Questions

The user should go through all questions in order unless directed otherwise. It is recommended that a nominated representative should lead the Signal Sighting Committee through the checklist and ensure that all questions are answered and all committee members’ opinions are captured. The checklist has been designed to complement the expertise of signal sighting committee members, so full participation is essential.

The order of the questions has been carefully prioritised to ensure that the most important questions relating to driver sighting of the signal are asked first.

The arrows ‘🡻’ or ‘🡺’ direct the user to the next question or the associated mitigation(s) as described in the Action column.

Mitigations

If an answer is selected that directs the user to mitigation, these are described in separate tables (‘A1’, ‘A2’, etc.).

The mitigations have been prioritised to support the user in identifying which should be performed first. Therefore it is important to note that: Mitigations must be addressed in the order provided.

The form should be used to record all mitigation measures that are implemented and any decisions made regarding the type of mitigation to implement.

|  |  |  |  |
| --- | --- | --- | --- |
| Date: |  | Signal number: |  |
| Design location: | | Actual location:  (if different from design location) | |
|  | |  | |
| Reason for Sighting:  (new signal, LED upgrade, etc.) | | Track details:  e.g. Single, Multiple or, Bi‑directional lines | |
|  | |  | |
| Additional comments: | | | |
|  | | | |

Section A – Minimum Acceptable Sighting

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| --- | --- | --- | --- | --- |
| Minimum Acceptable Sighting | | No | Yes | Action |
| 1) | Is there anything that will cause the driver to have an interrupted sighting, for the final approach to the signal? (i.e. the last 50m). | 🡻 | 🡺 | Go to A1 |
| 2) | Does the driver have a total sighting time that is less than the minimum 6 seconds sighting time? The minimum sighting distances for typical line speeds are shown in the table below:   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Line speed (kph): | 30 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | 115 | 130 | 145 | | Distance (m): | 55 | 72 | 75 | 93 | 110 | 129 | 147 | 165 | 183 | 200 | 239 | 266 | | 🡻 | 🡺 |  |
| 3) | Is the signal positioned on the right hand side of the running line? | Go to    Q4 | 🡻 |  |
| 3A)  If yes: | Why is the signal on the right-hand side? (CHOOSE ALL THAT APPLY): |  |  |  |
|  | 1. One with no running approach, e.g. At the end of a crossing loop in a single line section; or where trains start from sidings, terminal platforms or other non-running line situations. |  | 🡺 | Go to A2 |
|  | 1. For the wrong running direction in bi-directionally signalled double line sections. |  | 🡺 |  |
|  | 1. Likely to conflict with the positions of other signals already sighted. |  | 🡺 |  |
|  | 1. Obstructed by an object on the LHS that limits sighting and is physically impossible to move without incurring excessive costs (e.g. providing special mounting arrangement, overhead structure or undertaking substantial earthworks). |  | 🡺 |  |
| 3B) | Is there a line immediately to the right of the signal that it could be confused as applying to? (which could be more likely to occur if the signal is on a bend). | 🡻 | 🡺 | Go to A3 |
| 4) | Is the height of the signal (single or double aspect) different to other signals on the same line or adjacent signals on parallel lines? | 🡻 | 🡺 | Go to A4 |
| 5) | Is the signal located between parallel running lines in the same direction? | Go to    Q6 | 🡻 |  |
| If yes: | Is it possible that the signal could be confused as applying to the other running line? (e.g. which could occur if the signal is on a bend). | 🡻 | 🡺 | Go to A5 |
|  | Is the signal spacing different to those on parallel lines? | 🡻 | 🡺 | Go to A6 |
| 6) | Is there a possibility that a driver could ‘read through’ the signal to a signal in advance and mistake the less restrictive indication for their signal? or  Is there a possibility that the driver could ‘read through’ the signal in rear to the proposed signal and mistake the less restrictive indication for their signal? | 🡻 | 🡺 | Go to A7 |
| 7) | Is the signal located on a platform or at the end of a platform? | Go to    Section B | 🡻 |  |
| If yes: | Is the signal placed less than 15m from the departure end of the platform? | 🡻 | 🡺 | Go to A8 |
|  | Is the signal sighting (from the driver’s seated position) hindered or obscured when the train is stationary at the platform? (Consider all types and lengths of trains that can use the platform) | 🡻 | 🡺 |  |
|  |  | Go to Section B | |  |

| Mitigations: Acceptable Sighting | | 🗹 | Action |
| --- | --- | --- | --- |
| A1 | The signal location is not suitable: |  | Go to Q3 |
|  | 1. Reposition the signal further forward or rearward to increase the sighting distance. |  |  |
|  | 1. If this is not possible and the new signal cannot be moved, the Signal Design Engineer must justify why the signal cannot be moved and why a suboptimal location has been selected. If the signal cannot be moved consider: |  |  |
|  | 1. Installing a co-acting signal. |  |  |
|  | 1. If on a post, moving the signal to a gantry. |  |  |
|  | 1. Using a repeater. |  |  |
| A2 | Running signals shall be placed to the left of the track in the direction of travel. Seek approval from the Signal discipline head to place the signal at the right of the track and consider installing a co-acting signal (may need to be a dwarf signal) on the left side of the running line to improve the driver’s detection of the signal. |  | Go to Q3B |
| A3 | If the signal could be mistaken as applying to another line, as well as possibly being missed by the driver on the correct line, the signal must be relocated so that it is on the left hand side.  If this really isn’t possible then a co-acting signal should be installed on the left hand side and consider installing an arrow sign to indicate to drivers which line the RHS signal applies to.  Focusing of the RHS signal should be optimised to the relevant line. The use of shrouding to assist this should be considered.  Consider aligning the signal with one on the adjacent track, so the applicable track is clear.  Fill in a completely separate signal sighting form to assess the impact on the adjacent track, and refer the arrangement to the Signal discipline head. |  | Go to Q4 |
| A4 | Where practicable, signal heights should be consistent, providing that this does not make the signal less visible to the driver. This rule is more important for signals on the right-hand side. |  | Go to Q5 |
|  | In some situations the signal may have to be raised to make it visible (see D11 for exceptions). |  |  |
| A5 | Consider the following list of mitigations and select the most appropriate to make the signal less confusing for the driver: |  | Return to Q5 |
|  | 1. Move the signal so that it is clear which line it applies to. If possible the signal should be aligned with signals on parallel lines so that they line up (**NB** they may need to be staggered to achieve this on a bend). |  |  |
|  | 1. Consider installing a retro reflective arrow plate/sign to indicate to drivers which line the RHS signal applies to. |  |  |
|  | 1. Consider installing a longer hood or some other way of making the correct signal clear for the driver. |  |  |
| A6 | Where headways on adjacent parallel lines are different, signals should be arranged so that they line up where possible to make it easier for drivers to determine which signal applies to their line. This may not be possible with all signals on the two lines – but should be considered where signals are closely located. |  | Go to Q6 |
| A7 | Consider the risk and impact of the driver reading through the signal and the following possible mitigations in priority order: |  | Go to Q7 |
|  | 1. Use LED signals where possible to make the target signal more conspicuous. |  |  |
|  | 1. Consider a screen for lights from outside of the rail corridor, e.g. traffic light. |  |  |
|  | 1. Change the light intensity or focus. |  |  |
|  | 1. Make the signal background larger or increase the size of the hood. |  |  |
|  | (**NB** this will not improve the situation for night viewing). |  |  |
| A8 | Ensure that the signal is located so that the driver can clearly read the signal aspect when stopped at the platform. Place the signal at least 15 metres from the departure end of the station platform (or the top of the platform ramp). If track geometry or other obstruction forces the signal closer to the platform consider the following mitigations to provide the best sighting for the driver: |  | Go to Section B |
|  | 1. Installing a co-acting signal. |  |  |
|  | 1. Raising the signal on a gantry or a higher post. |  |  |
|  | 1. Relocating the signal. |  |  |
|  | 1. Raising or lowering the signal heads. |  |  |
|  | 1. Install tri colour or multi lamp route indicators to achieve 4 above. |  |  |
|  | 1. Changing the focus of the signal (NB some signals on platforms may need to be focused away from the driver to prevent excessive brightness at night). |  |  |

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| Acceptable Sighting: Justification for mitigation measures adopted  Please provide additional detail about decisions that are taken |
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Section B – Interruptions

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| --- | --- | --- | --- | --- |
| Interruptions | | No | Yes | Action |
| 8) | Are there any objects that could interrupt the driver’s 6 second sighting at line speed? | Go to    Section C | 🡻 |  |
| 9) | On approach to the signal (excluding the last 50m from the signal, which must be kept clear), do the interruptions to signal sighting make up 20% or more of the total sighting distance to the signal? | 🡻 | 🡺 | Go to B1 |
| 10) | Is the interruption caused by: (CHOOSE ALL THAT APPLY) |  |  |  |
| 1. Foliage? |  | 🡺 | Go to B2 |
| 1. A fixed object such as: a cutting, a crest of a hill, a building, a stanchion, platform fence, equipment, furniture, overhead line equipment? |  | 🡺 | Go to B3 |
| 1. Trains on other lines (e.g. train approaching on an adjacent track on a right hand curve or a train in a siding on a left hand curve)? |  | 🡺 |
| 1. The signal being in a tunnel or underground? |  | 🡺 |
| 1. Other: please describe  |  | | --- | |  | |  | 🡺 |

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| Mitigations: Interruptions | | 🗹 | Action |
| B1 | If the interruptions make up more than 20% of the sighting distance the signal location is not suitable. The signal sighting committee should work with the Signal Design Engineer to improve signal sighting. |  | Go to Q10 |
| B2 | If foliage is causing the interruption it should be removed or trimmed and a maintenance plan should be set for ongoing removal or eradication. |  | Go to Section C or  Q10 |
| Consultation with other rail network providers may be required. |  |
| Make the signal stand out more, e.g. by using LEDs. |  |
| B3 | The cause of the interruption must be captured and the most appropriate mitigation justified providing the best sighting for the driver. Review the aspect sequence that is used; if the signal is frequently encountered at caution then interruption of the driver’s view may increase the SPAD risk for the signal in advance. Consider the following list of mitigations which are placed in order of consideration: |  | Go to Section C |
| 1. Reviewing the object causing the interruption for removal. |  |
| 1. Installing an LED signal. |  |
| 1. Moving the signal horizontally to increase the sighting (this must not put the signal within the structure gauge or ideally further than 2.5m from the running face of the nearest rail.) |  |
| 1. Installing a co-acting signal. |  |
| 1. Installing a repeater. |  |
| 1. Placing the signal on a gantry or on a higher post. |  |
| 1. Raising or lowering the signal heads. |  |
| 1. Install Tri colour or multi lamp route indicators to achieve 7 above. |  |
| 1. Investigate if the line speed can be reduced to achieve the minimum signal sighting. |  |

Section C – Distractions

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| --- | --- | --- | --- | --- |
| Distractions | | No | Yes | Action |
| 11) | Are there possible operational distractions that may affect the driver’s sighting of the signal? | Go to    Section D | 🡻 |  |
| Is the signal positioned near a section of track where:  (CHOOSE ALL THAT APPLY) |  |  |  |
| The signal is near (within 50m of) a lineside sign? |  | 🡺 | Go to C1 |
| The signal is located at a gradient change or station stop that requires the driver to power up or brake within the LAST 50m of the sighting distance? |  | 🡺 |
| It is likely that the driver will be attending to another duty (e.g. checking timetable, using train operating system etc.) when they need to sight the signal? Provide details:   |  | | --- | |  | |  | 🡺 |
| Is it likely that another operational factor may distract the driver’s attention from the signal? (E.g. level crossing, another train, platform) Provide details:   |  | | --- | |  | |  | 🡺 |
| Other: Provide details   |  | | --- | |  | |  | 🡺 |

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| Mitigations: Distractions | | 🗹 | Action |
| C1 | Understand the nature of the distraction and the possible effect on train management. The distraction should be removed if possible. |  | Go to Section D |
| If it is an operational issue then this should be reviewed with the appropriate train crewing representative. |  |
| If there is a sign that could be a distraction, consider changing the location of the signal or the sign to minimise the distraction. |  |
| Otherwise, if the distraction is serious, consider the following: |  |
| 1. Installing an LED signal. |  |
| 1. Installing a co-acting signal or a repeater. |  |

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| Interruptions and Distractions: Justification for mitigation measures adopted  Please provide additional detail about decisions that are taken |
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Section D – Signal Design

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| Signal Design | | No | Yes | Action |
| 12) | Is the signal placed on a post? | Go to    Q13 | 🡻 |  |
| If yes: | Is the horizontal centre of the signal post not located between 2.2 and 2.5m from the running face of the nearest rail? | 🡻 | 🡺 | Go to D1 |
| Is the height of the red aspect positioned significantly lower or higher than 3m above rail level for a single light or 2.3m for a double light signal? | 🡻 | 🡺 |
| Is the lamp type or the intensity of all signal aspects not matched to the previous signal and the next signal?  (could increase the possibility of read through). | 🡻 | 🡺 | Go to D2 |
| Is the signal horizontal distance from the running face of the nearest rail not matched to the previous signal and the next signal? | 🡻 | 🡺 | Go to D3 |
| 13) | Is the signal placed on a gantry? | Go to    Q14 | 🡻 |  |
| If yes: | Is the lamp type or the light intensity of all signal aspects not matched to other signals on the gantry? | 🡻 | 🡺 | Go to D3 |
| 14) | Is the signal out of focus or alignment so that it is does not provide the train driver with optimum sighting of signal indications? | 🡻 | 🡺 | Go to D4 |
| 15) | Is the track bi-directional? | 🡻 | 🡺 | Go to D5 |
| 16) | Is the signal positioned near a live overhead wiring air gap so that an electric train stopped at the signal will span an air gap? | 🡻 | 🡺 | Go to D6 |
| 17) | Is the signal in a tunnel? | Go to    Section E | 🡻 |  |
| If yes: | Is the signal positioned so that it is not close to the driver’s eye level? | 🡻 | 🡺 | Go to D7 |
| Is the signal located near a tunnel exit? | 🡻 | 🡺 | Go to D8 |
| Go to Section E | |  |

| Mitigations: Signal Design | | 🗹 | Action |
| --- | --- | --- | --- |
| D1 | These nominal ranges are specified in ESG100.1 however if the signal sighting can be improved then some adjustment is acceptable. For vertical height the red aspect of post mounted running signal aspects should be positioned to provide a stop aspect as close as practical to driver’s eye level, in accordance with the requirements of the structural gauge, and having regard to the different types of trains likely to pass the signal.  Guidelines for exceptions:  Where it is necessary to observe an aspect over the top of a train on an adjacent track, observe an aspect over a rise, or through a series of curves or if there are other physical lineside obstructions such as the face of a rock cutting. |  | Return to Q12 |
| D2 | If the Lamp type and intensity are not matched to surrounding signals, this should be justified on the signal sighting form. Consider the risk and impact of the driver reading through the signal and the following possible mitigations in priority order: |  | Return to Q12 |
| 1. Use LED signals where possible. |  |
| 1. Consider a screen for lights from outside of the rail corridor, e.g. traffic lights. |  |
| 1. Change the light intensity or focus. |  |
| 1. Make the signal background larger or increase the size of the hood. |  |
| (**NB** this will not improve the situation for night viewing). |  |
| D3 | Where possible, modify the signal so they are consistent. |  | Go to Q14 |
| If this is not possible, refocus the signal to better match the neighbouring signals. |  |
| D4 | Refocus the signal to provide the driver with optimum sighting.  The correct lens should be used to achieve best sighting. |  | Go to Q15 |
| Spread light lenses reduce the intensity of the indication and should not be used unless the approach to the signal is sharply curved and/or the maximum sighting distance is less than 250m. |  |
| For running signals the signal should be aligned toward the defined sighting point or the previous signal, whichever is the least distance. |  |
| D5 | 1. Optimise signal position in the correct (or primary) direction. |  | Go to Q16 |
| 1. Match the signal height and spacing to neighbouring running signals on the same line to make it easier for drivers to determine which signal applies to their line. If this is not possible, describe why the signal height and spacing will not match on the sighting form and investigate the most appropriate mitigation to provide the best sighting from the drivers position: |  |
| 1. Changing the signal background to make the signal more conspicuous. |  |
| 1. Installing a co-acting signal. |  |
| 1. Installing a repeater. |  |
| D6 | Since the last pantograph on an 8 car intercity electric set is approximately 175 metres from the front of the set, the signal should be placed at least 200 metres from the centre of the overlap (air gap) bay, if the air gap is on the approach side of the signal. |  | Go to Q17 |
| If this is not possible move the position of the overhead wiring air gap. |  |
| **NB** Avoid locating signals such that any part of the signal or the maintainer servicing the signal is within 1.5 metres of any live overhead pull-off or isolating insulator. |  |
| D7 | SPG 0706 states that the signal lamp case should be mounted so that the top red aspect is between 2250 mm and 2550 mm above rail level. If this cannot be achieved, the justification should be recorded on the sighting form. |  | Return to Q17 |
| D8 | If the signal is near a tunnel exit reduce the effect of light on the signal aspect. Consider repositioning the signal so that it is further away from the exit. Consider the use of LED signals if it will make the signal easier to see. |  | Go to Section E |

Section E – Environment

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| --- | --- | --- | --- | --- |
| Environment | | No | Yes | Action |
| 18) | Is the signal located in front of a dark, light or cluttered background that will disrupt a clear sighting of the signal? | 🡻 | 🡺 | Go to E1 |
| 19) | Can sunlight shine into the signal lens from the **front** of the signal (sun is behind driver) and reduce visibility or create washout or phantom effects? | 🡻 | 🡺 | Go to E2 |
| 20) | Can sunlight shine into the signal from the **rear** of the signal (sun shines into the driver’s face) to cause glare and make it hard to see the signal? | 🡻 | 🡺 |
| 21) | Are there any other sources of light that may disrupt a clear sighting of the signal (e.g. traffic lights, street lights, floodlights)? | 🡻 | 🡺 | Go to E3 |
| END | |  |

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| --- | --- | --- | --- |
| Mitigations: Environment | | 🗹 | Action |
| E1 | The signal should be made to stand out from the background |  | Go to Q19 |
| 1. Attach a larger background to the signal to enhance the contrast between the signal and background. |  |
| 1. Use LEDs if they will enhance the visibility of the signal aspect. |  |
| E2 | For existing signals, sightings may need to be conducted in the morning or evening to determine if there is an issue. For new signals consider the direction that the signal is facing – East/West facing signals are more likely to be affected. Try to make the signal light brighter. Install LEDS to reduce the effect of sunlight. |  | Go to  Q20  or  Q21 |
| When sunlight shines into the **front** of the signal (from behind the driver) other options to consider include the following in approximate priority order: |  |
| 1. Ensure that anti-phantom filters such as shinkolight are used. |  |
| 1. Extend the signal hood. |  |
| 1. Refocus or change the proposed focus of the signal lens. |  |
| 1. Consider lowering the signal. |  |
| 1. Install a co-acting signal. |  |
| 1. Install a repeater. |  |
| 1. Reposition the signal. |  |
| When sunlight shines into the **rear** of the signal (sun is in the driver’s face consider making the background bigger to make the signal stand out more. |  |
| E3 | Where possible, look to screen the signal from the other light sources. |  | End |
| Talk to the owner of the light source to see if it can be moved or replaced with a disruptive light source, e.g. low pressure sodium lights *should not* be used around signals. |  |

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| Signal Design and Environment: Justification for mitigation measures adopted  Please provide additional detail about decisions that are taken |
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