).

The busiest day of the survey at South Drive Footpath Level Crossing based on the number of pedestrians and cyclists was Sunday 5th February 2017 with 215 (117 Eastbound and 98 Westbound). The busiest days for train movements were Monday 6th February 2017 and Tuesday 14th February 2017 with 168 trains recorded (84 trains Northbound and 84 Southbound on both days).

To provide an insight into the usage of the crossing, the analysis of the movements was as follows:

Summary of Total Movements												
South Drive LC												
Day	Trains	Adults	UnAcc'd Children	Eld/Infirm	Pushchairs	Carry Tools/W/barrow	Jogger/Runners	Hood/Earphones	Dog Walkers	Cyclists	Horses/Herded Animals	Total
04 February 2017	164	44	0	0	2	8	3	1	106	11	0	175
05 February 2017	125	107	0	0	1	4	8	3	78	14	0	215
06 February 2017	168	54	0	0	3	20	2	2	60	23	0	164
14 February 2017	168	79	0	0	2	4	7	1	61	32	0	186
08 February 2017	167	59	0	0	2	5	3	0	51	26	0	146
09 February 2017	167	43	0	0	0	6	0	0	51	19	0	119
10 February 2017	166	44	0	0	0	3	3	9	58	19	0	136
11 February 2017	165	39	37	0	1	2	2	1	43	6	0	131
12 February 2017	126	61	0	0	0	1	4	0	56	18	0	140
MAXIMUM	168	107	37	0	3	20	8	9	106	32	0	215
AVERAGE	157	59	4	0	1	6	4	2	63	19	0	157

Figure 40 – Summary of Total Movements at Crossing

As the census was undertaken in February, it would be reasonable to expect the crossing usage to increase in the summer months. The warmer weather is likely to increase pedestrian/cyclist usage of the crossing as people head to Riverside Park for recreation purposes and increased daylight hours/longer evenings will attract more people to the allotments. The census was also undertaken during a period free of bank holidays or school holidays which would also suggest increased usage at other times of the year i.e. during the school holidays in August.

5.2. Incident History

Analysis of the data shown on the Network Rail website showed that no incidents were reported in the 12 months prior to the last assessment date in January 2016 and none have been reported since. During email correspondence dated 17 February 2017, David Guy (Network Rail Level Crossing Manager for the area) stated the following:-

I have checked the incident spreadsheet and can confirm that there have been no incidents of misuse reported at the crossing.

However, NDC have noted the following observations during the recent census:-

- There were a few instances of pedestrians stood trackside when trains pass.
- The majority of cyclists are mounted when traversing the crossing.
- There is daily wheelbarrow usage for carrying horse feed over the crossing.
- Pedestrian climbed pole at right side of pedestrian gate trying to remove something (Monday 6th February 2017 22:30).
- Personnel on site gritting level crossing (Friday 10th February 2017 09:30).
- 2 groups of youths back and forth kicking football. 1 youth crosses just before train passes. Appear to have shopping trolley or pushchair and stand in middle of track with it (Saturday 11th February 2017 18:45 – they all leave via estate footpath 19:26).

Ken Herries (Nexus Principal Engineer – Signalling) has provided the following incident data that has been logged by Nexus (note that information is presented as logged, therefore spelling and grammatical errors have not been corrected):-

Date	Time	Description	Category
09/04/2011	<u>22:28</u>	Driver reported having to brake severely using normal service brake to slow train and sound warning horn approaching South Drive Crossing, young males crossing over crossing. Driver asked if alright to continue, stated ok, youths scattered when he sounded horn	near miss
30/03/2012	<u>17:20</u>	Driver reports person walking over South Drive crossing approximately 200 metres in front of train. Driver sounded horn and applied emergency brake bringing the speed down from 80km/h to 40 km/h before releasing the brake. Driver states person was walking right to left over the crossing from his viewpoint. Driver okay to continue and reports no passengers hurtful informed Comments by TCI K. Wilson: I was not informed of this incident, until approximately 21:40 hours. However, a TCI will request a report form the driver on his next turn of duty.	near miss
28/03/2013	<u>18:27</u>	Three youths ran across crossing in front of approaching train - track break used.	Near miss

20/04/2013	<u>19:27</u>	driver had to brake hard at south drive crossing as youth approaching	near miss
07/06/2013	<u>15:27</u>	driver used service brake for 3 males who crossed on approach to south drive	Near miss
10/04/2014	<u>09:15</u>	Missuse - train past board but only horn sounded no other actions taken	Near miss
21/08/2014	<u>13:10</u>	Person crossed in front of train, brake applied	Near miss
11/09/2014	<u>14:38</u>	Pedestrian crossed against wig wags, train was past whistle board, driver sounded horn applied service and emergency brake but released before train came to a halt	Near miss
14/09/2014	<u>14:22</u>	Male with dog crossed over in front of train, train was past whistle board, driver sounded horn and applied service brake	Near miss
30/09/2014	<u>14:14</u>	Pedestrian crossed ignoring warning, train was past whistle board, driver sounded horn and applied service brake	Near miss
24/10/2014	<u>15:25</u>	Hebburn T132 Driver reports a near miss with a pedestrian with dog @ South Drive pedestrian crossing, the driver resounded the horn & applied the emergency brake bringing the train to a control stand. No passenger injuries were reported however driver slightly shaken up but ok to continue. Driver ok to continue, pedestrian left the location	Near miss
13/01/2015	<u>12:59</u>	Pedestrian ignored warning, train past whistle board, driver resounded the horn, and applied service brake	Near miss
07/03/2015	<u>10:26</u>	near miss with pedestrian on south drive crossing, driver applied service brake and applied horn	Near miss
03/08/2015	<u>20:12</u>	Pedestrian ignored warning, train past whistle board, driver did not have time to react	Near miss
20/11/2015	<u>17:49</u>	pedestrian crossed, driver applied emergency brake only	Near miss

Figure 41: Incident data as provided by Nexus on 6 March 2017 details regular occurrences of crossing misuse by pedestrians.

5.3. Sun Glare

The orientation of the footpath over the tracks is approximately East-West. Users are expected to monitor the rail approaches for trains when using the crossing. As such, users may be affected by sun glare.

TSP Projects have utilised a website known as 'SunCalc' to assess the movement and position of the sun during specified times and dates of the year. The thin orange curve is the current sun trajectory, and the yellow area around is the variation of sun trajectories during the year. The closer a point is to the centre of the circle, the higher the sun above the horizon. The colours on the time slider show sunlight coverage during the day.

Two days have been assessed to give an indication of the conditions experienced throughout the year; the longest day and the shortest day.

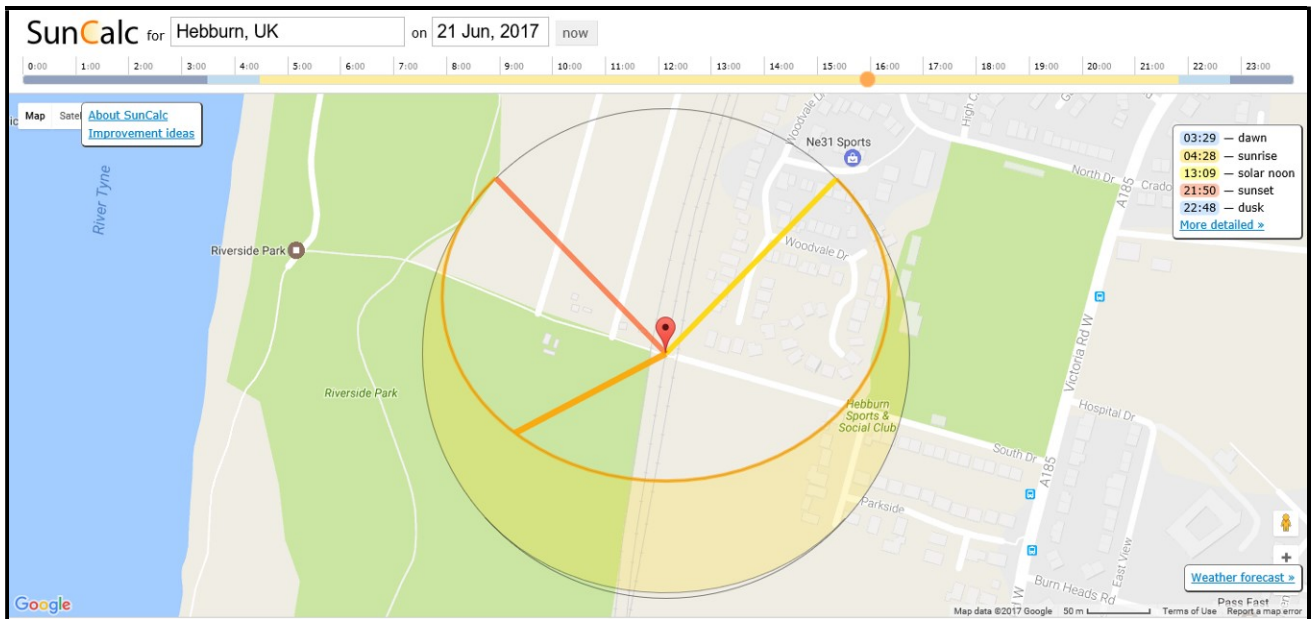


Figure 42: SunCalc Analysis of the Longest Day of the Year – users may be affected by sun glare during sunset hours when approaching from South Drive, particularly as the land slopes down beyond the crossing towards the River Tyne. This could be an issue if Miniature Stop Lights (MSL) were installed at the crossing.

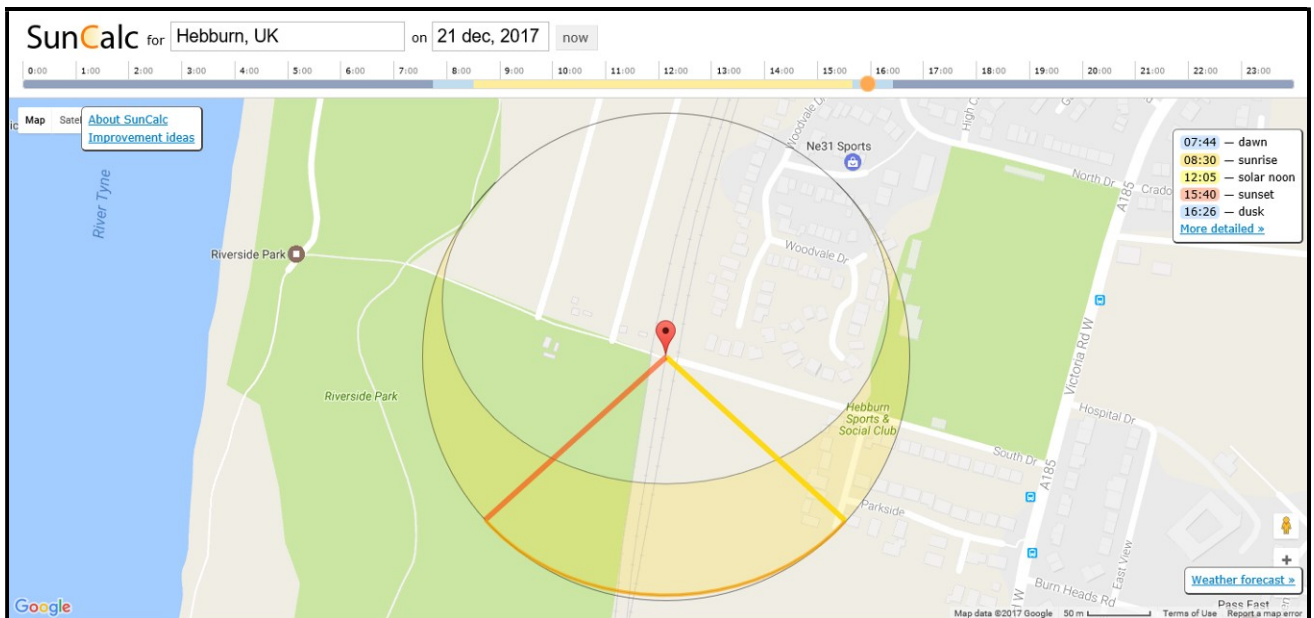


Figure 43: SunCalc Analysis of the Shortest Day of the Year – users looking for trains in a Southern direction are likely to be affected by sun glare as the sun remains low in the sky to the south of the level crossing. There is limited natural cover as users are looking down the railway corridor. This could also be an issue for train drivers heading toward Pelaw as it may reduce the timescale for brake application in an emergency at the crossing.

6.0 Future Developments

6.1. Railway

TSP Projects have reviewed the Network Rail 'Route Specifications 2016 London North Eastern and East Midlands' and the Network Rail 'Long Term Planning Process: Freight Market Study' reports and neither show any proposed upgrade or change of use for the Network Rail line to the Jarrow Freight Terminal. The report covers up to and including the year 2043. During email correspondence dated 17 February 2017, David Guy (Network Rail Level Crossing Manager for the area) stated the following:-

It's difficult to speculate to 2043 but I can say that in the next 5 years there are no aspirations for the current site owner to increase traffic levels.

It has been confirmed that there are no foreseen Network Rail infrastructure upgrades proposed on the single line Jarrow branch. It is understood that there are no proposed upgrades of the Nexus route except for the ongoing maintenance renewals work covering most of the Nexus infrastructure. This renewals work is understood to be ongoing over the entire Nexus network until 2021. When asked whether there was any planned works in the vicinity of the crossing, Ken Herries (Nexus Principal Engineer – Signalling) stated the following:-

Not at present although track dualling might introduce a better timetable in that area.

TSP Projects have also reviewed the Nexus 'Metro Strategy 2030' report. It identifies the aspiration for steady growth; an approximate 22% increase in trips per year from 49 million in 2020 to 60 million in 2030, although it is thought that this is more likely to be achieved by filling the existing rolling stock rather than a dramatic increase in additional trains per day. When asked if there were any plans to increase/decrease future train movements over the crossing, Ken Herries (Nexus Principal Engineer – Signalling) stated the following via email correspondence dated 6 March 2017:-

Not at present although track dualling might introduce a better timetable in that area.

There is a long term aspiration for the Nexus route to move towards driverless operation. The report states the following:-

Level crossings may be an issue. From initial discussions with the ORR, it is felt that these may be surmountable in regulatory terms, but nevertheless the Green Line for example, with 4 vehicle level crossings on Nexus tracks and 3 on Network Rail tracks, is clearly far from ideal. The Yellow Line, with only one vehicle level crossing on Nexus tracks, may be a better candidate, and it may be possible that only the Yellow Line could be converted.....It should be noted also that four pedestrian level crossings on Metro tracks may need to be bridged or stopped up.

South Drive Footpath Crossing is located on the Yellow Line, and as such, there may be support within Nexus to close this crossing.

During email correspondence dated 6 March 2017, Ken Herries (Nexus Principal Engineer – Signalling) stated the following:-

Driverless trains are very unlikely. The new fleet specification assumes conventionally driven trains. Driverless would require a sophisticated signalling system and it is not expected that this will be funded before 2030 at the very earliest.

6.2. Non Railway

Miller Homes are developing a former Siemens and Narec Clothing Laboratories site off Victoria Road West in Hebburn, Tyne and Wear. The site is proposed to accommodate approximately 334 new housing units and is bounded on the West side by the Newcastle and South Shields line of the Tyne and Wear Metro (Nexus). There is also a third line, owned by Network Rail, used by freight trains to and from Jarrow Oil terminal.

The North End of the site is partially bounded by South Drive, a road off Victoria Road West. This terminates in a footpath level crossing which leads to Riverside Park, the park being bounded immediately to the West by the River Tyne and forming a recreational area for dog walkers and residents, particularly children. The level crossing also provides one of two main access points to allotments. National Cycle Route no.14 runs along the western boundary of Riverside Park. The South Tyneside Heritage Trail is also routed across the level crossing.

In terms of the Miller Homes development the nearest access/egress point from the new development is proposed to be on Victoria Road West. Consequently anyone walking from the nearest dwelling to the level crossing would need to travel approximately 425 metres. Occupants of the furthest property from the crossing would need to walk approximately 900 metres.



Figure 44 - Miller Homes Masterplan Detailing Proposed Land Split. The location of the existing footpath crossing is circled.

In addition to the development by Miller Homes, Persimmon are redeveloping a site approximately 600m north of South Drive Level Crossing (as the crow flies). It would seem unlikely that this development would affect the usage of the crossing.

7.0 Crossing Options

7.1. Network Rail All Level Crossing Risking Model (ALCRM)

The existing level crossing has a risk rating of C4. Any crossing where the rating is A,B,C and/or 1,2 or 3 is considered by Network Rail as being in the high risk category. This risk rating is established by Network Rail using their All Level Crossing Risk Model (ALCRM) which is a software tool used across the industry to establish level crossing risk based on the relevant inputs. The software is run by Network Rail and whilst TSP Projects are not trained in regards to the data inputs to ALCRM, pedestrian usage is likely to be a significant factor.

The latest Network Rail Census states that on average 12 pedestrians or cyclists and 174 trains use the crossing on a daily basis. Using information from the Census of Rail and Pedestrians Users recently completed by NDC, the pedestrian/cyclist data in the current Network Rail ALCRM report is not representative.

TSP Projects have provided the latest census data to Network Rail. This has resulted in the existing ALCRM risk rating of C4 increasing to C2.

7.2. Possible Effect of Proposed Development

The Miller Homes development is due to build approximately 334 housing units. The nearest house is just over five minutes' walk away from the level crossing with the majority up to twice this distance. As the attrition rate for walking versus distance is quite high, TSP Projects have estimated how the proposed development will affect the level crossing usage.

The basis of the estimate has been taken partly from the National Travel Survey data of 2014 published by the Department for Transport on 2nd September 2014. Industry professionals have also correlated some of the calculations. It is estimated that there could be about 80 dog-owning households within this new development and that there could be a total of just over 900 daily pedestrian trips from, and into, the estate (for all reasons). Walking in connection with journeys to and from work are acknowledged to be on average longer than those undertaken for other reasons such as leisure, shopping etc. In urban areas, 90% of walking trips are likely to be less than 5 minutes long which corresponds to a distance of approximately 400m. From these figures, this would correspond to 10% of trips being over this distance and would mean that approximately 90 trips leaving and entering the site in all directions will have the aim of being greater than 400m. These trips will be for all reasons including accessing local facilities such as schools, commuting, shopping as well as leisure such as jogging, dog walking and walking.

Due to the location of the crossing, the main reason to cross the railway at South Drive is for leisure, dog walking and accessing the allotments. However, there is also potential for a small number of walking commuters to the Siemens factory. It is worth noting that National Travel Survey data from 2014 gave 18% of all walking trips as leisure, 19% as other (including "just walking") and 10% as personal business. If it is assumed that 66% of the leisure walks are likely to use the level crossing with a quarter of each of the others, this will give a figure of approximately 19% of the 90 trips that may use the level crossing. This may then generate an additional 26 'single-direction' trips over the crossing in a 18 hour period (which equates to approximately three crossings per two hours).

TSP Projects have provided the latest census data to Network Rail. This has resulted in the current ALCRM risk rating of C4 increasing to C2, irrespective of any potential increase in user numbers created by the Miller Homes development. It is estimated that the Miller Homes development will attract an additional 26 crossing per day which does not change the ALCRM risk rating of C2.

7.3. Options considered

The recent Census of Rail and Pedestrian Users has shown that the existing usage of the crossing is greater than previously recorded by the Network Rail ALCRM report resulting in a higher risk rating. Consequently, the existing protection arrangements may now be considered inappropriate. Possible mitigation measures in response to the higher risk rating (a rating that is not changed by the anticipated increase in usage from the Miller Homes development) are as detailed below.

7.3.1. Closure of Crossing via Diversionary Route

Closure of the crossing would assist in the Nexus long term goal of driverless operation whilst saving the cost of ongoing maintenance of the crossing. It would also deter lineside access to members of the public in what appears to be a high vandalism area.

The alternative route between the level crossing and Riverside Park would be via Victoria Road West and North Farm Road. The distance would be approximately 1.4km as shown in the diagram below. The entire route would be on a segregated footway. If this option was chosen it is anticipated that the Persimmon development would be completed by the time the footpath diversion came into operation.



Figure 45 – Possible Alternative Route

It is highly likely that Nexus would not want to close the RRAP at South Drive as this can be used to maintain Nexus infrastructure. As the full level crossing deck would not be completely removed, it is thought that the ongoing maintenance cost savings would be negligible.

TSP Projects do not consider this a viable option.

7.3.2. Close Crossing and Provide Footbridge

This is achievable from a technical point of view, but is likely to require mobility impaired access ramps and land purchase. It would assist the Nexus long term aspiration for driverless trains. This solution is likely to be cost prohibitive and could potentially endure a prolonged planning period relating to Public Rights of Way diversions and temporary Stopping Up Orders.

However, TSP Projects consider this a viable option to be explored long term.

7.3.3. Close Crossing and Provide Underpass

Technically this is feasible and would address all of the issues raised, as well as assisting the Nexus long term aspiration for driverless trains. However, this solution is likely to be cost prohibitive and could potentially endure a prolonged planning and approval period.

TSP Projects do not consider this a viable option.

7.3.4. Relocate Crossing to Achieve Minimum Sighting

Relocating the crossing to provide sufficient sighting and compliant warning times would only be possible if the crossing moved approximately 100m to 150m south of the current crossing. This option would be further complicated by the existing point work in this area for the loop for Nexus Metro trains. This option would result in amendments being required to the public rights of way which would require all the relevant guidance, permissions and consultations to be completed. This could also increase the distance that users have to walk to get to their destination which may be unacceptable. It may also introduce issues with security as the route would have no natural surveillance.

TSP Projects do not consider this a viable option.

7.3.5. Existing Crossing Type with Localised Safety Improvements

The crossing could be improved through localised safety improvements such as the removal of existing trip hazards, relocating the decision point signage on the Riverside Park side of the crossing to increase the users view of approaching trains, install anti-trespass guards and relocating the crossing gates to the decision points (with associated fence alterations). TSP Projects would strongly recommend the installation of 'Cyclists Dismount' signage. The instructions for 'The Hebburn Stroll' should also be updated to more accurately reflect the operating instructions for the crossing.

However, given that the crossing is used by substantially more users than previously thought, there could be debate as to whether the existing method of protection i.e. footpath crossing protected only by whistle boards, is suitable.

It should also be noted that a footpath crossing is not normally provided over more than two tracks; the low usage of the Network Rail line is thought to act as potential mitigation to this guidance.

It is not likely, however, that the existing ALCRM score would be improved with localised improvements.

TSP Projects consider this a viable option.

7.3.6. Provide Telephones at Existing Crossing

Provision of telephones is unlikely to be a suitable mitigation. As can be seen from the hoardings protecting the allotments, vandalism is prevalent in the area. If the telephones were vandalised, it is likely that users would continue to use the crossing without protection.

It can be difficult to change user behaviour. As a result, the crossing users are unlikely to use the telephones and if they did, the increase in Signaller workload would be unacceptable.

TSP Projects do not consider this a viable option.

7.3.7. Provide Supplementary Audible Warning Device (SAWD)

From March 2017 Network Rail is introducing a Supplementary Audible Warning Device (SAWD) for use on footpath crossings providing they have existing whistle board protection (as at South Drive Footpath Level Crossing). The product is intended to be a supplementary control to the existing 'Stop, Look, Listen' level crossing signage. The SAWD system is designed to be a cost effective means of reducing the risk to users of footpath crossings by providing them with an audible warning of approaching trains. It should be noted, however, that SAWD can only be configured to detect trains on 1 or 2 lines and there are 3 at the site of the crossing, although the 2 Nexus lines carry a significant proportion of the rail traffic and hence contribute a far greater risk to users. Similarly the SAWD is a Network Rail system so it is not clear whether this would be accepted on Nexus operated lines.

TSP Projects consider this a viable option for investigation but there must be dialogue between Network Rail and Nexus as to whether this equipment can be configured correctly.

7.3.8. Upgrade to Footpath Crossing with Miniature Stop Lights

This form of protection involves Miniature Stop Lights (MSL) and audible warning devices linked to the Signalling and initiated by approaching trains. The crossing could also be improved through localised safety improvements such as the removal of existing trip hazards and relocating the crossing gates to the decision points (with associated fence alterations). TSP Projects would strongly recommend the installation of 'Cyclists Dismount' signage.

It should also be noted that a footpath crossing is not normally provided over more than two tracks; the low usage of the Network Rail line is thought to act as potential mitigation to this guidance. The provision of MSL's would provide further mitigation. However, it should be noted that the MSL equipment may be susceptible to vandalism.

TSP Projects consider this a viable option.

7.4. Option Selection Summary

The Office of Road and Rail (ORR) will insist that any developments that have the potential to change usage of the crossing will need to be fully assessed via a suitable and sufficient risk assessment. The ORR will not accept any development that increases the risk rating.

Crossing Type	No. of Pedestrians (per day)	No. of Trains (per day)	ALCRM Risk Ranking	TSP Risk Rating			Associated Costs
				Freq.	Sev.	Risk Value	
Footpath Crossing with Whistle Boards (existing arrangements)	157 (existing average)	166 (existing average mon-sat)	C2	3	4	7	Ongoing regular maintenance costs.
	183 (estimate following construction of Miller Homes development)	166 (no dramatic increase in trains expected)	C2	3	4	7	
Footpath Crossing with Whistle Boards (and localised safety improvements)	157 (existing average)	166 (existing average mon-sat)	C2	3	4	7	Initial improvements cost <£80k. Ongoing regular maintenance costs.
	183 (estimate following construction of Miller Homes development)	166 (no dramatic increase in trains expected)	C2	3	4	7	
Footpath Crossing with Supplementary Audible Warning Device (SAWD)	157 (existing average)	166 (existing average mon-sat)	N/A as not currently designed for application over 3 tracks	3	4	7	Initial improvements cost estimated at £180k. Ongoing regular maintenance costs.
	183 (estimate following construction of Miller Homes development)	166 (no dramatic increase in trains expected)	N/A as not currently designed for application over 3 tracks	3	4	7	
Footpath Crossing with	157 (existing average)	166 (existing)	C2	2	4	6	Initial MSL cost of £340k.

Crossing Type	No. of Pedestrians (per day)	No. of Trains (per day)	ALCRM Risk Ranking	TSP Risk Rating			Associated Costs
				Freq.	Sev.	Risk Value	
Miniature Stop Lights (MSL) and Audible Warning Device (AWD)		average mon-sat)					Ongoing regular maintenance costs.
	183 (estimate following construction of Miller Homes development)	166 (no dramatic increase in trains expected)	C2	2	4	6	
Close Crossing and Provide Footbridge	157 (existing average)	166 (existing average mon-sat)	N/A	1	1	2	Average cost of footbridge £500k.
	183 (estimate following construction of Miller Homes development)	166 (no dramatic increase in trains expected)	N/A	1	1	2	

Figure 46 – Table Showing Perceived Risk Rating of Protection Methods

To calculate the TSP Projects Risk Rating, the Risk Ranking Matrix shown in Figure 41 has been utilised. This method allocates a value for the 'Frequency' of an event happening (based on all evidence reviewed) and the 'Severity' of the outcome should that event happen. These 2 values are then added together to produce the overall Risk Value. Depending on the score, the Risk Value is then categorised as 'broadly acceptable' (green), 'tolerable if ALARP' (yellow) or 'not acceptable' (red).

Using ALCRM, Network Rail has also investigated the effects of inputting the maximum number of users recorded over any one day during the 9 day Census of Rail and Pedestrian Users i.e. 215, and then added the estimated 26 additional crossings due to the Miller Homes development. Both achieve the same risk rating of C2 for the existing crossing type.

			Severity				
			RIDDOR Reportable minor injury or multiple non reportable minor injuries	Single Major Injury	Multiple Major Injuries	Single Fatality	Multiple Fatalities
			System Disruption				
			<20mins	1 Hour	1/2 Day	1 Day	1 Week
			1	2	3	4	5
F r e q u e n c y	Daily to Monthly	5	6	7	8	9	10
	Monthly to Yearly	4	5	6	7	8	9
	1 to 10 Yearly	3	4	5	6	7	8
	10 to 100 Yearly	2	3	4	5	6	7
	100 (+) Yearly	1	2	3	4	5	6
				Broadly Acceptable			
				Tolerable if ALARP			
				Unacceptable			

Figure 47 – TSP Projects Risk Ranking Matrix

For the existing crossing type, TSP Projects has allocated a severity of 4 (single fatality) and a frequency value of 3 (1 to 10 yearly). The frequency value has been allocated as 3 because, despite there not having been a fatality at the crossing, the Census of Rail and Pedestrian Users showed instances of misuse during a 9 day period. The incident data supplied by Nexus confirms this view.

8.0 Conclusions and Recommendations

The current arrangement at South Drive Footpath Level Crossing is such that sighting distances (from the decision points) do not appear to be adequate and this appears to have been acknowledged by the operators through the presence of whistle boards (which appear to be in compliant positions). This form of protection relies heavily on train drivers sounding their horn on each and every approach and assumes that users are not hard of hearing, using headphones, wearing hoods or are not distracted by dogs or other background noise.

According to the Network Rail website, the current risk rating of the crossing is C4 which is towards the higher end of the risk ratings used by Network Rail – the highest being A1 and the lowest M13. The existing Network Rail ALCRM census states there are 12 pedestrians or cyclists using the crossing per day. The 9 day Census of Rail and Pedestrian Users reveals there are many more users than previously recorded; on average 157 pedestrians and cyclists per day. A high proportion of the users identified were accompanied by dogs.

TSP Projects have provided the latest census data to Network Rail. This has resulted in the current ALCRM risk rating of C4 increasing to C2, irrespective of any potential increase in user numbers created by the Miller Homes development. It is estimated that the Miller Homes development will attract an additional 26 crossing per day which does not change the ALCRM risk rating of C2.

To mitigate the risks at South Drive Footpath Level Crossing (over the whole life of the crossing), TSP Projects recommend the following options (in descending order):-

1. Close Crossing and Provide Footbridge – This option should be the long term objective for the level crossing infrastructure owners because it will remove the risk at the crossing as pedestrians will not be exposed to the railway.
2. Upgrade to Footpath Crossing with Miniature Stop Lights – As the MSL's are operated by approaching trains, this option removes human error for the train drivers (who may forget to operate the horn) and provides an audible and visual indication to users when it is safe to cross.
3. Provide Supplementary Audible Warning Device (SAWD) – This option should be investigated to ascertain whether the system could be adapted for 3 tracks and whether Nexus would permit its operation on their infrastructure.
4. Localised safety improvements at the crossing – These should include the removal of existing trip hazards, relocating the decision point signage on the Riverside Park side of the crossing to increase the users view of approaching trains, install anti-trespass guards and relocating the crossing gates to the decision points (with associated fence alterations). The instructions for 'The Hebburn Stroll' should also be updated to more accurately reflect the operating instructions for the crossing. TSP Projects strongly recommend the installation of 'Cyclists Dismount' signage.

TSP Projects believe that the localised safety improvements listed in Option 4 (above) could also be undertaken in association with Options 2 or 3.



TSP Projects, York (Head Office)

Meridian House, The Crescent, York, YO24 1AW, UK
T: +44 (0) 1904 454 600, F: +44 (0) 1904 454 601

TSP Projects, Birmingham

Alpha Tower, Crowne Plaza
Suffolk Street, Birmingham, B1 1TT, UK
T: +44 (0) 121 242 1240, F: +44 (0) 121 246 4664

TSP Projects, Manchester

1st Floor, Fairbairn Buildings, 70-72 Sackville Street,
Manchester, M1 3NJ, UK
T: + 44 (0) 161 242 2990, F: +44 (0) 161 242 2999

TSP Projects, Reading

Office 1.09, Dukesbridge House, 23 Dukes Street
Reading, Berkshire, RG1 4SA, UK
Tel: +44(0) 843 4878776

TSP Projects, Workington

Curwen Road, Derwent Howe, Workington, Cumbria,
CA14 3YX, UK
T: +44 (0)1900 68000, F: +44 (0)1900 601111.