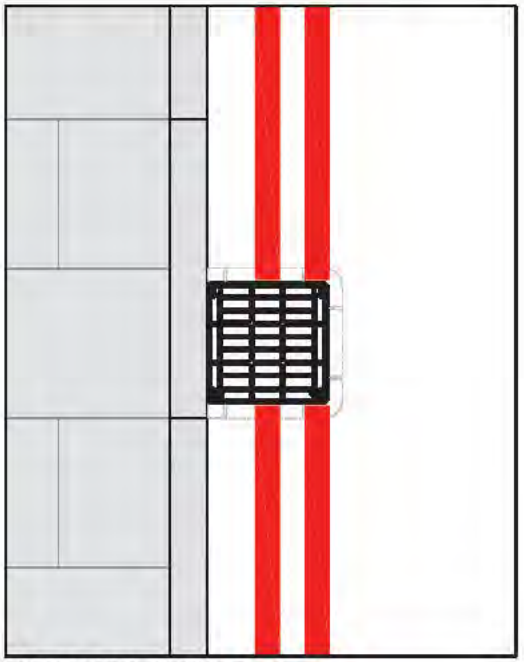
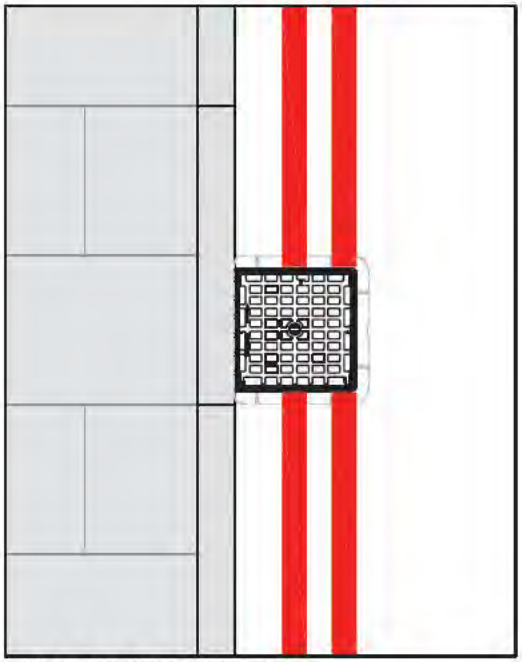
Figure 277: Carriageway gully grate types



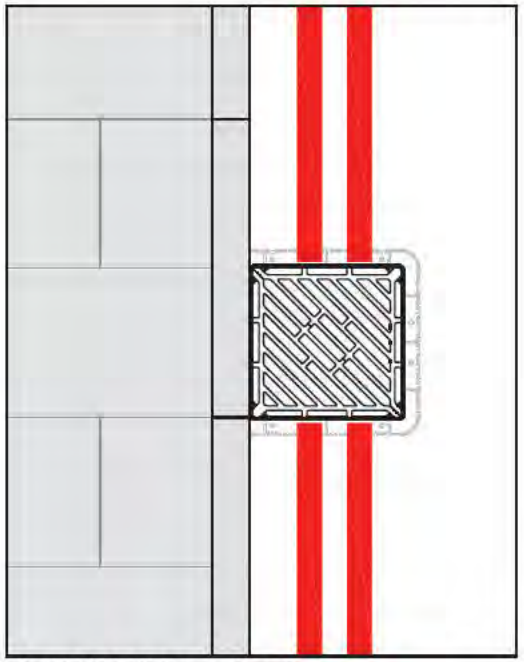
CYCLE FRIENDLY GRATE

Grate slots should be at right angles to the direction of travel.



CYCLE FRIENDLY GRATE

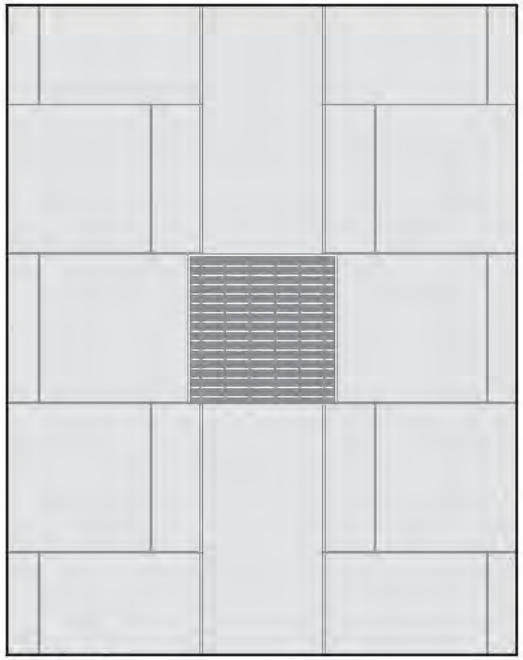
Cycle friendly grates can take several forms, this being another example. These grates should be slip resistant. While they are also pedestrian friendly they should not be in a pedestrian crossing.



HIGH VOLUME GRATES

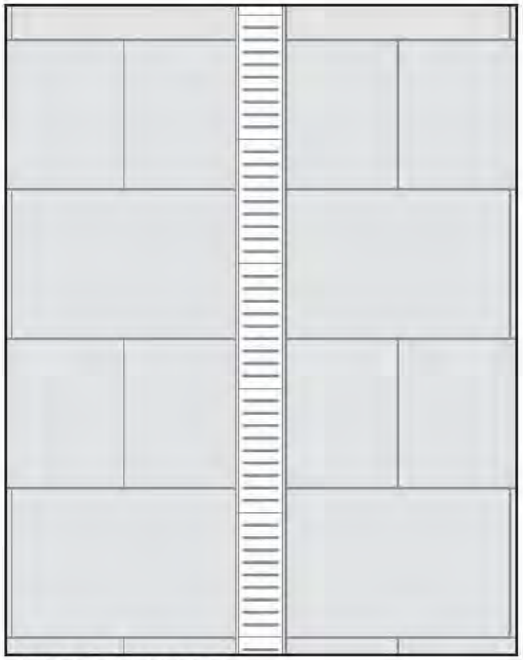
Above is an example of a high volume grating that may be used on the network where cycles are not permitted.

Figure 278: Footway drainage options on footway



CHANNEL

This is an example of a pedestrian friendly gate. Spaces between slots in footway grates should be between a minimum of 6mm and a maximum of 10mm to avoid heels becoming trapped.



LINEAR CHANNEL

Consideration should be given to the maintenance implications of linear channels which can block with debris unless routinely cleared.

Sustainable urban drainage systems and attenuation systems

Sustainable urban drainage systems manage surface water caused by rainfall. Approaches to managing rainfall can address water quantity (flood mitigation) as well as its quality (pollution reduction). SuDS may also provide amenity value when incorporated with green infrastructure.

Sustainable drainage is normally achieved by managing rainwater close to where it falls, by providing areas where rainwater can be stored – normally within natural contours – so that it is allowed to soak (infiltrate) into the ground, evaporate into the atmosphere or be used by vegetation (evapotranspiration) or be released slowly back into the conventional (piped) drainage system.

Designers should not propose options that:

- Cause a negative net effect to the Green Estate
- Do not consider whole life costs
- Are not technically feasible

With the greater focus on the need to reduce surface water runoff, we encourage designers to apply water-sensitive urban design principles so that green infrastructure is not lost, especially to impermeable surfaces, and to explore opportunities for incorporating SuDS measures to hold surface water and to manage its release into the piped drainage system. Where SuDS incorporate plantings, please consult an arboriculture and landscape manager.

Figure 279: Braham Street Park, Aldgate, uses a granular surfacing

Figure 280: Derbyshire Street, Bethnal Green, directs water into planted beds by using gaps in the edging

(Image courtesy of Greysmith Associates)

Permeable and porous surfacing

Porous and permeable surfaces allow rainwater through the surface layer to dissipate into underlying permeable soils. London is underlaid with a foundation of clay, which is ostensibly impermeable. However, there are locations throughout London where the soils are permeable and are able to remove rainfall from the surface. Whether or not the site in question has permeable soils, permeable and porous pavements may offer attenuation solutions which drain into a conventional (piped) system. Permeable and porous surfaces are becoming more readily available commercially. With appropriate consideration these could be incorporated into water collection features.

Proposals should be brought to the SDRG at the initial design stages.

Rain gardens and SuDS

Rainfall can be collected and directed from the footway or carriageway into a planting bed or tree pit, provided the tree is a suitable species. This can be achieved through the use of swales, permeable surfaces, kerb extension planters, street planters, and tree pits. Where space is available and is technically feasible these options should be considered. Please speak to an aboricultural and landscape maintenance manager for species selection when working on the TLRN.

Green walls

Vertical green walls using rainwater runoff from roof systems can play an important part in improving the streetscape. However, there is a high cost associated with the installation and maintenance of green walls. Therefore careful consideration is required at early design stages to whole life costs. All green wall proposals need SDRG approval.

Figure 281: Edgware Road green wall

The Stockholm Solution
Stockholm, Sweden

Creating healthier street trees through water attenuation

Key functions

Opportunity

Trees in Stockholm, Sweden, have been used as part of a cost-effective system to manage excessive stormwater runoff.

Benefits

Stormwater tree trench systems reduce the reliance on existing drainage systems, improve safety by removing water ponding from footways and carriageways, and reduce splashing from passing vehicles.

Implementation

The trees are connected by an underground infiltration structure. Under the paving, a trench is created and lined with permeable fabric and filled with stone or gravel. Stormwater runoff flows through a special inlet (storm drain) leading to the stormwater tree trench. The runoff is stored in the empty spaces between the stones, watering the trees and slowly infiltrating through the bottom. If the capacity of this system is exceeded, stormwater runoff can bypass it entirely and flow into an existing street inlet.

Image courtesy of Wolf Paving Company, Inc.

Applying in London

Stormwater tree trenches should be considered in areas that are prone to flooding. This type of infrastructure should be investigated in Opportunity Areas and areas of regeneration.

Porous pavement trial London, UK

Water attenuation for safer streets

Key functions

Opportunity

Porous pavements offer highway authorities and developers a new tool to manage stormwater by allowing it to drain through the pavement surface into a stone recharge bed and infiltrate into the soils below.

Benefits

Porous materials remove excess water from carriageways and footways, improving driving conditions in wet weather and reducing splashing from moving vehicles.

Implementation

Porous pavements work by providing the water with a place to go, usually in the form of an underlying, open-graded stone bed. As the water drains through the porous asphalt and into the stone bed, it slowly infiltrates into the soil or to an attenuation system. The stone bed size and depth must be designed so that the water level never rises into the asphalt. This stone bed, often 450mm to 900mm in depth, provides a tremendous subbase for the asphalt paving.

Image courtesy of Wolf Paving Company, Inc.

Applying in London

Porous pavements are being trialled on the TLRN to determine if their use is appropriate and under what circumstances. We will publish results when the trial is complete.

Attenuation and infiltration systems London, UK

Replicating natural systems to provide easily maintained, aesthetically pleasing drainage capacity

Key functions

Opportunity

New and existing developments disrupt natural drainage of rainfall. While conventional drainage systems reduce flood risk, there are other smaller landscape features that can briefly attenuate or infiltrate rainfall and add visual amenity and ecosystem benefits.

Benefits

Attenuation and infiltration systems can reduce flood risk while also improving the ecology and visual amenity of the site.

Implementation

Following consultation with urban designers and ecologists, the raised kerbs installed in Potters Fields Park, London Bridge, were designed with slots between them to direct water off the kerb and footway into the adjacent gardens. This infiltrates a small amount of the flow and provides the gardens with a plentiful water supply.

Applying in London

Successful attenuation and infiltration systems require early consultation with several professionals to ensure structural, operational and maintenance issues are considered. These systems work well in areas of high footfall and where an opportunity to beautify the landscape exists.

Additional information

British Standards:

BS EN 124: Gully tops and manhole tops for vehicular and pedestrian areas

BS 8301: Drainage

BS 7903: Guide to selection and use of gully tops and manhole covers for installation within the highway

Department for Transport:

Design Manual for Roads and Bridges: Volume 4 – Geotechnics and Drainage

Department for Environment Food & Rural Affairs:

National Standards for sustainable drainage systems, 2011

National Joint Utilities Group:

NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus, 2007

Construction Industry Research and Information Association (CIRIA):

The SuDS Manual (C697)

WRc Group (Water Research Centre):

Sewers for Adoption (7th edition), 2013

13.4 Lighting the way

Vision and purpose

To enhance night-time use, economy and enjoyment, and to provide safe passage across the Capital for all road users, we choose to provide street lighting across the TLRN. Street lighting provides many benefits to the network, including:

- Reducing night-time accidents and personal injuries
- Reducing crime and fear of crime

Figure 282: Highway lighting column illuminating footway and carriageway

Figure 283: LED lighting recently installed

(Image courtesy of CU Phosco Lighting)

- Promoting personal physical fitness and sustainability by encouraging walking and cycling after dark
- Facilitating social inclusion by permitting the use of streets and amenities after dark
- Supporting the 24-hour leisure economy promoting economic development
- Providing safe access to educational facilities supporting lifelong learning
- Assisting emergency services to identify locations and so reduce response times
- Permitting the effective use of CCTV during the hours of darkness
- Maintaining and/or improving the quality of life and personal wellbeing
- Providing an aesthetically pleasing appearance during the day and night

However, such advantages need to be considered with other benefits. These include their environmental impact, sustainability, the reduction in greenhouse gas emissions, the more efficient use of energy, and the provision of Best Value. Such initiatives are supported by drivers including the Climate Change Act 2008 (to reduce greenhouse gas emissions), the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme (to make more efficient use of energy), and the Mayor's Transport Strategy and Climate Change Mitigation and Energy Strategy. We therefore embrace innovation and the latest technological advances to provide these outcomes and these include the implementation of a lighting Central Management System (CMS) and use of the latest light source technology.

Street lighting central management system

The current British Standard for road lighting recognises that road use often changes throughout the hours of darkness and with modern technology lighting levels on the carriageway can be adapted to meet those various requirements without compromising safety. We have therefore introduced a street lighting central management system to control and monitor each lighting point. This flexible approach to lighting and energy use supports the aforementioned aspirations.

This flexibility needs to be applied with London borough lighting policies in mind to ensure a consistent approach to road lighting across all of London's roads. Any proposed lighting installation on the TLRN will need to be CMS compatible.

Latest light source technology

For many years high intensity discharge (HID) lighting has been the mainstay of UK road lighting but advances in technology mean that the capability of solid state lighting now offers more energy efficiencies. We have trialled and are now installing LED technology across our road network. However, we are not committed to the use of only one technology since we aspire to the Institution of Lighting Professionals' (ILPs') mantra: 'the right light, in the right place, at the right time, controlled by the right system'. Where appropriate other sources might be preferred such as induction lighting. With an eye on the future perhaps it will be plasma light sources next.

Design process

The role of the lighting designer is to understand specific requirements and to detail lighting levels accordingly to maintain a consistent character and style across London.

When working on the TLRN, expert advice should always be sought from TfL Engineering to ensure the lighting design is appropriate for the street, conforms with the relevant British Standards, our own particular requirements, and industry recognised codes of safe and or best practice (for example, ILP and HSE guidance).

Lighting levels

Lighting schemes will be designed to BS 5489-1:2013 and CIE115 or later revisions and include a site specific risk assessment. Junction side road entry areas should also be similarly designed. This is anticipated to result in the majority of our roads being lit to lighting classes of ME3 and profiled to ME4 during the hours of darkness. Profiled lighting levels will be uniformly applied within 'logical groups' which will be managed over time by our CMS. Each logical group will predominantly lie between significant junctions, have consistent physical characteristics, and carry similar traffic volumes (including pedestrian traffic). Colour temperature (correlated) will be 'neutral white' (4,000K).

New street lighting on the TLRN

- Must be compatible with our CMS (incorporating digital addressable lighting interface, DALI, or wireless management and control, WiMAC, ballast)
- Must meet our standards and expectations
- Footbridges and subways should also be illuminated in accordance with BS 5489, BS EN 13201 and CIE115. The use of 'blacklights' in subways to deter drug misuse is not advocated

Materials

It is an objective to rationalise the range of luminaires installed, acknowledging that a Best Value lighting solution for the network as a whole should take priority over the Best Value solution for any individual location as a too localised view can result in management of the lighting asset as a whole being over complex. We therefore look to limit the number of products used and deploy just those with best overall performance.

Materials used on the TLRN must be compatible with the TfL Highway Specification. Functional but aesthetically pleasing equipment is preferred. Designers may request an exception to the palette in special circumstances such as in conservation areas. We do not recommend 'mock heritage' styles but wherever practicable will endeavour to maintain all genuine heritage lighting units. However, consideration to special lighting requirements based on the local context will be given on a case-by-case basis.

Lighting columns

Lighting columns may be conical or stepped tubular (site specific basis), must conform to BS EN 40 and as a standard be specified to accommodate a sign plate of 500 square millimetres. However, consideration for the column specification will be necessary if additional attachments such as banners, hanging baskets, CCTV cameras, etc. are required. Stepped tubular columns are generally confined to higher speed roads. Steel columns are to be finished in accordance with G2a or similar approved with generally a final coat of black (RAL9005) or in some locations signal grey (RAL7004). Aluminium columns are to be left bare or anodised where required.

Columns in vulnerable locations or where foundation difficulties are encountered may be installed in retention sockets subsequent to approval. Retention sockets may also be approved for some illuminated signs and are generally used to secure hooped bollards.

The recommended column set-back from the carriageway kerb face is defined by speed limits:

- Speed limits up to 30mph – column set-back 450mm minimum
- Speed limits above 40mph – column set-back 650mm minimum
- Alternative set-backs according to site specific requirements

Lighting column layouts should be in accordance with the site specific design risk assessment, be sympathetic to the local environment, and include considerations for illumination and maintenance requirements. Street clutter should be reduced by minimising the number of assets across a scheme.

The lighting design risk assessment may conclude that raise-and-lower columns provide the best option.

Figure 284: Heritage lighting should be preserved

At puffin and toucan crossing locations lighting columns should be positioned to enable primary signal heads and associated pedestrian head pushbuttons to be mounted on the column to reduce street clutter and provide good illumination at the crossing point.

Lighting columns should be positioned away from mature and newly planted trees and roots in accordance with NJUG guidance and also to

Figure 285: Example of a stepped tubular column

Figure 286: Example of a conical column

maintain lighting performance. The location of luminaires and column mounting height should be adjusted where tree canopies are low or designed away from trees where possible.

Where proposed lighting schemes are within residential areas lighting columns are to be located at property boundaries and gable centres of properties where possible.

When working on the TLRN:

- Where foundation difficulties necessitate the use of other non-standard foundations these should be in accordance with HSE guidance and again, only after approval from ourselves
- Columns should not be located in central reserves unless agreed otherwise with ourselves

Bracket arms

Bracket arms should only be fitted when required to achieve photometric performance or aesthetic objectives. They should coordinate with the form and proportion of the column with no change of size or 'step'. The outreach length is to be no more than 15 per cent of the column mounting height.

Wall-mounted lighting

Where the highway layout and building facades are appropriate wall-mounted lighting should be considered to minimise street clutter. However, wall-mounted lighting and columns should not be mixed on any street section. Please refer to the Code of Practice for Affixing Traffic Signs and Street Lighting to Buildings in London (2015) for further information.

- Wall-mounted equipment and electrical cables are to be discreet and in keeping with the building character
- For listed buildings consultation with the local planning authority is essential and adequate lead-in time must be programmed for Listed Building Consent
- Feeder pillars should be positioned in line with buildings or with the back of the footway to avoid visual and physical obstruction
- Please refer to the London Local Authorities and Transport for London Act (2003) for further information

High-mast and catenary lighting

Specialised mounting arrangements such as high-mast lighting and catenary lighting must be discussed and approved by TfL Engineering.

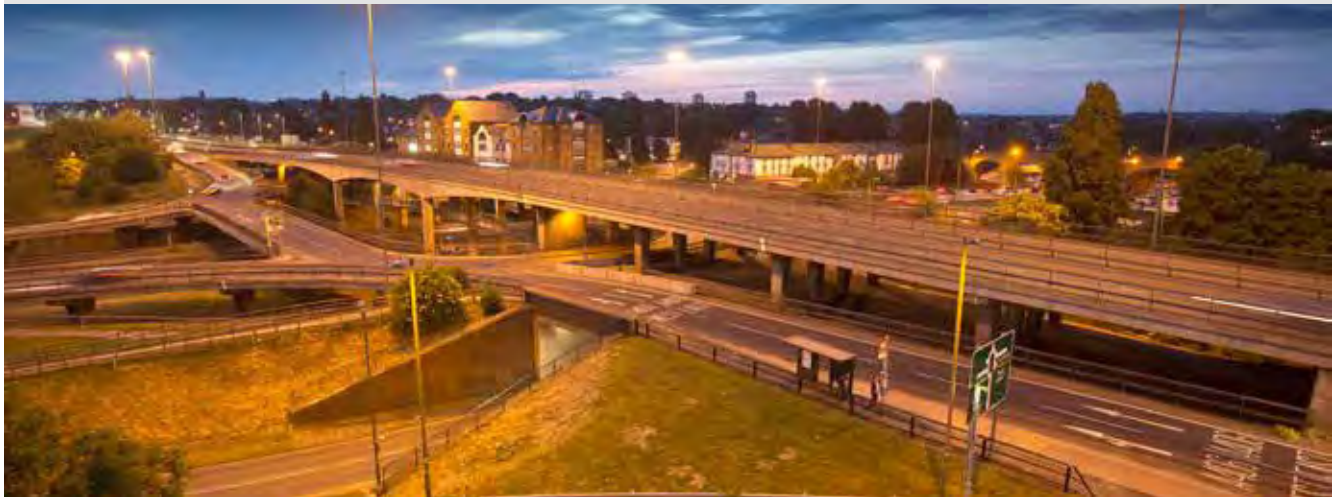
Luminaires

Luminaires must conform to the relevant British Standards (for example, BS EN 60598 and BS EN 62722, etc) and demonstrate optimum performance for their intended use.

The luminaire form and shape should not be obtrusive nor out of character with the general street scene.

Any electrical load installed on the TLRN such as a luminaire must have an appropriate ELEXON charge code to permit correct energy settlement.

Figure 287: CMS is used to control lighting levels throughout the hours of darkness



The luminaire must be oriented in accordance with the manufacturer's recommendation (for example to avoid glare). Our preference is for luminous intensity classes of G6 unless otherwise agreed by TfL Engineering.

Control of light pollution

Light pollution or obtrusive light must be avoided. The following lighting conditions are to be avoided:

- High light intensity in an inappropriate location
- Poorly positioned or oriented luminaires
- Undesirable highway lighting spilling out on to the surrounding environment
- Uplighters – uplighting may only be used with the specific consent of TfL
- Tree or invasive building illumination

Intrusive glare should be controlled by complying with BS 5489 and BS EN 13201 standards.

All street lighting on the TLRN should comply with obtrusive light limitations for exterior lighting contained in the Guidance Notes for the Reduction of Obtrusive Light published by the Institution of Lighting Professionals.

Electrical

Where lighting columns are serviced by a distribution network operator (DNO) supply, a secondary isolator is to be fitted in the column base compartment in order that electrical isolation can be safely achieved without the need to touch the DNO cut-out.

Independent connection providers can be used to help reduce delays in scheme works, approvals may be obtained via TfL Engineering.

All electrical installations must be installed and maintained in accordance with BS 7671 and BS 7430.

Good practice and the reduction of street clutter

We are determined to reduce the amount of street furniture that might confront all road users, therefore street lighting columns might also be employed in supporting, for example:

- Traffic signals
- Crossing controls
- Footway luminaires
- Trixi safety mirrors
- CCTV cameras
- Bus flags and timetables (subject to approval of TfL Buses)
- WiFi communications

Litter bins

Any requirement to mount such equipment on a TfL lighting asset first needs to be approved by ourselves to ensure that the specification and structural integrity of the asset is suitable to support the additional load and windage. Requests to mount equipment such as banners, flower baskets and festive lighting are covered by our highway licence arrangement.

Traffic control equipment such as signals and CCTV are placed in specific positions to ensure that the aspects are readily visible and that pedestrians can access push button units or the necessary view is provided. For these reasons, where it is proposed to install traffic control

Figure 288: Trixi mirrors are used by motorists to see their blind spots at junctions

equipment on lamp columns the street lighting designer should contact the relevant system designer to first determine the position of lamp columns and then locate the remaining street lighting around these positions.

Banners and advertising

Banners attached to existing street furniture and equipment such as lighting can provide an effective way of providing temporary signage or advertisement with minimal additional clutter and is controlled by licence.

The banner may be provided where the promoter can demonstrate that:

- The existing column can take the weight of the banner
- The fixings match the colour of the column
- The banners and fixings are removed within an agreed timeframe and with no damage caused to the permanent street furniture
- The banner and fixings do not cause road safety or visibility concerns

Advertising should be integrated within the urban realm so as to not impinge on pedestrian movement or impact on the overall quality of the streetscape.

The content of the advertising should comply with our conditions for the acceptance of advertising. These conditions are also used to control the artwork displayed on London Underground and buses.

Figure 289: Lamp columns can be used as a wayfinding assistant or to add to local character

Figure 290: Combined lighting column and signal head

Illuminated signs and bollards

Illuminated signs and bollards are to be specified and installed in accordance with current TSRGD requirements.

Feature lighting

Although the primary purpose of TfL road lighting is to illuminate the carriageway and the footpaths, consideration is also given for ensuring a pleasing aesthetic appearance. Requests for additional feature lighting will be considered on a case-by-case basis.

Silent Lights by Urban Matter New York City, USA

Playful lighting that responds to sound as vehicles pass overhead

Key functions

Opportunity

The challenge for Urban Matter was to transform the area under the Brooklyn-Queens Expressway in New York.

The underpass sits in a semi-industrial landscape surrounded by heavy motorway traffic. The pedestrian path is empty, dark, intimidating and avoided by locals.

Benefits

The spectacle provides a playful way of lighting the space and also gives a sense of safety at night. The 'gates' act as a wayfinding device to define a pathway at human scale across what would otherwise be a non-place.

Implementation

To create Silent Lights, a series of sensory gates were installed. These use sensors to respond to the noise of the traffic above. Coloured lights illuminate sequentially as vehicles pass overhead.

Image courtesy of Flickr/triebensee

Image courtesy of Urban Matter Inc.

Applying in London

This has the potential to be delivered in similarly forgotten urban underpass locations, such as the A12 through Hackney.

Hyde Park Corner subway London, UK

Redevelopment of vandalised subway using innovative lighting systems

Key functions

Opportunity

The Hyde Park Corner subway is located near the Lanesborough Hotel. Repeated vandalism of existing wall-mounted lights meant that a new vandal resistant lighting solution was needed to re-establish a safe environment.

Benefits

Careful detailing and well-placed lighting led to an atmosphere that was simultaneously calm and safe. The new lighting is attractive, discreet and much less susceptible to vandalism.

The handrails were painted bronze to match surrounding street furniture. Stonemasons were commissioned to replace the damaged stonework using artificially aged stone to ensure the new stone did not look out of place.

Despite its relatively high cost, this redevelopment was very well received.

Image courtesy of DW Windsor ©

Implementation

LED lighting was fitted under handrails; the heat from LED lighting made the handrails pleasantly warm. The lighting levels were adjusted to be brighter leading into the subway, creating an aesthetically pleasing atmosphere.

Applying in London

The usual preference in London is to remove subways; however, when they are retained, this example shows how they can be made calm, attractive and safe.

Blackfriars Underpass London, UK

Using innovative lighting technology to reduce maintenance costs

Key functions

Opportunity

Closing the Blackfriars Underpass for lighting maintenance every 18 months was an expensive and disruptive affair that damaged TfL's reputation.

Benefits

The ingress protection combined with the reduced maintenance of LED lighting makes the new system significantly more robust, and has reducing planned and unplanned maintenance.

Implementation

Using the limited space available, a new LED lighting system was installed; a system used previously in Australian train carriages and extremely resistant to dirt and water ingress.

A specialised diffuser was made to control the lighting within the underpass and ensured compliance with highway regulations.

Applying in London

The technology would be advisable anywhere where maintenance is a costly and complicated issue.

Additional Information

British Standards:

All lighting schemes on the TLRN must meet the relevant British Standard requirements including but not exclusively:

BS 5489: Code of practice for the design of road lighting

BS EN 13201: Road lighting

BS EN 40: Lighting columns

PD 6547: Guidance on the use of BS EN 40-3-1 and BS EN 40-3-3

BS 7671: Requirements for Electrical Installations

BS 7430: Code of practice for protective earthing of electrical installations

Department of Energy & Climate Change:

CRC Energy Efficiency Scheme (Amendment) Order, 2014

ELEXON:

Charge codes and switch regimes: https://www.elexon.co.uk/reference/technical-operations/unmetered-supplies/charge-codes-and-switch-regimes/

Greater London Authority:

The Mayor's Transport Strategy, 2010

The Mayor's Climate Change Mitigation and Energy Strategy, 2011

Health and Safety Executive:

Avoiding danger from overhead power lines

Avoiding danger from underground services

Risks associated with working on or near lamp columns with non-standard roots during excavation works, 2010

International Commission on Illumination:

CIE 115: Lighting of Roads for Motor and Pedestrian Traffic, 2010

Institution of Lighting Professionals:

All lighting on the TLRN should meet the requirements of industry-recognised codes of best and/or safe practice such as those recommended by the Institution of Lighting Professionals' Technical Reports and Guidance Notes including but not exclusively: Guidance Notes for the Reduction of Obtrusive Light

Bats and Lighting in the UK

Code of Practice for Electrical Safety in Highway Electrical Operations

Code of Practice for Variable Lighting Levels for Highways

Guidance Notes for the Reduction of Obtrusive Light GN01, 2011

Managing a Vital Asset: Lighting Supports

Legislation:

Climate Change Act 2008

London Councils

Code of Practice for Affixing Traffic Signs and Street Lighting to Buildings in London (June 2015)

Transport for London

Highway Licensing and Other Consents, 2011: https://www.tfl.gov.uk/info-for/urban-planning-and-construction/highway-licences

13.5 Leftover spaces

Unplanned leftover spaces can have a significant detrimental visual impact on London's streetscape. These neglected spaces may emerge organically as marginal underdeveloped pockets of land at the interface of planning boundaries, or can be the by-product of major developments which failed to integrate well with the surrounding urban fabric. In London this is most common where major highways cut across the landscape and leave fragmented areas adjacent to the roadside or beneath flyovers.

Often visible from the road network these spaces may not be easily accessible or become fenced off as unattractive residual spaces that have been designed as an after thought or not designed at all.

Figure 291: Spaces on the network which appear to be uncared for should be targeted for reinvigoration

They are not so much forgotten urban spaces, as areas of land that were never used in the first place.

Typically these spaces are not managed by the highway authority and can become overgrown, strewn with litter or may exist in isolation as an unattractive and polluted urban void.

Unplanned and poorly maintained spaces can create negative spatial implications, similar to the broken window effect. We recognise that while these spaces may currently exist as areas of neglect, many of them offer considerable potential as places of opportunity.

Strategy

Spaces should be identified adjacent to the road network which may be able to provide additional amenity, environmental or aesthetic benefits for the local area and the network as a whole. Uplift of leftover spaces should not be planned in isolation, but should encompass a wider strategy of improving leftover spaces along a designated route.

Designers are encouraged to establish baseline conditions to ascertain how the space is used, if at all, and identify opportunities which can contribute to wider environmental and socio-economic strategies in the All London Green Grid framework and London Plan. Assessments may include using the Pedestrian Environment Review System (PERS) auditing process to establish how the leftover space adversely impacts on the walking environment. Please contact our streetscape manager when these spaces are located on the TLRN at streetscapeguidance@tfl.gov.uk.

Context

Many of these leftover spaces are not readily accessible by foot and so designers should consider the role that these spaces can provide at a local and citywide level.

As new developments come forward in adjoining parcels of land, leftover spaces may emerge as viable opportunity spaces; as potential links or in some cases, new public spaces or development sites.

Where major street improvements are proposed, designers should be conscious of the surrounding boundary interface to ensure that any new surfacing or planting treatment is integrated with adjoining areas.

Design interventions

All identified spaces should be mapped, regardless of whether an intervention is to be proposed. Any space which has been identified as leftover should be assessed to determine the potential for intervention.

Together with the local authorities, we are encouraged to work in partnership to strategise and deliver site specific design interventions which look to support wider economic, social and environmental strategies.

Design teams should respond to the constraints of the existing space and provide opportunities which are site specific. Interventions may include, but not be limited to, the following options:

1. Improve management and maintenance

Some of the most dramatic changes to the quality of our roads can be achieved by simple changes to existing maintenance regimes.

2. Improve access

Public space is just that. It is by definition open and accessible to all. There should therefore be a presumption in favour of public ownership and adoption. Unless there are specific reasons against this for safety or other concerns.

3. Improve amenity

Greening

All highway landscape improvement proposals should be practical, feasible and sustainable and promoters should work with our arboriculture and landscape team to identify opportunities and management strategies for the Green Estate.

Scrubland can provide a valuable ecological function in the urban landscape. Existing areas of green infrastructure planting should generally be retained, except where a safety inspection identifies a need for remedial work.

Lighting

Improvements in lighting should be considered for spaces which have existing problems in visibility and perceived security. Good lighting can encourage more people to use leftover spaces and can complement other connectivity and aesthetic improvements across the area.

Temporary art installations

Public art may be considered for leftover spaces which are well overlooked and relatively well connected with a reduced risk of vandalism. Installations that are locally resonant or support local talent are preferred.

4. Reimagine the space

A suite of measures could be introduced together to help transform a space into a destination in itself. This may include creating new uses for the space, such as community and play facilities, places to live or commissioning artwork. Proposals of this nature will require community support, such that any design for a new public space provides for the local area.

Figure 292: Wild flowers planted next to the carriageway

Figure 293: A bridge undercroft beautifully clad in metal sheets and gabion cages

Figure 294: Anthony Gormley public exhibition 'Event Horizon'

St Paul's Churchyard London, UK

Repurposing space for public use

Key functions

Opportunity

A large part of St Paul's Churchyard was once a coach park but has since been transformed into a vibrant public square.

Benefits

The churchyard has been transformed into an open, inviting green space, designed to reflect the curved transept of the cathedral and provide a high quality welcoming setting for the new City Information Centre.

Implementation

A section of Carter Lane, between Godliman Street and Cannon Street, was closed, and a larger public space was provided by relocating the coach parking and replacing it with green space.

Applying in London

Schemes such as this could easily be implemented in other locations as part of a wider project.

Underpass Park
Toronto, Canada

Transforming derelict space under and around three flyovers into a vibrant community space

Key functions

Opportunity

Toronto is dominated by elevated motorways. These create physical and psychological barriers between neighbourhoods. To reconnect communities and create more public space, land underneath a flyover was used to create a park.

Benefits

This project has embraced the concrete beams and columns of the surrounding flyovers to create a welcoming environment. It connects two adjacent neighbourhoods and has the potential to act as a catalyst for regeneration in the area.

Implementation

The park was designed to appeal to all elements of the community through the inclusion of a playground, skate park, basketball courts, trees and public art. A large, flexible community space is the focal point for the park and is used for public events, such as markets and festivals.

Applying in London

This has potential for urban areas which are well-connected but bleak and underused.

Images courtesy of Waterfront Toronto

13.6 Pocket parks

The term 'pocket park' can be used to describe small spaces in the public realm that can be greened to offer an area for rest or recreation. Pocket parks can challenge the common perception of what a park can be. They can range from the traditional town centre green, to making better use of unusual spaces, such as underused parking spaces, roof tops, canal banks, or uninspiring green spaces associated with bus stops or road junctions. Pocket parks can also be created as 'meanwhile spaces' giving a temporary use to an otherwise underused piece of land, perhaps in the early stages of the development process. They can often be created at relatively low cost and with short delivery times.

The key principles of pocket parks are that they are:

- Publicly accessible
- Provide opportunity for local communities to enjoy outdoor space
- Encourage healthy living
- Help build social cohesion through providing opportunity for community gardening
- Recreational
- Volunteering

In 2012 the Mayor of London launched a two-year Pocket Parks Programme with the aim to create or improve 100 pocket parks across London. The programme promoted the principles of pocket parks through provision of grants to local authorities, housing associations, and community groups, to enable them to identify, create, design, and deliver 100 parks.

The Mayor's pocket parks are enhancing underused amenity green space that often provides little ecological or social value. Improvements on these sites include creating food growing spaces, reimagining play facilities, and creating new landscapes that promote sustainable urban drainage and improve the local ecology.

The concept of pocket parks has been embraced by the public and community groups and their creation should be considered as integral to public realm improvement projects.

Additional information

Greater London Authority:
Pocket Parks Prospectus:
http://www.london.gov.uk/sites/default/files/Pocket%20Parks%20Prospectus_1.pdf

Pocket Parks Programme:
http://www.london.gov.uk/priorities/environment/greening-london/improving-londons-parks-green-spaces/pocket-parks

Figure 295: Van Gogh Walk

The Edible Bus Stop®
London, UK

Making the most of spaces through urban greening

Key functions

Images courtesy of © 2014 The Edible Bus Stop®

Opportunity

There are many small underused public spaces across London, that if enhanced through urban greening, could help to make London a more pleasant city in which to live and work. The Edible Bus Stop®, an urban design group, saw an opportunity to transform a small poorly managed patch of amenity grass, into a new public garden maintained and managed by the community. In 2013, with help from London Borough of Lambeth and funding from the Mayor of London, the group designed and delivered the Mayor's first pocket park on Landor Road, Lambeth.

Benefits

Changing underused grey spaces into dynamic green spaces through clever design and planting can improve public perception of the public realm, and foster community cohesion and civic pride. Other benefits can include food growing and enhancing biodiversity. There are also well-documented links between making the public realm greener and more pleasant and boosting the local economy.

Implementation

The Edible Bus Stop® undertook extensive community outreach at every stage of the project, galvanising support from the outset. The group reimagined the entire area; creating large robust planting beds out of discarded granite kerbstones; adding new bespoke oak seating, and with the community planted edible plants, including herbs, strawberries, five fruit trees and rainbow chard. It has given local residents a space to come together and enjoy, and has encouraged them to take ownership, volunteer to help maintain the space, and grow what they wish. It has given the street an asset, making the space a place and the streetscape more pleasant and friendly.

Applying in London

One of The Edible Bus Stop's® ambitions is to create a series of small green spaces along transport routes starting with the length of the 322 bus route. Working with other local community groups, it has already applied the concept in spaces in West Norwood and Crystal Palace, on the 322 route. It hopes to set a precedent with its Edible Bus Route and roll out the concept across London's transport network and beyond. The approach is transferable to thousands of other underused, amenity spaces scattered across London's streetscapes. Small-scale improvements, as demonstrated at Landor Road Pocket Park, have created positive impacts on the local community's wellbeing and contributed to a cleaner, greener and friendlier city.

Parklets
San Francisco, USA

Introduction of small urban parks in underused car parking spaces

Key functions

Opportunity

The distribution of public open space is often unequal in urban contexts. Where there a shortage of public open space or the quality of the public realm is poor the creative use of space, such as parklets, should be encouraged.

Benefits

San Francisco's Parklet Program works to convert underused parking spaces into publicly accessible open spaces called parklets. These are generally installed next to the footway thereby extending the area of useable space for pedestrians as well as providing a range of facilities including seating, cycle racks and landscaping.

Implementation

The programme has sought to install parklets where there is a notable lack of public open space or where existing footway width is highly constrained. Parklets are designed to be permanent, temporary or seasonal structures which are financed and maintained in collaboration with local councils, business owners and non-profit community organisations.

Applying in London

London's Pocket Parks Programme has already transformed underused or derelict spaces and repurposed them for increased green space. The introduction of parklets could seek to improve constrained footways.

Derbyshire Street Pocket Park London

Creation of small urban parks in underused streets and public realm

Key functions

Images courtesy of Greysmith Associates

Opportunity

Providing access to quality open space is always a challenge in the most densely developed parts of the urban environment. There are many competing pressures on the public realm and creating green space requires thoughtful design and creative use of space. The eastern end of Derbyshire Street, Bethnal Green, was a dead-end road with only one function – space for 12 car parking bays. These were used infrequently; consequently the space created conditions that encouraged antisocial behaviour and fly-tipping.

Benefits

London Borough of Tower Hamlets sought to provide environmental and social benefits by transforming the underused space into a pocket park. The design incorporated a cycle path, new seating, green-roof covered cycle racks and bin stores, a rain garden and a defined area for café tables and chairs. Bespoke planters to capture rainwater from the roof of Oxford House, a popular community and arts centre, were designed and provided by Thames Water.

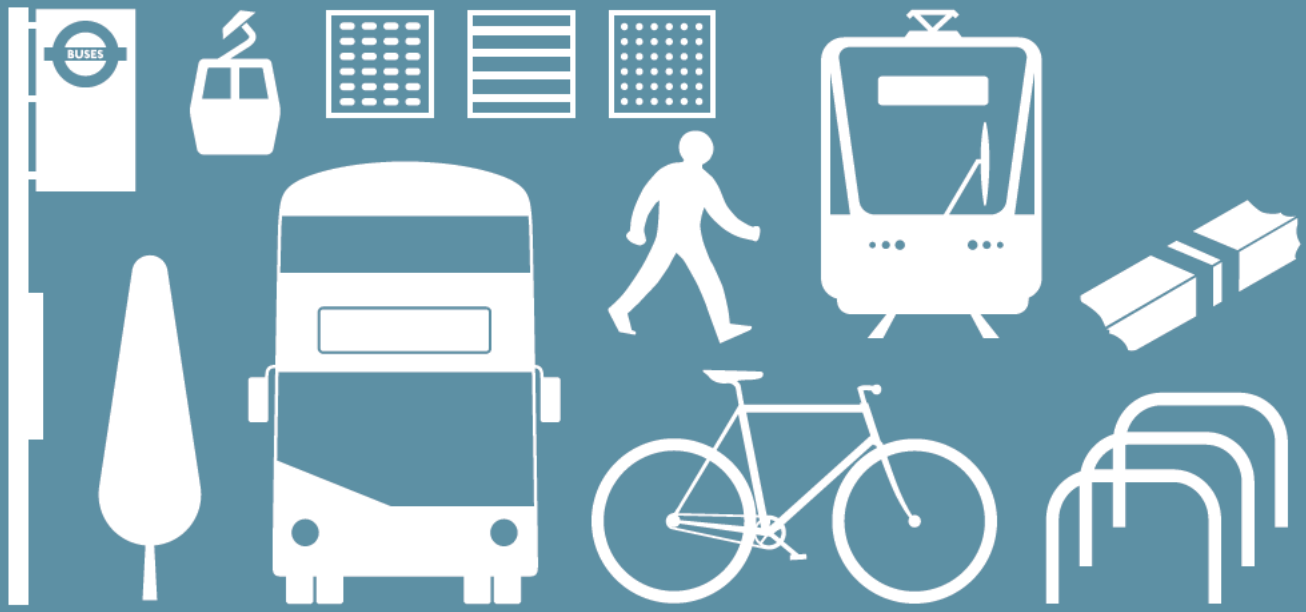
Implementation

The aim was to recreate an important node for pedestrians and cyclists within a thriving network of streets creating an active place from an unused space. A small section of the adjacent park was also incorporated into the design of the scheme, increasing connectivity as well as improving the opportunity to provide sustainable urban drainage. Funding for the project was provided by the Mayor of London's pocket park initiative and London Borough of Tower Hamlets.

Applying in London

Derbyshire Street Pocket Park is an excellent example of how the conversion of an underused grey space into a quality green one can provide a suite of improvements that address issues affecting many parts of London, for example, tackling antisocial behaviour or coping with areas prone to flooding. Each of the interventions delivered here can be applied in similar spaces across London, creating a mosaic of small urban spaces which are valued by local people and deliver more strategic environmental benefits through cumulative impact.

Part E Transport interchanges



14.1 Vision

The interface between a transport hub and the street is an essential part of the streetscape experience. It needs to provide a seamless journey and a clear transition for passengers using transport facilities, accommodate the needs of the station and demonstrate good practice streetscape design principles.

Figure 296: Wapping station interchange between buses and the station entrance

14.2 Street interchanges

The street almost always acts as an interchange zone, an area encompassing one or more interchange facilities creating a multi modal hub, and public space. It needs to fulfil several functions to provide a clear transition for passengers. Interchange zones need to facilitate convenient and safe pedestrian movement between different transport modes and allow for the efficient operation of public transport services.

Stations within the context of Streetscape Guidance are defined as any transport hub used to access public transport, which may or may not include infrastructure located directly on the road network. This includes:

- Rail stations – London Underground, London Overground, Docklands Light Railway and National Rail
- Bus stations – infrastructure which is provided on-carriageway
- Tram stops – operated by London Trams
- Piers – operated by London River Services or others
- Taxi ranks
- Cycle parking hubs

Our Interchange Best Practice Guidelines (2009) should be referred to as a general guide to improving quality and efficiency, and Station Public Realm Design Guidance (2015) referred to when defining the design approach for the station's public realm. Streetscape Guidance should be referred to when detailing the materials and their application from any station entrance that directly faces the street.

Station public realm

Stations and the spaces around them are important focal points for an area with the potential to become a destination in its own right, so any design should look to embrace the local character and sense of place, while providing a legible and consistent streetscape, linking effectively with the surrounding street network.

Figure 297: Wimbledon station forecourt provides seating, cycle parking, public art, taxi rank, and bus interchange

Not every station will include these spaces, generally referred to as a forecourt, a defined area which connects the station entrance to the streetscape, however, where they do occur the following should be accounted for:

- The space should be flexible such that it can respond to daily trends in pedestrian flows and accommodate different uses at different times. This may include temporary uses of space during quieter periods. The station forecourt should work as a cohesive and legible whole, with clear sightlines and well-defined transport entrances
- Designers should consider the context, proportions of the space and the degree of enclosure, when selecting materials and placing furniture within the forecourt. Please refer to the section 'High quality footways' in this guidance for further information
- Where retail units front on to the forecourt, frontages should be visually cohesive, with outdoor seating managed in designated licensed areas

Figure 298: Temporary table tennis installation at King's Cross/St. Pancras station

Figure 299: Legible London signage should be placed near an interchange point

Wayfinding

Information requirements vary depending on the stage in the passengers journey. The provision of comprehensive and consistent wayfinding information across the interchange should be provided to assist navigation. Please refer to Station Public Realm Design Guidance (2015) for further information. Consideration should be given to:

- Appropriate placement of transport infrastructure, such as bus stops, tram stops, kiosks and cycle hubs should aid natural wayfinding and minimise the need for signage when onward travel infrastructure is located within a direct line of sight from an alighting area
- Where direct line of sight to an onward journey mode is not achieved, routes should be simple with signage provided at key decision points. Signage should be rationalised to reduce clutter. Refer to 'Pedestrian wayfinding' and 'Traffic signs' in this guidance, and London Underground Signs manual (Issue 4, 2002) for further information

Footways

Surface materials can be used as a navigational tool and to communicate a change in use. A change in surface materials helps to demarcate the limits of the interchange zone or highlight where there will likely be a greater or different type of pedestrian presence. Each design response should be site specific and consider its function, performance and context. The following examples are potential approaches to the treatment of the footway:

- A consistent approach to paving the footway in front of the station should be used to maintain visual continuity with the surrounding streetscape. Where designers are looking to extend forecourt paving across the footway SDRG approval is required

Figure 300: Green Park Tube station entrance paving has a distinct design used as a 'welcome mat' into the station

- Non-standard surface materials require SDRG approval but may be considered for use on the footway outside a station if the design intent is to visually unify the street and interchange zone. This may be useful in larger forecourt settings where a consistency of material can reinforce the station setting and better relate to the surrounding architecture
- Footways should be designed to accommodate peak pedestrian flows, but be flexible so that they also work at quiet times. Refer to Pedestrian Comfort Guidance for London (2010) for further details

Carriageways

- Special consideration to surface materials is required at interchange points due to frequent and heavy use. All materials and treatments must be robust and able to withstand anticipated use

Figure 301: Bus interchange with a 140mm kerb upstand

- Clear delineation in surface materials and kerb heights are recommended in interchange zones between footways and carriageway. An upstand of 140mm is recommended in most cases
- Containment kerbs may be required where a safety audit has identified a risk of vehicle overrun on to the footway. Please refer to 'Kerbs' for further information
- Signalised crossings should be provided on primary pedestrian desire lines at the entrance to the station to allow people less confident to cross. Please refer to 'Crossings' for further information

Street furniture

Street furniture can be used to reinforce different public realm functions, particularly with regard to pedestrian movement: stationary activity can be encouraged by providing seating away from major desire lines; or trees can be used to reinforce primary walking routes towards the station.

The placement of street furniture on the footway adjacent to an entrance or forecourt area should allow for complex pedestrian movements, as pedestrian desire lines will likely not just be along the street. It should also be recognised that people will need more space to stop, orientate themselves and wait for others.

- The standard Streetscape Guidance furniture placement design principles still apply (refer to 'Footway amenities' and 'Safety and functionality'), however, back of footway furniture should be carefully considered to ensure adequate permeability between kerb edge services, such as buses and taxis, and the station entrance. The placement of street furniture should not hinder maintenance activities
- Large cycle hubs may be required to support station facilities and these should be sited in a convenient location which does not impinge on footway space. For normal cycle provision please see 'Cycle parking'. Designers should consider how cyclists will access cycle parking facilities if not at the kerb edge, to ensure that they do not inadvertently create a shared space to the detriment of pedestrian movements. Cycle parking must not create a barrier therefore short strips of no more than six racks should be provided
- Passenger information, street furniture and signage should all be coordinated in furniture zones, with structures or at the back of footway to minimise clutter

Figure 302: Emirates Air Line Greenwich Peninsula station where stone plinths are used as a security measure and a seating feature

Security

The approach to security should be to firstly design out the likelihood of crime through passive measures and good quality design. The layout should ensure good natural surveillance, be well-lit and promote a high sense of personal security by avoiding the creation of blind spots or dark corners. Careful design, selection and placement of street furniture can create passive measures that prevent and discourage crime from occurring without affecting the overall character of a place. All aspects of the design must comply with Section 17 of the Crime and Disorder Act.

Overt use of CCTV can help in some situations to deter crime, but should not be relied upon in itself due to its relation to fear of crime. Cameras should be placed and merged with adjacent street furniture to minimise visual clutter. Refer to 'Roadside cameras and CCTV' for further information.

Where security bollards are required other furniture such as reinforced seating should be considered to provide greater multifunctional value and help to reduce street clutter. Please note that where street furniture is intended to be used as a security measure, it must first be approved by the Centre for the Protection of National Infrastructure. Security bollards should be considered as a last resort where vehicle incursion may occur and carefully detailed to minimise their use. Refer to 'Barrier free footways' for further information.

- Footways and waiting areas should be visually permeable to enable adequate passive surveillance

Additional information

Transport for London:

Accessible Bus Stop Design Guidance, 2015

London Underground Signs manual, 2002

Pedestrian Comfort Guidance for London, 2010

Station Public Realm Design Guidance, 2015

London Underground Station Design Idiom, 2015

14.3 Transport mode specific design considerations

The following section outlines mode specific design considerations that should be read alongside Station Public Realm Design Guidance.

14.4 Rail interchanges

A large number of major rail stations front directly on to the TLRN including London Euston, London King's Cross and Waterloo, as well as numerous London Underground, London Overground, Docklands Light Railway and National Rail stations.

Designing the interface of the street with these stations is crucially important to maintaining the quality and continuity of the streetscape at some of London's busiest transport nodes.

Detailed guidance

Footways

There are several general approaches to surface treatments typically used at station entrances that treat the entrance as:

An 'entrance mat' – using a visually different paving material directly surrounding the station entrance to highlight the entrance. This approach tends not to be used in new stations, but is commonly seen at stations that are listed or in a conservation area. If considering this approach please seek the approval of the SDRG.

A distinct space – using a distinct urban realm treatment in the forecourt of the station to distinguish it as a separate space from that of the street. This approach can be extended across the footway or stop at the edge of the footway.

Figure 303: King's Cross station forecourt uses stone plinths as a security measure

If considering this approach please seek the approval of the SDRG.

Part of the street – using the same material as the footway up to and perhaps into the station entrance. This is a common approach when the station entrance is directly on the street and there is little or no forecourt space.

Streetscape Guidance seeks a consistent approach to footway paving as seen in 'High quality footways' and 'Footway amenities'. When considering an alternative approach, please seek the approval of the SDRG.

Street furniture

- Station Public Realm Design Guidance provides detail on when and where it may be appropriate to locate street furniture. If street furniture will be included at the station entrance or forecourt, please follow the guidance set out in:
- 'Ambience'
- 'Footway amenities'
- 'Safety and functionality'

Large cycle hubs, refer to 'Cycle parking hubs', may be required to support rail station facilities and these should be located in a convenient location which does not on impede on footway space. Designers should consider how cyclists will access the cycle parking facility if it is not at the kerb edge, to ensure that they do not inadvertently create a shared space to the detriment of pedestrian movements.

Additional information

Transport for London:

Station Public Realm Design Guidance, 2015

Interchange Best Practice Guidelines, 2009

London Underground Station Design Idiom, 2015

Department for Transport:

Security in Design of Stations (SIDOS) Guide, 2012

14.5 On-highway bus station interchanges

Most of London's major bus stations are integrated with other public transport modes, in particular London Underground. The interchange experience is therefore a key consideration in delivering an efficient and beautiful public realm which acts as a pleasing transitional space between transport modes.

Streetscape Guidance does not provide specific details on bus station design; rather it identifies the key design considerations for ensuring successful urban integration of the bus station with the adjoining road network, and clarifies the aspirations for maintaining the quality and character of the streetscape across the bus station frontage.

Figure 304: Bus interchanges happen both on and off the highway

Figure 305: On-street bus interchanges need to provide for the safe passage of cyclists and vehicles

General considerations

Bus interchanges accommodate a high frequency of buses and a large volume of people. Therefore, bus interchanges should aim to provide clear delineation between waiting areas and movement corridors to avoid congestion and ensure the safety of all users.

Provision for cycling is a priority that should be designed in for both on-carriageway facilities and cycle parking. Different regulations apply to bus station that are off-highway.

The design of the station buildings and the configuration/provision of bus stops will depend on site-specific operational and spatial characteristics, and will always require specialist architectural and highways advice. Our Bus Infrastructure team should always be consulted regarding any street improvement project adjoining a bus station or any aspect of a TfL bus station.

Detailed guidance

Many major bus interchanges will occur on the highway road network where passengers can transfer to another mode of transport like rail or Tube. Brixton, Waterloo, King's Cross and Paddington stations are just a few examples of where buses stop on the carriageway at frequent intervals to allow passengers to interchange.

These interchanges are often constrained by narrow footways and active frontages. However, the following considerations can help relieve congestion and create a smooth interchange:

Footways

- Consider the provision of a centre median along the length of an on-carriageway interchange zone to assist passengers with informal crossings. The median should be paved in the same material as the footways and no street furniture should be placed on it
- Provide frequent and wide formal crossings on desire lines; refer to Crossings for further information
- Design teams should use a consistent approach to paving the footway and it should match the material of surrounding footways to maintain visual continuity with the surrounding streetscape
- When designing a forecourt as part of an interchange that is public space, designers should first consider the opportunity to create a place when reviewing the approved

palette of materials in this guidance. Bespoke materials should only be considered where a strong case can be made as to their value in responding to the character of the space and the surrounding architecture. This will require approval by the SDRG

- Where a non-standard material has been specified, designers should be especially careful in detailing the intersection of the bespoke treatment with the standard footway materials used on the TLRN

Street furniture

- Street furniture should be kept to a minimum and equipment and signs should be combined where possible; refer to 'Footway amenities' and 'Safety and functionality' for more information
- Passenger information and bus stop signage should all be coordinated in furniture zones to minimise clutter. Consideration of adjacent frontages when siting bus infrastructure is important and will influence the layout and format of bus stop shelters. Please contact our Bus Infrastructure team and refer to 'Kerbside activity' for further information

Carriageway

- Carriageway surfacing should be carefully considered so as to ensure durability
- Containment kerbs may be required where a safety audit has identified a risk of vehicle overrun on to the footway
- Please be aware of DfT guidance on highway marking

Additional information

Transport for London:

Interchange Best Practice Guidelines, 2009

Accessible Bus Stop Design Guidance, 2015

Station Public Realm Design Guidance, 2015

14.6 Tram interchanges

Tramlink provides 28km of rapid, street level and off-carriageway services across central Croydon, from Wimbledon to New Addington, Elmers End and Beckenham Junction. Tramlink is a fully integrated public transport service and connects with numerous bus routes, seven mainline rail stations and the London Underground.

Powered by electricity, trams do not emit fumes and so provide a greener public transport solution than motor vehicles. They do however require extensive infrastructure for operation including rail tracks within the carriageway, overhead power lines and raised platforms. Any proposed extension or changes to the route should consider the visual impact on the streetscape, in particular, where possible building fixings should

Figure 306: Elmers End tram stop

be used to support the overhead. Where this is not possible special consideration should be given to the visual impact that the overhead line supports may have on the urban environment.

London Trams, a division of London Rail, is responsible for maintaining the infrastructure and the vehicles, overseeing the operations of the Tramlink network and for future enhancements to the system. We are committed to maintaining and improving the tram network by providing higher frequency services, without compromising the road network capacity.

Location

- Tram stops may be located within the street environment or off-carriageway and consist of a raised platform, ticket vending machine, Oyster reader, emergency help point, information boards and shelter and seating where space allows
- Tram routes that run within the carriageway either run in mixed traffic or within their own dedicated lanes
- Highway arrangements at on-street stops shall be designed to minimise the speed of traffic through or around the stop. The layout of on-street stops must be designed to minimise the risk of vehicles mounting the platform or hitting the platform edge

Detailed information

Platform widths should be designed to cater for the anticipated volume of pedestrian use.

- The minimum width between tramway edge and any structure should be 1,500mm
- The nominal minimum platform width will be 3,000mm for side platforms and 5,000mm for island platforms
- Side platforms with absolute minimum width of 2,000mm may be considered where pedestrian demand profiles are sufficiently low and designs agreed with London Trams on the basis of risk and value management assessments
- Along the full length of the platform, a single row of lozenge tactile paving should be used to delineate the edge with a contrasting colour
- The kerb height needs to be raised in most instances to 350mm to provide step-free access for boarding the tram

Figure 307: Tram and bus interchange at Centrale shopping centre, Croydon

- Poles to support overhead lines should be setback at least 450mm from the kerb edge. These poles should be considered for mounting other signage or street lighting to reduce clutter, while taking into account the maintenance requirements as strict access arrangements are in place due to overhead lines carrying high voltage
- Signalised pedestrian crossings across the carriageway are not generally required at each end of each platform, however, an uncontrolled crossing point should be provided where the desire lines dictate it
- The provision of a signalised crossing will be dependent on pedestrian desire lines, sightlines and vehicle flows and will be determined using risk assessment and industry guidelines/standards
- Tree plantings should be considered where possible

Additional information

Department for Transport:
Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Office of Rail Regulation:
Guidance on Tramways: Railway Safety Publication 2

Transport for London:
Trams Customer Environments

14.7 London River Services interchanges

The road network and London Underground stations are often adjacent to a number of our piers, including Victoria Embankment adjacent to Blackfriars, Embankment and Westminster piers, and New Ferry Approach and Pier Road serving the Woolwich Ferry terminals.

The design of the public realm in these locations generally requires minimal alterations to standard arrangements. For most pier locations, the majority of the supporting infrastructure is provided off the highway and on the river.

Figure 308: London River Services' totem and ticket kiosk

Off highway infrastructure includes walkways, waiting rooms and boarding ramps on floating pontoons. Design guidance for these components is detailed in our London River Services: River Infrastructure Guidelines (2014).

Highway provision is generally limited to a single free-standing ticket kiosk, overhead pier signage, free-standing poster frame units and a Legible London wayfinding totem.

Ticket kiosk

- Ticket kiosks should be located in close proximity to the pier entrance on a highly visible stretch of footway, line of sight should ideally be maintained to any nearby London Underground stations, bus stops or other major interchanges
- The placement should be a minimum 450mm from the kerb edge, facing in towards the footway so as to encourage queuing away from the carriageway

Figure 309: River pier ticket kiosk

- The building should meet current building regulation requirements
- A minimum unobstructed footway width of 4,000mm should be provided at the ticket kiosk front desk
- Waiting rooms with seating are provided on some piers; however, additional seating may be provided within the footway furniture zone a minimum of 2,000mm from the kiosk, so as to ensure adequate access to the kiosk door
- Temporary queue management barriers may be erected during opening hours if required. The footway should maintain a 2,000mm unobstructed width. After hours, barriers should be stored on the pontoon

Signage

- Ticket kiosk signage should be clear and concise, to minimise the visual impact on the streetscape, while providing sufficient information for passengers
- Tamper proof vinyls and anti-graffiti overlays should be used in all exterior applications where signage is required
- Designers should refer to the bespoke treatments and approved standards in our London River Services: River Infrastructure Guidelines (2014)

Additional information

Transport for London:
London River Services: River Infrastructure Guidelines, 2014

14.8 Taxi ranks

We are responsible for the regulation of taxis and private hire vehicles (PHVs). TfL Taxi and Private Hire is responsible for appointing and revoking all taxi ranks within the London boroughs, other than those located in the City. Taxi ranks within the City of London are not under our jurisdiction, but are appointed and managed by the Commissioner of Police for the City of London.

Figure 310: Taxi rank

Designers should consider the contribution that taxis can provide at interchanges for onward travel and ensure that the placement and design of taxi ranks and set down/pick-up facilities do not impede general traffic flows while remaining convenient and accessible for passengers, particularly for those with mobility impairments. Taxi ranks are particularly important to disabled people or those who have difficulty accessing other transport modes. Taxi ranks may only be used by taxis (Hackney Carriages) and not PHVs which must be pre-booked via a licensed TfL operator. Please refer to the Taxi Ranks at Major Interchanges: Best Practice Guidelines (2003) for information on general design principles of taxi ranks.

Location

Taxi ranks should be located close to transport interchanges and major attractions such as retail areas, bars/restaurants, events, sports stadia and hotels. We can also appoint rest and refreshment ranks to provide a designated space for taxi drivers to take a short break.

Ranks should be positioned with due regard to safety, so that passengers can board from or alight on to the footway from the nearside doors of a taxi. Care needs to be taken with respect to cyclists and cycle routes.

Materials and layout

When designing a taxi rank, a length of 5,000mm per taxi is standard. The size, layout and design of the taxi rank will depend upon several factors but must be located within sightline of the venue they serve and at a suitable distance for the passenger. Please refer to Taxi Ranks at Major Interchanges: Best Practice Guidelines (2003) for further information.

- Taxi ranks should be clearly signed and marked according to the TSRGD manual. Set down and pick up areas should have a minimum kerb height of 140mm to allow easier access for those with mobility impairments and luggage
- Footways adjacent to the taxi rank should have an unobstructed minimum width of 2,000mm for alighting and boarding; sufficient for wheelchairs to manoeuvre and to accommodate access ramps and an additional 1,500mm for pedestrians to bypass the rank
- A formal pedestrian crossing with a dropped kerb or raised table should be located near to the taxi rank to allow for convenient, safe access and to discourage informal crossing in-between taxis. However, taxi ranks should not be on the opposite side of the road to the venue they serve forcing passengers to cross the road before being able to access a taxi
- Seating and shelter should be positioned nearby where space allows

Figure 311: Taxi set down and pick up areas should have a minimum kerb height of 140mm

Road markings and regulations

- Taxi ranks are bays marked with 50mm-wide yellow broken lines on the edge or centre of the carriageway surface and signed in accordance with the TSRGD
- Only licensed taxis are permitted to stop in the areas bounded by the road markings
- For all TfL-appointed taxi ranks on the public highway, a taxi rank order must be completed and this is undertaken by TfL Taxi and Private Hire. If the taxi rank is on the public highway then a Traffic Management Order should also be completed to ensure it can be enforced and this will be carried out by the highway authority

Consultation

TfL Taxi and Private Hire must be consulted in all projects involving taxi ranks to advise on location, design and layout.

Additional information

Statutory instruments:

Traffic Signs Regulations and General Directions, 2002 and 2015

Department for Transport:

Inclusive mobility – A guide to best practice on access to pedestrian and transport infrastructure, 2021

Transport for London:

Taxi Ranks at Major Interchanges: Best Practice Guidelines, 2003

Transport for London appointed taxi ranks, 2014

14.9 Cycle parking hubs

This guidance should be read in conjunction with the London Cycling Design Standards, 2014: Chapter 8.5 – Cycle parking to support different uses. It provides guidance specifically for cycle hubs adjoining the TLRN.

Cycle parking hubs are designed to provide a large number of secure cycle parking spaces in areas of highest demand, while also offering a range of related facilities which may include cycle maintenance, secure long-stay parking and cycle hire.

Hubs are most often located near rail stations but may also be considered for major trip attractors such as shopping centres or landmark buildings. Reliable cycle parking facilities and hubs at stations will become an increasingly important way of supporting cycling as a viable interchange mode for onward travel.

The installation of large cycle parking facilities at stations may be complicated by land ownership and commercial relations. Local authorities are encouraged to work in partnership with landowners and ourselves to provide facilities that can accommodate and support the anticipated future growth in cycling.

Figure 312: Ealing Broadway cycle hub

(Image courtesy of H-B Designs Ltd)

Location

- Where the TLRN adjoins a station forecourt, a cycle parking hub may be considered within the road network boundary, as long as complementary measures are put in place to maintain appropriate unobstructed footway widths. This may include footway widening or decluttering of other street furniture
- As a minimum, footway widths of 3,000mm should be provided adjacent to hubs, to allow for a waiting cyclist to gain access to a facility without blocking the full width of the footway
- Cycle hubs should be located within convenient access of the station entrance, no more than 200 metres away, so that cyclists are less inclined to fly park closer to the entrance
- The location should ensure high levels of natural surveillance, supported by CCTV coverage

Design considerations

- Any new structure should aim to accommodate current summer demand for cycle parking and provide an additional 20 per cent of space where practicable
- The placement should not obstruct existing pedestrian desire lines or create unnecessary conflict between pedestrians and cyclists crossing the footway to access the hub. It may be appropriate to provide a shared use area around the hub, with dropped kerbs to allow for safer, more comfortable cycle access
- For any secured facility, designers should carefully consider the management regime, staffing requirements, tariff rates, and access arrangements, so as to maintain a viable and efficient facility

Detailed Information

- Parking stands should provide two lockable points, so the frame and both wheels of the cycle can be securely fixed, as detailed in 'Cycle parking'
- Gated compounds should allow for 24-hour access
- Any covered structure should ensure a minimum head clearance of 2,400mm. This might be an opportunity to create a structure that responds to its context, and act as a beacon or icon
- Roofs should be sloped so as to reduce the accumulation of debris and discourage antisocial behaviour
- Cycle hub surface materials should respond to the local context. The use of setts should be avoided in favour of 900x600mm slabs or asphalt
- Street furniture must be kept to a minimum to allow for regular and numerous pedestrian and cycle movements (refer to London Cycling Design Standards, 2014)
- Where the cycle hub is located on the footway dropped kerbs should be provided and shared use areas should be considered

Additional information

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Part F Appendix

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BS 7533: Part 12 provides sub-structure advice for pedestrian areas

BS 7669-3: Guide to the installation, inspection and repair of safety fences

BS 7671: Requirements for Electrical Installations

BS 7903: Guide to selection and use of gully tops and manhole covers for installation within the highway

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15.2 List of revisions

Revision number	Content	Date	Author	Reviewed by	Approved by
2016 Revision 1	Text and content corrections throughout Update to 2.4 Street Types for London Update to tramline and ladder paving policy on page 139	January 2016	Shannon Rice, Streetscape Manager	Matthew Wilson, Highways Manager – Sponsor	Dana Skelley, Director of Asset Management
2017 Revision 1	Text and content corrections throughout Update to Part A – A vision for London's Streets Update to seating/bench policy Update to vehicle crossovers	May 2017	Shannon Rice, Streetscape Manager	Matthew Wilson, Highways Manager – Sponsor	Dana Skelley, Director of Asset Management
2019 Revision 1	Text and content corrections throughout Update to 10.5 Electric vehicle charging points on page 188	March 2019	Jon Hodges – Streetscape Design Manager	Martin McMahon – Asset Management Strategy Lead	Garry Sterritt – Head of Asset Investment


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London's electric vehicle charge point installation guidance

December 2019

Transport for London

Introduction

This guidance provides information to support the installation of electric vehicle (EV) infrastructure in London. The focus of the guidance is on the implementation process and considerations specific to London's streetscape.

It supersedes the previous 'Guidance for implementation of electric vehicle charging infrastructure', published by Transport for London (TfL) in April 2010. The rationale for updating it at this time is in response to the findings of the Mayor's Electric Vehicle Infrastructure Taskforce and the associated London Electric Vehicle Infrastructure Delivery Plan (June 2019). In this, up-to-date official guidance for installing the infrastructure in London was considered key to enable the levels of infrastructure expected to be needed by 2025, to ensure infrastructure would no longer be a barrier to people switching to EVs.

The Delivery Plan also sets out a future focus on rapid charge points ('rapids') in particular to suit the needs of essential, high-mileage road users such as taxis, private hire and other light commercial vehicle drivers. It explains the rationale for a focus on rapid charging hubs, and sets out a vision for at least five to be put in place, one in each sub-region of London, by 2025. To improve overall coverage, additional rapid chargers should be prioritised to serve London's town centres. This could be in the form of hubs or single rapid chargers, to primarily serve commercial needs. For slower chargers, the focus is on increasing the numbers to meet the rising demand and to plan for this strategically as opposed to an ad hoc way. In addition, the importance of minimising streetscape impact is paramount, and this guidance will help to encourage this.

Similar to the 2010 edition, the primary audiences for this document are London borough officers and private landowners looking to install EV charge points. It will also be useful for urban and landscape designers, architects, product designers, manufacturers, suppliers, operators and energy distributors as well as authorities outside London with an interest in installing EV infrastructure.

The history of London's EV charging and how it has evolved is set out in further detail in the Delivery Plan. Numbers are constantly growing and as of September 2019, London has 4,292 publicly accessible charge points spread across 2,779 locations[1]. There has recently been a huge uplift in lamp column charge points across London on residential streets as a result of the Go Ultra Low City Scheme (GULCS).

London Councils will also be setting up a coordination function to help with EV infrastructure installation. This will aim to provide a central source through which boroughs can get information and support for installing new charge points across London. When live, this will be hosted on London Council's website.

In its Road to Zero strategy, the Government has set out that from 2040 it will end the sale of petrol and diesel cars and vans. The Mayor's ambition is to accelerate this target and work towards all new cars or vans registered in London to be zero emission by 2030, meeting the aspirations of the Committee on Climate Change. This highlights the need for growth of the public charging infrastructure network, which is to be achieved with the help of private and public sector input. The focus is on extending infrastructure for high-mileage users such as

[1] *Zap-Map: Guide to EV charging*: https://www.zap-map.com/charge-points/

taxis, private hire and light goods vehicles which are essential to keep London moving while supporting all Londoners. EV infrastructure in London should complement the Mayor's other aims around encouraging more people to walk, cycle and use public transport while seeking to reduce the number of cars on London's roads. Where people do need to drive a car it should be the cleanest possible vehicle. A good EV charge point network can support this switch to cleaner vehicles.

Due to the changing nature of EV technology, both in terms of vehicles and charge point infrastructure, we will keep this guidance under review and update when necessary to ensure it continues to reflect the current state of the EV market and the technology available.

Structure of this guidance

The guidance is divided into five sections:

- **Policy context** – provides the policy context for EV infrastructure to deliver zero emission transport in London
- **Selecting the type of EV charge point** – sets out the different options and user needs for different types of charge point infrastructure
- **Design of EV charge point facilities** – provides parameters for the design of charge point facilities and considerations for all users of the street
- **Planning and consents** – sets out the possible requirements for implementing charge points
- **Implementation, operations, safety and maintenance** – details the considerations for implementation and ongoing operation and maintenance of facilities

Scope of this guidance

Not all electric vehicle charging infrastructure is covered by this guidance document. This is because the focus here is on publicly accessible infrastructure as opposed to private infrastructure. Also the technology is constantly advancing, and options such as wireless charging are not considered viable to be widespread at this point in time.

The following infrastructure is covered in the guidance:

- **Location:** On-street and off-street charging infrastructure including single and double roadside charge points as well as hubs for six or more charge points
- **Access:** Publicly accessible charge points, both on-street and off-street. The guidance does not cover private or home charging infrastructure
- **Speed:** Static posts from lamp column charging through to rapid charging (not faster than 50KW), but not wireless charging or mobile charging infrastructure
- **Vehicle type:** Charging for cars and light goods vehicles, but not heavy goods vehicles, buses or electric bikes or scooters

Home charging

Home charging is not covered in this document. There are a number of potentially significant public safety issues that can arise where the user does not have their own off-street parking and where electric cables may be trailed across the pavement.

According to the Highways Act 1980, running an electric cable across the pavement to charge a vehicle from your home or business will find you liable for any injury to people or damage to property. This is set out below.

Highways Act 1980, Section 162 - Penalty for placing rope, etc. across highway. U.K.

A person who for any purpose places any rope, wire or other apparatus across a highway in such a manner as to be likely to cause danger to persons using the highway is, unless he proves that he had taken all necessary means to give adequate warning of the danger, guilty of an offence and liable to a fine not exceeding [F1level 3 on the standard scale].

F1 Words substituted by virtue of Criminal Justice Act 1982 (c. 48, SIF 39:1), ss. 38, 46

Policy context

This chapter sets out the background and policy context for the installation of EV charge points within the framework of the London Plan, the Mayor's Transport Strategy, the Government's Road to Zero vision and the Mayor's EV Infrastructure Delivery Plan.

Strategic context

The London Plan is the statutory Spatial Development Strategy for Greater London. Following the May 2016 Mayoral election, a new London Plan is under development which will set out key statutory policy and standards for parking in London which is of relevance to the installation of EV charging infrastructure. To help facilitate the switch to EVs, the Draft London Plan (July 2019) states, under policy T6 Car Parking, that 'where car parking is provided in new developments, provision should be made for infrastructure for electric or other Ultra-Low Emission vehicles in line with policies T6.1, T6.2, T6.3 and T6.4. All operational parking should make this provision, including offering rapid charging. New or re-provided petrol filling stations should provide rapid charging hubs and/or hydrogen refuelling facilities.' Policy T6 also states car-free development should be the starting point for all developments proposed in places that are already (or are planned to be) well-connected by public transport, with development elsewhere designed to be with limited car use and the minimum necessary parking.

Reducing greenhouse gas and harmful air pollution emissions is essential for London's future as a healthy, economically successful and sustainable city. The Mayor's London Environment Strategy[2] and the Mayor's Transport Strategy set out that by 2050 London will become a 'zero carbon city' and will have the best air quality of any major world city, going beyond the legal requirements to protect human health and minimise inequalities.

At the national level, the Government has set out its aims for zero emission transport in its Road to Zero vision, in which it calls for at least 50 per cent – and as high as 70 per cent – of new car sales and up to 40 per cent of new van sales to be ultra low emission by 2030. By 2040, no new conventional petrol or diesel cars or vans will be sold in the UK.

The Mayor's ambitions for a zero carbon London by 2050 can only be achieved if all vehicles are zero emission by that date, which refers to vehicles that produce zero harmful emissions at the exhaust. The Mayor's Transport Strategy sets out a roadmap to achieving zero emission transport and to encourage the switch to ultra low and zero emission technologies.

To deliver the Mayor's ambition of zero emission transport, an increase in trips undertaken by walking, cycling and public transport will be required, with all remaining vehicle trips fully zero emissions.

Specifically, the Mayor's Transport Strategy sets out the following aims to achieve zero emission road transport by 2050:

- 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041;
- Reduction in overall traffic levels by 10-15 per cent by 2041; and
- Remaining vehicles on London's roads to be zero emission by 2050, including:

[2] Mayor of London. London Environment Strategy. Greater London Authority. May 2018.

- All licensed taxis and private hire vehicles being zero emission capable by 2033 at the latest; and
- A zero emission bus fleet by 2037 at the latest.

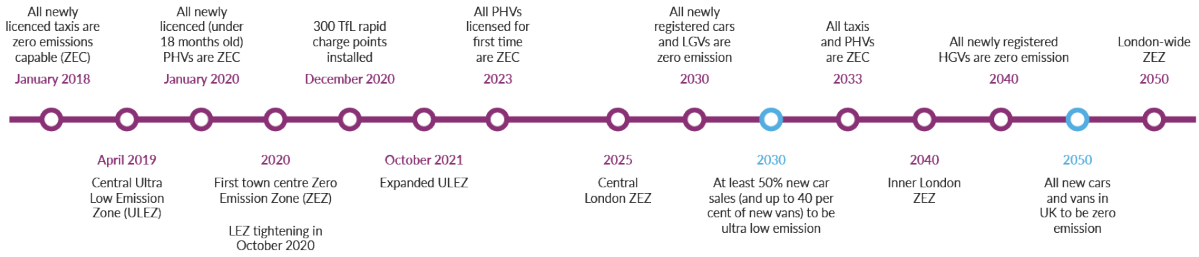
The Mayor's Transport Strategy also identifies electric vehicles as a key component to achieving zero emission transport and sets out the following proposal for EV charging infrastructure:

Proposal 34

The Mayor, through TfL and the boroughs, will work with Government to ensure that sufficient and appropriate charging and refuelling infrastructure is put in place to support the transition from diesel and petrol-powered vehicles to Ultra Low Emission Vehicles, including ensuring that London's energy-generating and supply system can accommodate and manage the increased demand associated with this transition.

The EV Infrastructure Delivery Plan summarises the timeline of policies which have recently been, or will be, enacted in London to move towards zero emissions.

Timeline of key related policies



Selecting the type of EV charge point

This section provides information on selecting the right type of EV charging infrastructure based on local needs and requirements.

Categories of charging infrastructure

It is recommended to undertake research into the different types of charging infrastructure before deciding on the most suitable for your needs.

The table below gives a brief overview on the types of charge points available. For the most recent solutions and more technical details on charging equipment see BEAMA's Guide to electric vehicle infrastructure.

Categories of charging infrastructure

Category **Power** kW **Type of connector**	**Typical formats**	**Points to note**
Rapid DC 50+ (CCS/CHAdeMO/Supercharger) AC43+ (Type 2)	• **Rapid charge hubs** • **Fuel stations** • **Taxi rest ranks**	• **Fast charge speeds (c.22kWh in 30mins providing – 120km of range for 50 kW rapid)** • **Higher capital cost (c.£50,000) and higher prices (20p-40p/kWh)*** o Most new Battery Electric Vehicles (BEVs) can use rapid DC chargers o Maximum DC charge for majority of new BEVs is 50kW o Some models allow 100kW+ o Maximum DC charge of some Plug-in Hybrid Electric Vehicles (PHEVs) is 22kW o No DC charging for many PHEVs/older BEVs
Destination	• **Retail/public car parks**	• **Slower speeds (c.22kWh/-120km of range in 3 hours**

Slow to fast AC 3-22 (Type 2)	• **Urban centre streets** • **Leisure centres** • **Hospitality**	**for a 7kW fast charger and 6 hours for a 3.6kW slow charger)** • **Lower capital cost - £4,000-£6,000 for a fast charger and as low as £1,000 for a slow charger** • **Lower prices (9-15p/kWh)*** • **Streetscape impact will limit on-street mass deployment** • **All EVs can use a form of AC charging. However:** o Maximum AC charge of many PHEVs is 3.6kW o Maximum AC charge of many BEVs is 11kW o Some exceptions allow 22kW
Residential **Slow to fast** AC 3-22 (Type 2)	• **Charge pillars** • **Lamp columns** • **Pop-up/kerb chargers**	
Private Varies	• **Home** • **Workplace** • **Depot**	

Publicly accessible

Private

***Indicative pay as you go price range**

Figure 2 shows examples of some of the most common types of charger, however there are a number of innovative variations that could also be considered now or in the future. Examples include models which features charge points that are flush with the pavement or 'armadillo' kerbside charge points which have been trialled in Southwark.

Examples of charging infrastructure

Residential slow to fast – lamp column charge point	Destination or residential slow to fast charging	Rapid charging
		

Different users and vehicles types will have different charging requirements. This will influence which type of charging infrastructure is most useful to them. The table below provides an overview of the different requirements by user type.

Requirements by user type

User category	Vehicle type	From or near home or at depot (Slow/standard charge)	While 'grazing' or at the workplace (Any charge speed)	'On-the go' or in-transit (Typically rapid charge)
Company fleet Light Goods Vehicles (LGVs)	**BEV**	**Regularly to nightly** (during working week)	**Rarely to occasionally (depending on mileage and access to depot charging)**	**Occasionally to daily** (depending on mileage)
	PHEV		**Rarely or never**	**Occasionally** (where vehicle supports)
Privately owned LGVs (including gig economy)	**BEV**	**Regularly to nightly** (during working week)	**Occasionally to regularly** (depending on nature and length of stop and access to	**Regularly** (depending on daily mileage and ability to charge from or near home)

	PHEV		home charging)	**Occasionally** (where vehicle supports)
Taxi	**Any**	**Nightly** (during working week)	**Rarely or never**	**Regularly to daily** (depending on daily mileage and ability to charge from or near home)
Private hire	**Any**	**Nightly** (during working week)	**Rarely or never**	**Regularly to daily** (depending on daily mileage and ability to charge from or near home)
Private cars	**BEV**	**Regularly**	**Occasionally** (depending on use of vehicle and ability to charge from or near home)	**Occasionally to regularly** (depending on use of vehicle and ability to charge from or near home)
	PHEV	**Regularly**	**Occasionally to regularly** (depending on use of vehicle and ability to charge from or near home)	**Occasionally** (where vehicle supports)
Shared vehicles (eg car clubs)	**BEV**	**Regularly to daily**	**Occasionally to regularly** (although dependent on business model)	**Regularly** (dependent on vehicle and business model)
	PHEV			**Regularly** (where vehicle supports)

Funding for charge points

A number of funding streams are available for the installation of charge points as shown in the table below. This is not an exhaustive list and there may be other funding sources available.

Public funding options for public EV infrastructure

Aimed at	Fund	Detail
Private/ Charge point manufacturers /Taxis & PHVs	Office for Low Emission Vehicles (OLEV) grant schemes	For the installation of electric vehicle charging infrastructure: guidance and application forms can be found on government-grants-for-low-emission-vehicles These include: • Application guidance for vehicle manufacturers • Authorised installers • Approved charge point model list • Vehicles eligible for the scheme • Minimum technical specifications • Guidance for manufacturers and installers • Guidance for customers • Grant claim forms
Residential / car clubs/ innovative local projects	London's Go Ultra Low City Scheme (GULCS)	£13.2m capital programme awarded to TfL, the Greater London Authority (GLA) and London Councils by OLEV aimed at driving the switch to ultra-low emission vehicles The programme has four main streams: residential charging, car clubs, increasing rapid chargers and Neighbourhoods of the Future (NoF) (local, innovative projects) https: //www.goultralow.com
	Local Implementation Plans (LIPs) – TfL funded	Boroughs can use LIP Corridor funding allocations for the installation of charge point infrastructure in their area.
	Mayor's Air Quality Fund (MAQF)	Funds from the MAQF can be used to support the switch to EVs, for example through funding EV parking spaces or facilities for EV delivery vehicles. MAQF funding requires boroughs to meet a number of bidding and assessment criteria, including the securing of match-funding for bids. Currently the MAQF is in its third and final round which will last for three years. Additional rounds may open in the future.
	Liveable Neighbourhoods - TfL funded	EV charge points could be included as part of a local Liveable Neighbourhoods scheme within a borough. Funding awarded as part of such a scheme could be allocated specifically for EV charge points.
Investors	EV Charging Infrastructure Investment Fund (CIIF)	This £400 million fund – up to half of which will come from the UK Government – is being privately operated and will catalyse the rollout of electric vehicle charging infrastructure. Note, this is effectively a loan rather than a grant fund.

Funding for the installation of charge points can also be obtained through Section 106 agreements (planning obligations under Section 106 of the Town and Country Planning Act

1990 focused on site specific mitigation of the impact of development) and the Community Infrastructure Levy (CIL).

New developments are required to provide charge points as set out in the GLA's Land for Industry and Transport supplementary planning guidance (SPG) and borough Development Planning Documents, masterplans and site development briefs should reflect this guidance. However, where additional site specific mitigation is required S106 funding and/or CIL may be obtained for the delivery of additional EV charge points.

Procurement options

There are a number of procurement options available for the installation of charge points. Awarding authorities should ensure charge point operators have been appointed via a competitive dialogue procurement process and that charge point operators meet certain requirements. These requirements should include, but are not limited to, the following:

- Health and safety
- Cyber security
- Finance (eg customer payments, financial reporting)
- Infrastructure (eg standards, design and functionality)
- Installation and commissioning back office and operations (eg customer service, national charge point registry, data sharing)
- Maintenance
- Accessibility for different user groups

Local authorities can access our Electric Vehicle Charging Infrastructure framework as an example for guidance and the UKEVSE Procurement Guidance.

Available frameworks

There are a number of procurement frameworks that are available, or could be useful, particularly for the public sector:

TfL's Electric Vehicle Charging Infrastructure Framework

Local authorities can access our Electric Vehicle Charging Infrastructure Framework for the supply, installation, maintenance and operation of slow – fast charge points that provide a power outage capacity of less than 22kWh. The framework can be adapted to meet local needs and can also link in with the maintenance agreement between the supplier and the borough. The framework includes seven providers and was awarded in July 2018, to run for an initial term of three years. The framework is successfully used as part of GULCS.

Rapids

For the delivery of rapid charge points local authorities can access our Rapid Charge Point Framework. As with the electric vehicle infrastructure framework, this can also be adapted to meet local needs. The framework includes five charge point providers and was awarded in May 2017, to run for up to four years.

Design of EV charge point locations

This section covers guidance on where to locate charge points and the basic design principles that should be considered when installing a charge point. It also sets out considerations relating to other users of the street space around charge point infrastructure.

Where to locate charge points

The EV Infrastructure Delivery Plan gives insights into the scale and location of charge points required.

There are four core themes that will ensure the best service for current and future EV users:

1. Identify current user demand
2. Provide for future switch
3. The right charge point in the right place
4. A good geographical spread

In 2017 we also issued a location guidance document giving an overarching view of the infrastructure and where in London it is required.

The process for installing charge points begins with site selection based on current and future demand and is often an iterative process with initial sites chosen, design solutions considered and then a series of assessments followed by planning permission, all of which can sometimes lead to a site being excluded as a suitable location.

When considering where to locate a charge point it is also important to think about the availability of the capacity in the local electrical network and whether it can support the new infrastructure. Also consider if the electricity supply installed is suitable for an upgrade as this is likely to cost more than the EV charge point installation itself. SSE and UKPN have advice on this on their respective websites: https://www.ssen.co.uk/Connections/EVconnections/ and https://www.ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point

Product design considerations

When choosing the EV charge point it is worth considering how to futureproof the equipment to reduce waste and minimise the risk of stranded assets. For the charge point you should consider whether it is:

- Upgradeable
- Easy to replace
- Modular - a modular charge point design that would allow components to be easily replaced and upgraded while keeping the same charge point housing
- Multifunctional

Please note that any future material changes to design and material, even changes to colour, could make it necessary to re-apply for planning permission (see Section 5).

BEAMA are producing their own guidance which will give further useful details on product design considerations. Guidance is due to be published in the first half of 2020 and will be available through the BEAMA website: http://www.beama.org.uk.

Design principles

Consideration needs to be given to all those using the space around an EV charge point, whether on or off-street and whether or not the charge point is being used. When selecting sites for a charge point considerations will need to ensure that they will be easy to use and users will feel safe while using them. Thought also needs to be given to other users of the street to ensure they do not experience any inconvenience caused by charge point users or find space is constrained as a result of charge point provision. The following principles can help identify potential sites for charge point provision, but also to ensure the charge point type is site-suitable. The table below sets out key points around overall design principles.

Overall design principles

Safety	The location should be safe for a user to access the charge point at all times of day, without introducing risks to road safety or personal safety for themselves or other road and footway users. Key considerations include: - Adequate ambient street lighting and good lighting of the charge point - Chargers that are not placed close to junctions and crossings to risk obstructing the inter-visibility sightlines between motorists and pedestrians - There should be a sufficient amount of level surface around the charge point to allow easy access to the charge point by wheelchair users on the footway - Charge points should not create potential hiding places or locations for anti-social behaviour - Cables should not be run in such a way to cause an obstruction. More specifically, it would be unacceptable where this creates a trip hazard or is at body or vehicle height. Any cable obstruction will have negative implications for road safety - There should be sufficient drainage, especially near basements and in buildings to mitigate flash flooding or fire-fighting measures - Equipment installation should be in accordance with the Institution of Engineering and Technology's 'IET Code of Practice for Electric Vehicle Charging Equipment' ISBN:184919839X
Comfort	The site should have sufficient space for a user to access the charge point without negatively impacting any walking or movement around the charge point, especially for any disabled pedestrian. Footways should provide a clear zone of at least 2m width to allow two wheelchairs to pass each other comfortably, even when the charge point is in use. However, the Pedestrian Comfort Level (PCL) also plays a key role in site selection. The site need to be able to demonstrate a PCL of no less

	than B+ to avoid creating constrained space that could negatively impact pedestrian movement. Consider how usage may change throughout the day. For example: - Near bus/coach stops and taxi ranks where passengers may be boarding/alighting and mobility ramps may be deployed (unless installing rapid chargers for taxis) - AM and PM peaks in pedestrian flows, especially around bus termini, railway stations, Tube stations and other transport hubs where pedestrian flows can be particularly heavy - Forecourts that may be used for outdoor dining, displays and market stalls - Near event hosting locations such as stadiums where crowding occurs periodically
Inclusivity	The charge point should be easy to use for disabled users. This is especially so with regard to the provision of comfortable space for wheelchair users. A charge point that is orderly with well aligned equipment will be particularly beneficial for a visually impaired pedestrian to navigate around intuitively.
Coherence	The charge point should be easily identifiable so people can clearly see where they can access EV charging. Additionally, well aligned equipment that contrasts with the local environment will help increase the awareness of the existence of a charge point for pedestrians who may be visually or cognitively impaired.
Attractiveness	The charge point should not clutter the local environment either physically or visually. For example, fast and rapid charge points are unlikely to be suitable in some heritage or conservation areas. Hub locations could provide opportunities to create a new urban space with multi-functions. This could add to the location's attractiveness for users to wait while charging their vehicle. Seating in such locations would also be beneficial for disabled users of hubs and should be a consideration. It is important to avoid siting a charge point close to trees to prevent risk of damage to the canopy and tree roots. The location of the charge point should have sufficient room for maintenance with no litter traps.
Reliability	User satisfaction will depend on their confidence in charge point provision, which means charge points should have 24-hour access (Monday to Sunday), preferably with free or discounted parking charges. However, charging time limits will depend on individual boroughs as some may have local time restrictions. Maintenance is crucial for ensuring charge points are in good working order to build user trust in the facilities and also to encourage more future users. There should be a maintenance agreement between the charge point manufacturer and the borough or private customer; this will need to be agreed as part of the procurement process. A maintenance plan should include regular checks and an agreement for timely necessary repairs by maintenance crews.

Design principles specific to off-street charging hub facilities

Ideally, charge points are best in off-street hub locations. They offer greater flexibility and more space to have many charge points in a single location. The EV Infrastructure Delivery Plan defines a hub as having a minimum of six chargers enabling simultaneous charging of six or more vehicles.

Examples of hub locations could include:

- Petrol stations and motorway services
- Retail outlets such as supermarkets
- Park & Ride and station car parks
- Other publicly accessible car parks
- Private off-street spaces such as at workplaces (which are publicly accessible)

In these locations it will be important to assess entry and exit points to and from the hub to ensure safe and easy access. Specific consideration should be given to any additional needs that wheelchair users might have in relation to accessing hubs and charge points in these locations.

For rapid charging hubs in particular there are some additional points to consider in relation to where such a hub might be located. For example:

- The hub should ideally be in close proximity to roads with high traffic flow where the need for this type of hub will likely be greater
- The hub should avoid areas of conservation or listed buildings (they have a higher risk of rejection at planning)
- There should be sufficient space to accommodate an electricity sub-station, if one is not already located nearby, to feed all rapid chargers (minimum 50kW three phase each)
- For taxis, being close to major transport hubs, such as main line train stations and airports, will be beneficial

Additionally, when planning rapid charging hubs, consideration should be given to the inclusion of additional facilities for people to use while waiting for their vehicle to charge. For example:

- Protection from the weather (note that roof/weather protection will require additional planning permission)
- Toilet facilities (including accessible toilet facilities)
- Food/drink facilities
- Somewhere warm and dry to sit other than inside the vehicle
- Load balancing system to enable a better opportunity for a reliable and constant EV charge

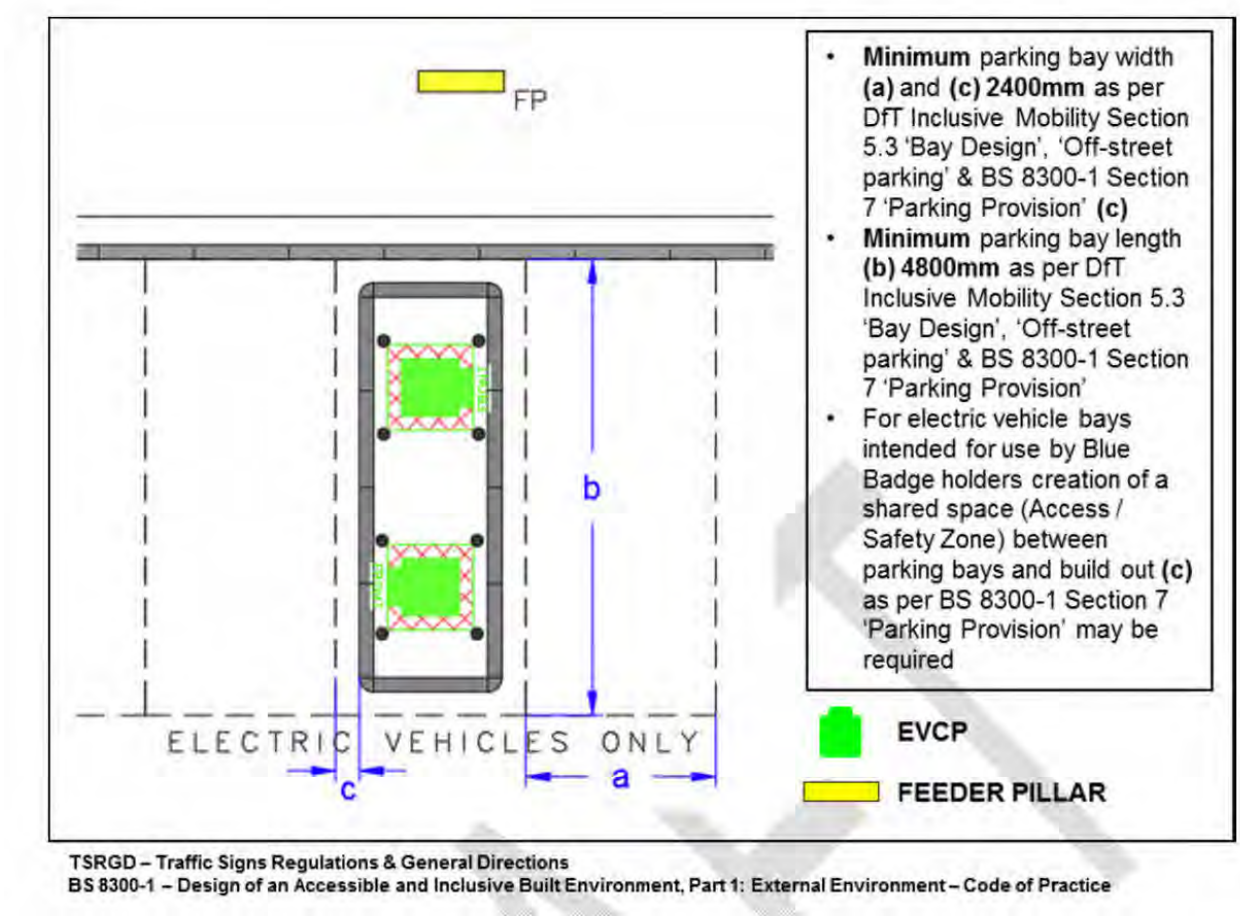
- Good quality WiFi connection

Example designs for off-street charge point infrastructure

The following technical diagrams provide examples of how specific off-street charge points might be designed, including requirements for disabled users.

Rapid electric vehicle charge point installation in an off-street car park

The diagram below shows a general perpendicular arrangement for two charge points on a perpendicular island in an off-street car park. The charge point should have a distance of at least 2.5m from each other and the feeder pillar.



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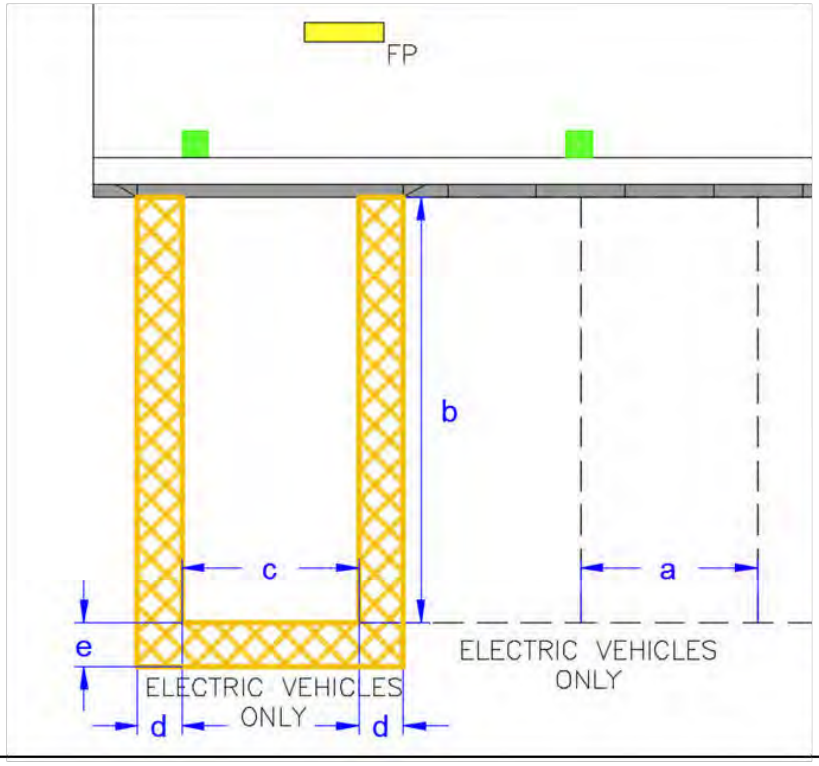
Electric vehicle charge point installation in an off-street car park

The diagram below shows the general arrangement for providing two charge points in an off-street environment for disabled users. The space width minimum (a) should be 2700mm, preferably 3600mm (c) to allow for access around the vehicle. The minimum vehicle length (b) is 6600mm. The charge points are set back at the standard of 450mm from the kerb edge, and should have a distance of at least 2.5m from each other and the feeder pillar.



- **Minimum** parking bay width **(a)** and **(c) 2400mm** as per DfT Inclusive Mobility Section 5.3 'Bay Design', 'Off-street parking' & BS 8300-1 Section 7 'Parking Provision' **(c)**
- **Minimum** parking bay length **(b) 4800mm** as per DfT Inclusive Mobility Section 5.3 'Bay Design', 'Off-street parking' & BS 8300-1 Section 7 'Parking Provision'
- Shared space (Access / Safety Zone) between parking bays **(d & e) 1200mm** as per BS 8300-1 Section 7 'Parking Provision'

EVCP

FEEDER PILLAR

ACCESS / SAFETY ZONE

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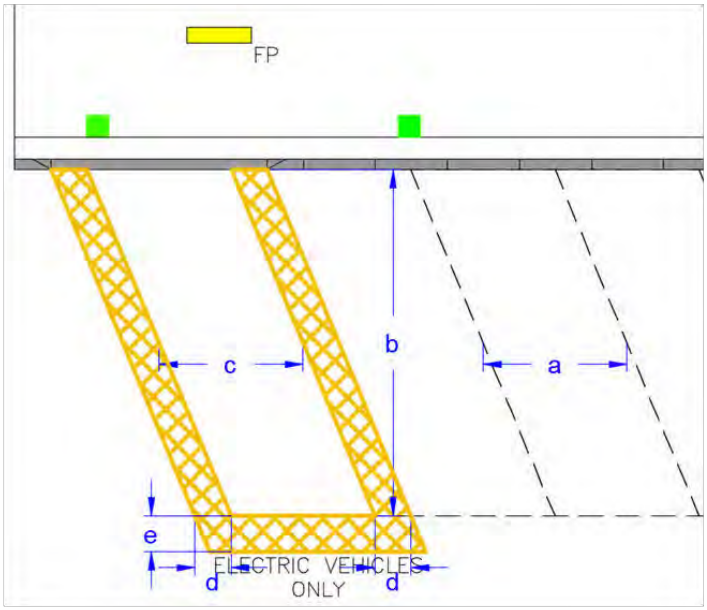
Electric vehicle charge point installation in an off-street car park

The diagram below shows the general arrangement at an angle for providing two charge points in an off-street car park for disabled users. The space width minimum (a) should be 2700mm, preferably 3600mm (c) to allow for access around the vehicle. The minimum vehicle (perpendicular) length (b) is 4200mm. The charge points are set back at the standard of 450mm from the kerb edge, and should have a distance of at least 2.5m from each other and the feeder pillar.



- **Minimum** parking bay width **(a)** and **(c) 2400mm** as per DfT Inclusive Mobility Section 5.3 'Bay Design', 'Off-street parking' & BS 8300-1 Section 7 'Parking Provision' **(c)**
- **Minimum** parking bay length **(b) 4800mm** as per DfT Inclusive Mobility Section 5.3 'Bay Design', 'Off-street parking' & BS 8300-1 Section 7 'Parking Provision'
- Shared space (Access / Safety Zone) between parking bays **(d & e) 1200mm** as per BS 8300-1 Section 7 'Parking Provision'

EVCP

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ACCESS / SAFETY ZONE

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Design principles specific to on-street charge points

Providing an on-street charge point requires additional considerations and it will largely depend on the type of street and space available to ensure the overall design principles are met.

Many of the design principles can be adhered to by following our Streetscape Guidance, which now includes a section on electric vehicle charge points. It is essential that any on-street charge point can provide a clear zone of at least 2m width for two wheelchair users to pass each other comfortably, even when the charge point is in use. It will be particularly important to ensure an outcome of no lower than a B+ pedestrian comfort level (PCL).

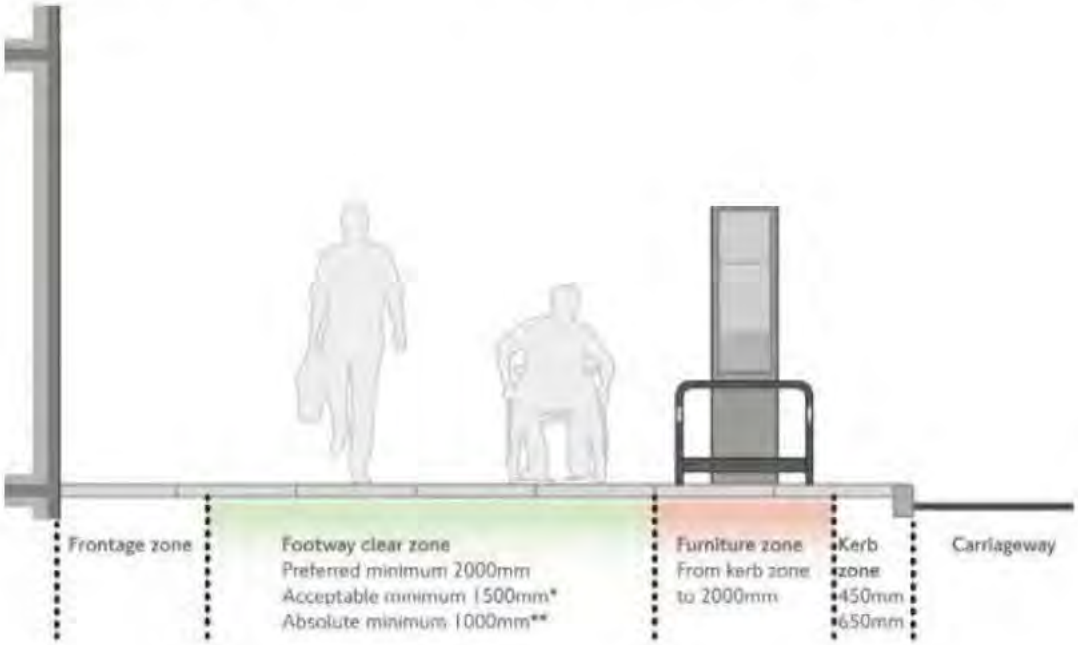
This means enough space for people walking and for choosing a route and to access buildings. Importantly, this allows space for two wheelchair users to pass each other. It also accommodates space for building frontages; this will depend on the street use but there should be at least 2000mm of clear footway (see the PCG for further detail). However, it may be acceptable to allow a C+ PCL where there is a transport interchange or office and retail provision.

To achieve this, the design of the facility should avoid creating pinch points and restricting pedestrian movement. The easiest way to achieve this is to provide the facility in the carriageway. Ideally, this should be on a footway build-out and designed with the following considerations:

- Carriageway width should be sufficient to allow safe manoeuvring into and out of the bay with a 'buffer zone' to protect drivers accessing their vehicles and charge points, while other traffic can pass by safely. The buffer zone should be at least 1m depth for space of a standard body width (based on PCG standard body ellipse of 600mm) moving around the vehicle, with some accessible for wheelchair users.
- Build-outs may encourage pedestrians to cross the road where it is unsafe due to restricted inter-visibility sightlines with motorists. Therefore, additional safety measures may be required
- A charge unit should ideally be provided on both sides of a build-out in order to retain more space for pedestrians on the footway where necessary
- Streets where traffic speed is low to medium will make it easier and safer for drivers to use the charge point
- Where charge points are located within existing parking bays (excluding 'Clearway' bays that need to be kept clear of parking at particular times of day) the following should be considered:
    - Loading bays should be retained and should incorporate chargers for commercial vehicles
    - Disabled bays should be retained and incorporate chargers
    - If designated bays, such as loading bays, are relocated they should only be moved to within a practical distance and not be removed from the immediate area without Traffic Authority approval
- EV charge point bays should not be introduced in locations where they will reduce kerbside access for essential servicing activity of nearby buildings

The EV charge point should only be located on the footway that can provide at least 2m width for a footway clear zone and no less than a B+ PCL. The charge point should be placed in the furniture zone at least 450mm from the kerb edge (shown in the illustration (below).

'Furniture zone design standards' – Streetscape Guidance (page 205)



The location of the electricity supply will need to be considered as it needs to be close enough to allow the feeder pillar to be connected. Always consult an electrical engineer when locating and specifying a feeder pillar unit. Where the nearest supply source is not accessible, additional isolating pillars may be necessary. Refer to our Streetscape Guidance (section 12.7) for further information.

Lastly, as recommended in our Electric Vehicle Infrastructure Delivery Plan, reducing the streetscape impact of chargers is of utmost importance. Consideration should be given to the surrounding environment and the physical dimensions of the charge point to make an assessment of whether it is a suitable choice for the area. This should take into account whether or not the location is a conservation area, or close to a heritage site. It should also consider whether the charge point is likely to detract from the look and feel of the surrounding streets. The photographs on page 9 set out some examples of the different types of charge that could be considered, including low-profile charge points that are incorporated into lamp columns or bollards, while at the same time ensuring they do not become trip hazards and are accessible for all.

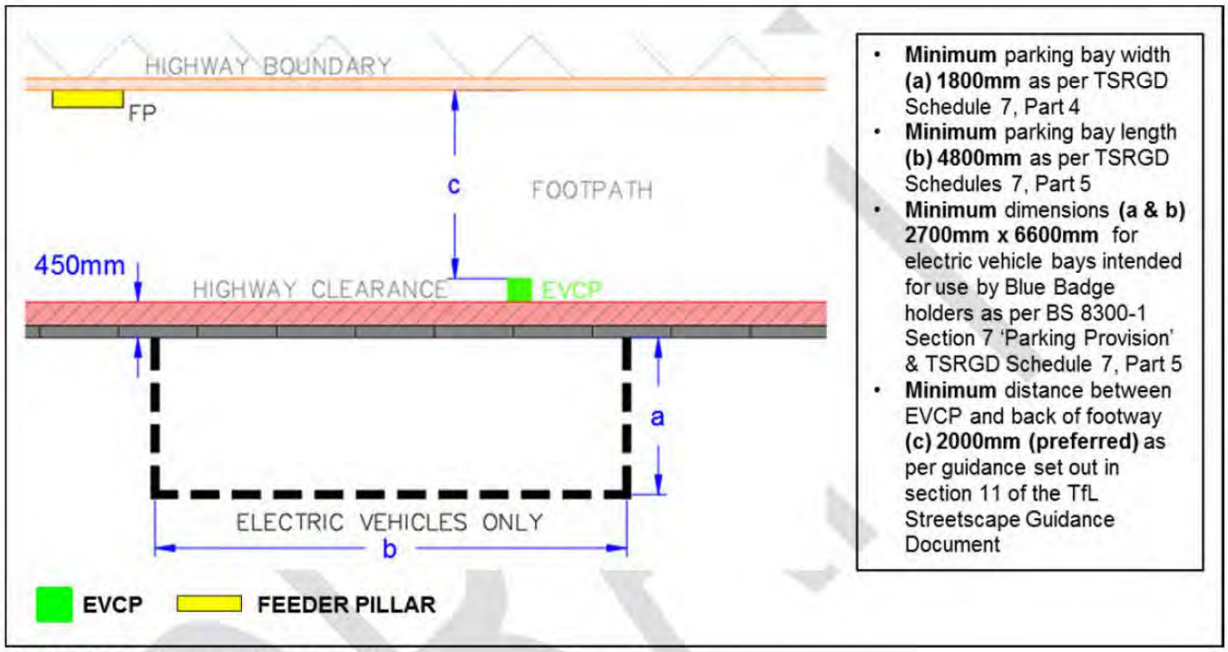
Examples of designs for on-street charge point infrastructure

The following examples show different designs for on-street facilities of all types of charge points (including Rapid Charge Points).

Electric vehicle charge point installation on the footway

The diagram below shows a general arrangement for providing charge points on the footway. The minimum footway width of 2m (c) should allow comfortable user access and

walking route. The charging bay - width (a) and length (b) - needs to be sufficient for a driver to have safe access around their vehicle. The 450mm space is the standard for vehicle overhang to protect on-street furniture.



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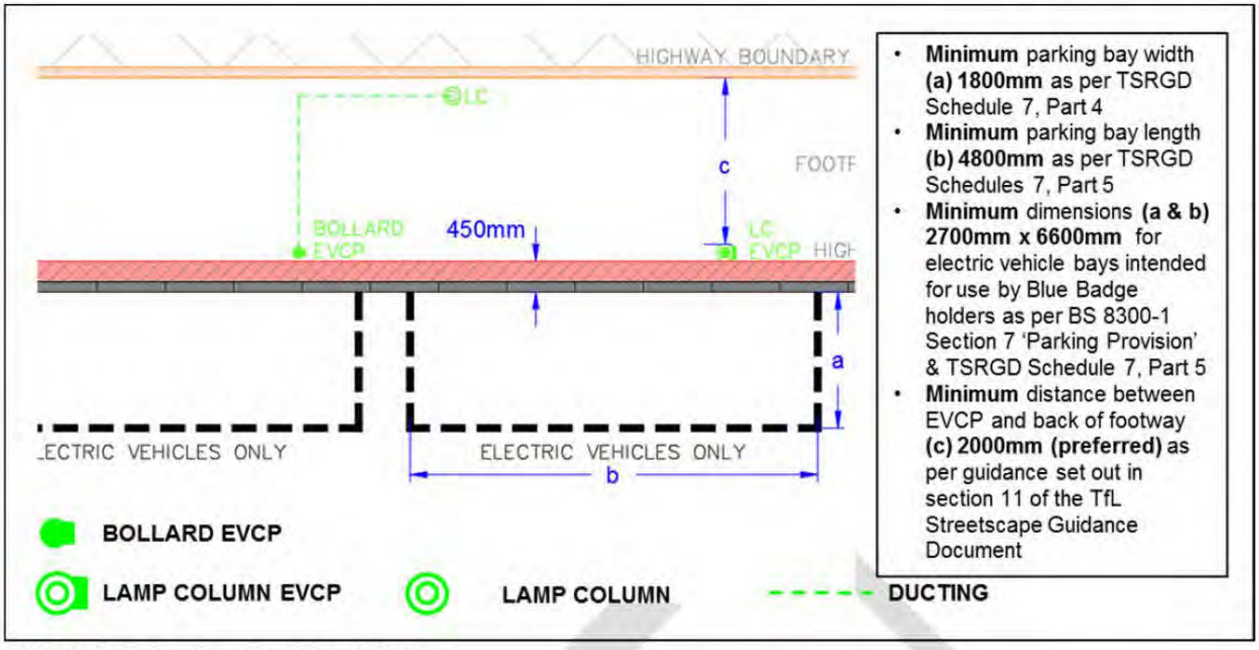
Lamp column electric vehicle charge point installation on the footway

The diagram below shows a general arrangement for providing two charge points on the footway with one for connection to a bollard and another to a lamp column. The minimum footway width of 2m (c) should allow comfortable user access and walking route. The charging bay - width (a) and length (b) - needs to be sufficient for a driver to have safe access around their vehicle.

The 450mm space is the standard for vehicle overhang to protect on-street furniture.



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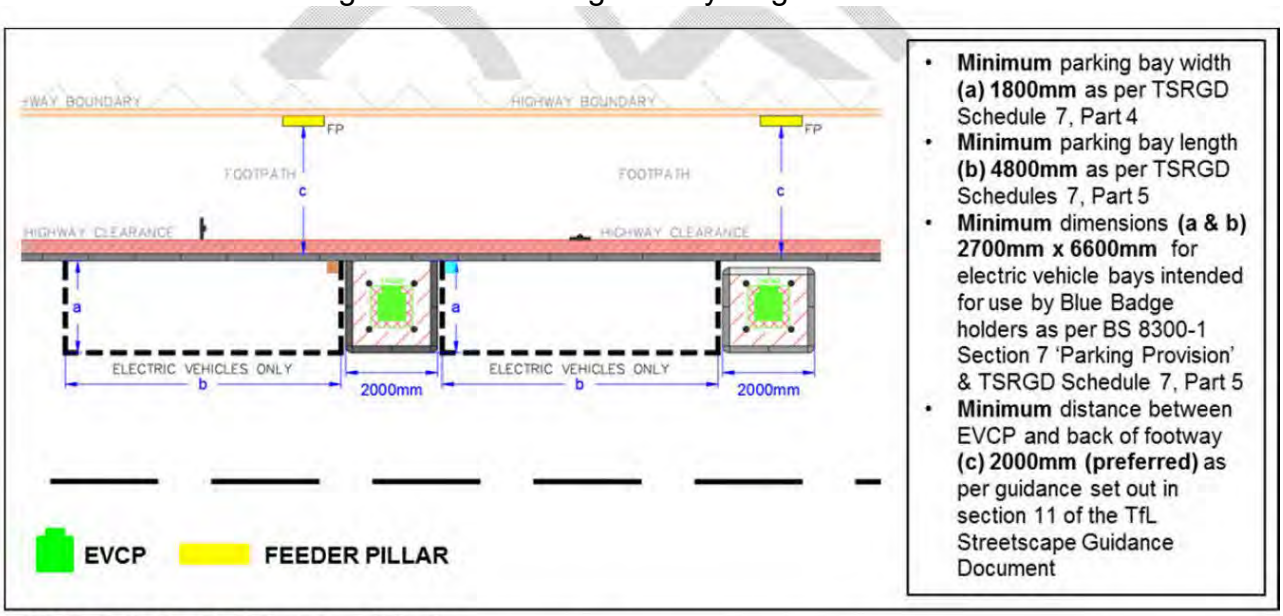
Given the increased size and energy provision for rapid chargers on-street, the following issues need to be considered:

- Review local planning policies with design standards
- Avoid locations resulting in many utilities around the proposed charging bay
- Avoid locations within the root protection zone of a tree, unless appropriate tree protection measures have been agreed by an arboriculture expert from the Highway Authority
- Ensure at least 2500mm clearance between feeder pillar, charge point unit, charge bay and any other powered street furniture eg lamp columns, existing electrical supply pillars, unless otherwise approved by the Highway Authority's electrical engineers
- Use polymer-based bollards and offset at least 120mm from the corners of the charge points adjacent to the kerb edge to protect the rapid charge point from vehicle impacts

The two following diagrams provide more detail on designing for a rapid charge point.

Rapid electric vehicle charge point installation in the carriageway - example 1

The diagram below shows the general arrangement for providing two rapid charge points on separate build-outs. The minimum footway width of 2.5m (c) should allow comfortable user access and walking route. The charging bay - width (a) and length (b) -needs to be sufficient for a driver to have safe access around their vehicle. Where a bay is between build-outs, consideration should be given to increasing the bay length.

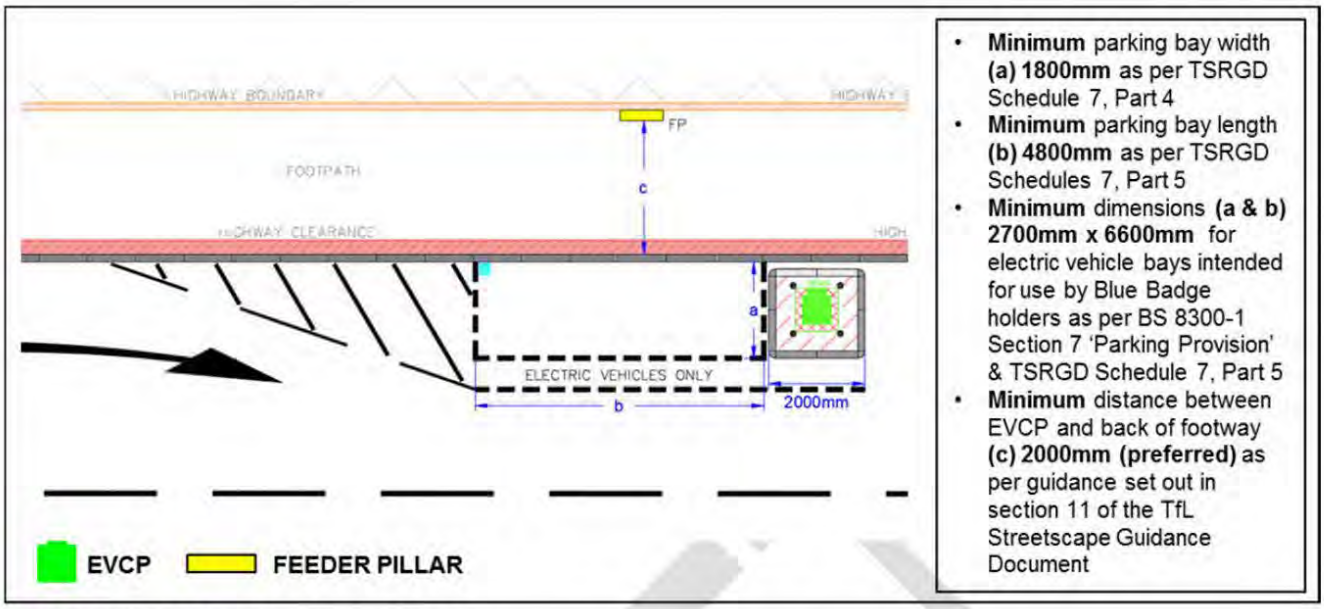


TSRGD – Traffic Signs Regulations & General Directions
BS 8300-1 – Design of an Accessible and Inclusive Built Environment, Part 1: External Environment – Code of Practice

Impact on footway and carriageway draining must be considered when installing charge points on build-outs.

Rapid electric vehicle charge point installation in the carriageway - example 2

The diagram below shows the general arrangement for providing a rapid charge point on a build-out. The minimum footway width of 2.5m (c) should allow comfortable user access and walking route. The width includes the standard 450mm from the kerb for vehicle overhang to protect on-street furniture. The charging bay - width (a) and length (b) - needs to be sufficient for a driver to have safe access around their vehicle. The hatch marking helps deflect main route traffic away from the charge point bay with additional space for driver access. In heavily trafficked areas, hatching is to be provided to provide a 0.5m buffer zone between the bay and the running lane.



TSRGD – Traffic Signs Regulations & General Directions
BS 8300-1 – Design of an Accessible and Inclusive Built Environment, Part 1: External Environment – Code of Practice

Impact on footway and carriageway draining must be considered when installing charge points on build-outs.

Exclusion zones between electrical street furniture

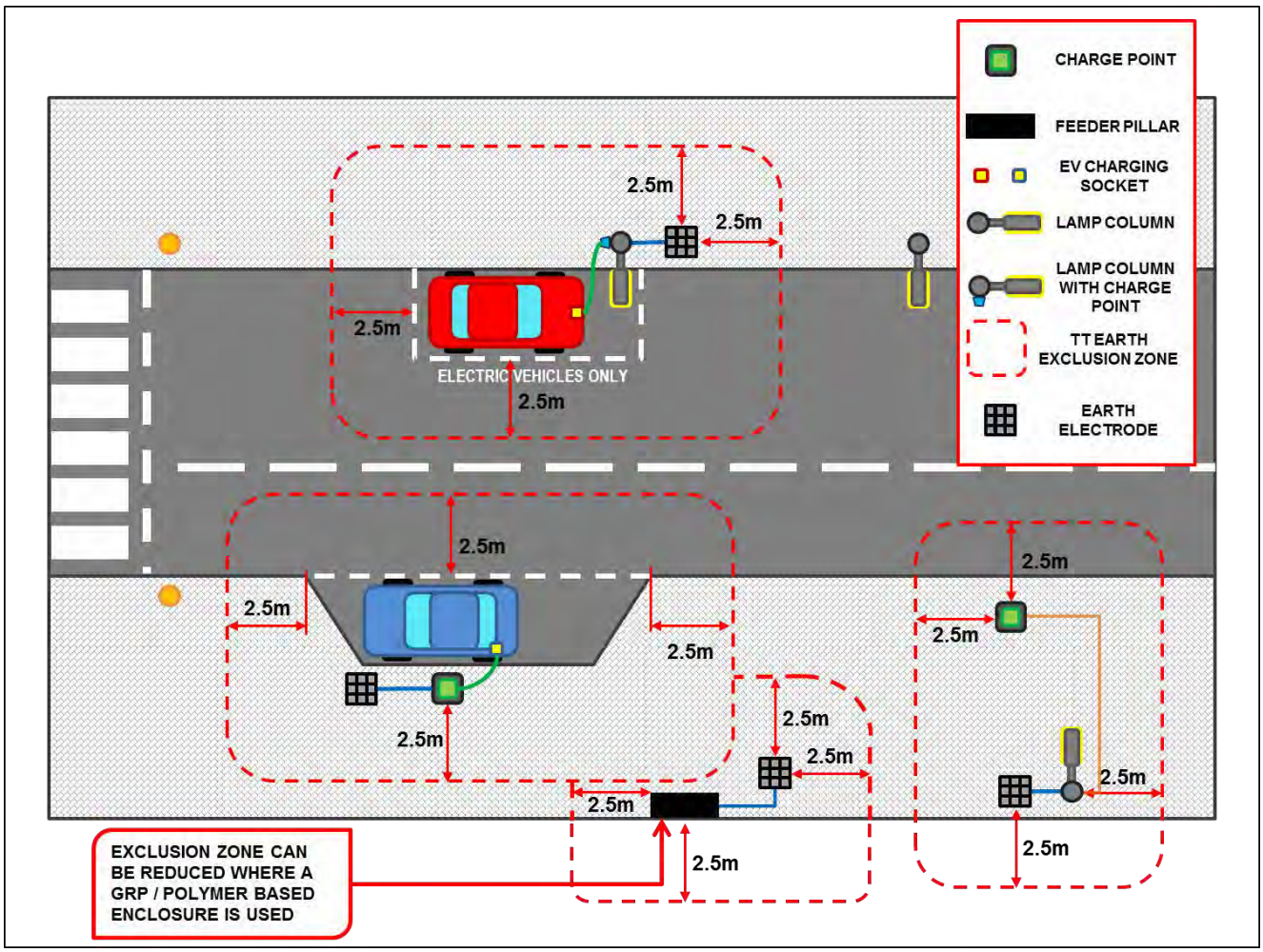
Charge points installed on the highway are required to have a TT earthing system in accordance with Energy Networks Association (ENA) Engineering Recommendation G12, Issue 4, Amendment 1 (2015) and UK Power Networks (UKPN) Engineering Design.

Standard EDS 06-0017 'Customer LV Installation Earthing Design'

This earthing system is different from that used on most other electrical street furniture (street lights, traffics signals, etc.). In line with the IET code of practice for electric vehicle charging equipment installations, any charge point installations (including earth electrode(s)) must be situated at least 2.5m, 'arms reach', away from any point of any other type of electrical earthing system. This is to prevent the risk of dangerous touch voltages between adjacent electrical street furniture on different earthing systems. This earthing exclusion zone must also consider the area where the electric vehicle will reside for the duration of a charging session. An illustration of this exclusion zone can be seen in the diagram below.

Electric vehicle charge point – TT earthing exclusion zone

The diagram below shows the general electrical earthing distance needed between adjacent electrical earthing equipment that may be on different electrical earthing systems.



Signs and road markings

For signs and road markings refer to Traffic Signs Regulations and Directions (TSRGD) for appropriate signing and carriageway markings.

For taxi charging bays, yellow lines are included and are marked as 'E- TAXIS'. For other vehicles, bays have white lines and are marked as 'ELECTRIC VEHICLES' or 'ELECTRIC VEHS'.

With regard to road signs, they should be of appropriate size, within the furniture zone, orientated as required by the Traffic Signs Manual (Chapters 3 and 5) and their poles should be consistent with the Highway Authority's streetscape palette.

Planning and Consents

This section sets out the considerations for installing charge point infrastructure in relation to the necessary planning and consents requirements.

Planning permission

Local authorities benefit from permitted development (PD) rights in relation to the installation of EV charge points. PD rights allow certain changes to be made without the need to apply for planning permission. (See the Town and Country Planning (General Permitted Development) (Amendment) (England) Order 2011, Town and Country Planning (General Permitted Development) (England) Order 2015 and Town and Country Planning Regulations SI 2019 No 907 for further information).

For EV charge points being installed on the highway, Class A, (art 12, Schedule 2 is the relevant section of the General Permitted Development Order (GPDO). This allows local authorities to install charge points on the borough highway.

For charge points being installed on private land, Class D& E, Part 2, Schedule 2 of the GPDO applies.

Class D focuses on electrical outlets mounted on a wall for recharging electric vehicles. To benefit from permitted development rights the units have to be less than 0.2 cubic metres; over 2m from the highway and not within a designated scheduled monument or the curtilage of a listed building.

Class E deals with electrical upstands for charging vehicles in off-street parking locations. These can be up to 1.6m in height in residential grounds or 2.3m in height in all other cases. They must be over 2m from the highway and not within a designated scheduled monument or the curtilage of a listed building. In addition there can only be one upstand provided per parking space.

If these conditions cannot be met, planning permission will be required.

Third parties looking to install a charge point on the highway (eg anyone other than the local authority) may need to obtain planning permission. Early engagement with the relevant highway and planning authorities should be undertaken regarding any site being considered.

Submitting a planning application

All planning applications being submitted for a charge point will require:

- Location plan (1:1250)
- Existing and proposed site plans (to scale) showing street features such as street furniture, signage, trees, equipment, etc
- Justification for installing the charger in the proposed location
- Elevation drawings of the charger and feeder pillar
- Foundation drawings for charger

If the site is in a flood risk area, conservation area, near a listed building or close to a tree, these issues will need to be addressed and the application demonstrate that the charge point will not have a detrimental impact. Further advice on the level of information required can be obtained from the relevant planning authority.

Consents

The following highlights the typical consents required to deliver EV charge points. Relevant specialists within the local highway authority should be engaged as different sites require different consents.

Highway and traffic consent

For any construction works on the highway to be carried out, including on privately owned roadways and pavements, it may be necessary to acquire highways and traffic related powers, consents or agreements from the relevant borough(s) or third parties. The following is a high level summary of the main consents potentially required for the installation and operation of charge points:

Section 278 Agreement (Highways Act 1980)

A section 278 agreement is a legal agreement between the relevant highway authority and any person, for example a developer, for works which the highway authority believes will be of benefit to the public. This is usually on the terms that the person or developer pays the costs of the works as specified in the agreement. The agreement may also provide for making payments to the highway authority in respect of the maintenance of the works to which the agreement relates.

Section 8 Agreement (Highways Act 1980)

A Section 8 agreement allows a local authority or ourselves to construct, reconstruct, alter, improve or maintain the highways of another local authority and vice versa. Ideally detailed designs should be completed prior to entering into the agreement. However, the agreement can also be an ’in-principle‘ agreement based on concept design.

Permanent Traffic Management Orders - Section 6 (Road Traffic Regulation Act (RTRA) 1984)

A Permanent Traffic Management Order (PTMO) is the statutory instrument used to control moving or stationary traffic on the highway. We will draft, advertise and process the PTMOs if on the Transport for London Road Network (TLRN), and the relevant London borough will process it if it is on a borough road. If we are processing PTMOs on borough highways then a Section 101 agreement under the Local Government Act (LGA) 1972 with the borough will need to be completed (or vice versa).

Section 17 Notice (London Local Authorities and Transport for London Act 2013)

The Section 17 process refers to the public notification requirements stipulated by the London Local Authorities and Transport for London Act 2013. It dictates that a notice be posted on/near the site to inform the public of the authority’s intention to place a charge point in this location and that materially impacted property owners be notified. A notification period is to be no less than 28 days, during which public representations may be made. A London authority cannot exercise their powers to which the notice relates until they have considered all representations made to them in connection with the proposal within the period specified in the notice.

Section 50 Street Works Licence (NRSWA 1991)

This must be applied for in situations where a scheme promoter may wish to place or retain apparatus in the street and thereafter to inspect, maintain, adjust, repair, alter or renew the apparatus, change its position or remove it. The licence may be issued by the relevant highway authority with such conditions as it deems necessary.

London Permit Scheme (LoPS) – Traffic Management Act 2004, Traffic Management Permit Schemes (England) Regulations 2007

This scheme, designed to control the carrying out of specified works in specified streets in a specified area whereby utility companies inform highway authorities of their intentions to carry out works in their areas. Permits are required under the LoPS in respect of all registerable activities as referred to in the Code of Practice for Permits and Statutory Guidance, both dated March 2008.

In addition, a Road Safety Audit (RSA) may be required. RSAs are essential in assessing the operational road safety impact of a new street scheme where there is a physical change that will impact on road user behaviour.

Undertaken by a team of independent and specially trained auditors, RSAs consider the safety implications of design interventions, including the impact of the overall layout on the network under all anticipated operating conditions and the potential implications for all road users, especially the most vulnerable.

The process for completing RSAs on our road network is specified in TfL Procedure SQA-0170. Local authorities may have their own RSA procedure; if not, the use of our Procedure is commended, or the National Standard for Road Safety Audit (Design Manual for Roads and Bridges Standard GG-119) may be followed.

The highway authority can request the removal or relocation of third- party street furniture to accommodate the delivery of schemes. In some cases, planning or listed building consent may be required. The relocation of listed street furniture should be avoided if possible.

Communication and consultation

Communicating the benefits of EV charge points will be key for implementation as charge points are often installed in the public realm. All relevant stakeholders should be informed of the rationale for installing charge points, how they are likely to benefit the local community and the governance processes/when they can provide feedback.

Potential stakeholders, particularly for public and/or on-street charge points, include:

- Planning and highway authorities
- Disability groups
- Emergency services
- Energy providers
- Landlords
- Property developers
- Local politicians and/or Members of Parliament

- Local residents/Londoners and resident groups/community or conservation groups
- Transport for London
- Freight and small business stakeholders (eg the FTA, Federation of Small Businesses)
- Business Improvement Districts

Some of these will be formally consulted if planning permission is sought and early engagement will avoid abortive work and speed up the overall process.

Implementation, operations, safety and maintenance

This section covers the key aspects of installing an EV charge point and what should be considered in terms of operation, safety and ongoing maintenance.

Implementation

Electrical guidance

London Councils, the GLA and ourselves have produced Electrical Guidance to assist London boroughs in the delivery of residential EV charge points. The guidance includes clarification of roles and responsibilities between the charge point operators and London boroughs (or Private finance initiative contractors).

Electrical standards for installation

The Institution of Engineering and Technology (IET) published under their IET Standards a Code of Practice for Electric Vehicle Charging Equipment Installation (3rd edition). The scope of the document covers the installation of conductive electrical vehicle charging equipment in all locations, eg on-street, commercial and industrial (in or adjacent to business premises, single level or multi-storey public and private car parks and filling stations) and domestic installations (in or adjacent to houses and associated garages). The 3rd edition has been fully updated to BS 7671:2018.

Power supply

Energy connections can take time to deliver and may require an update to grid connections where sufficient power does not exist; this mainly applies to rapid chargers or hubs where energy requirements are greater. UK Power Networks (UKPN) has produced a constraints map available at the following link: https://innovation.ukpowernetworks.co.uk/2019/06/10/ev-network-impact/ . UKPN also have further relevant guidance on their website: https://www.ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point and SSEN also have guidance available online: https://www.ssen.co.uk/Connections/EVconnections/

To help with requesting a power supply the Energy Networks Association has published combined Guidance on Heat Pump and Electric Vehicle Charging Infrastructure Installation. It details the process and forms to be completed for submission to the local Distribution Network Operator (DNO). Currently, installers need to complete a range of different forms and meet different requirements but a streamlined process with minimal paperwork is being established.

The UK electricity network is split into regions, each with a local distribution company. For London there are two:

UK Power Networks (UKPN) - 0800 029 4285; https://www.ukpowernetworks.co.uk/
Scottish and Southern Electricity Networks (SSEN) - 0800 048 3516; https://www.ssen.co.uk

Temporary traffic management handbook - keeping people safe at roadworks

Our temporary traffic management handbook sets out good practice to those involved with roadworks and other construction related activities on London's roads. London's road network has changed in recent years, with far more people choosing to travel on foot, by cycle or by bus, and this guidance specifically focuses on these travel choices. It supplements existing national standards, and it is expected that the guidance is followed by

all those involved with the design, planning, implementation and inspection of temporary traffic management on the TLRN.

Timescales

Timescales can vary between different projects due to many factors, for example, planning, consents and power connections. The planning application validation and determination by the planning authorities takes approximately 8-12 weeks. On the TLRN, for example, it has taken an average of 38 weeks to install rapid chargers on private land and where wayleaves are required this can take considerably longer. Charging points themselves can be installed within 6-8 weeks, but these other issues can mean deployment must be planned at least six months in advance.

Hubs can also take longer to install than single or double charge points, due to their added complexity and the number of charge points being installed. Gaining a connection to the power network also varies depending on the size and number of charge points. UKPN provide information on this on their EV charge point webpages (https://www.ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point). Typically, for a smaller connection (1-3 fast charge points or one rapid) it will take 8-12 weeks for a connection. For a large connection (multiple fast/rapid charge points in, say, a hub) it can take six or more months. SSEN provide information on their webpages as well, which can be found here: https://www.ssen.co.uk/Connections/EVconnections/

Operations

From a user perspective, it would be ideal for charge points to be available to customers at all times. However, there are some cases where this is not operationally possible - for example, where the 'shared private infrastructure' model is adopted. This is discussed further in the EV Infrastructure Delivery Plan, but it broadly consists of a private entity opening up its charge points for public use at certain times of day.

Charge points should be open to all as much as possible (as set out in the EV Infrastructure Delivery Plan), but there are instances where specific user needs justify dedicating the charger to the user type. Examples of this include London taxis, particularly in central London. In the early phases of delivery for rapid charge points it was important to cater for taxis as new licensing requirements meant that they were likely to be early adopters of EVs with a significant need to charge in central London. Consideration should also be given to electric commercial/logistics vehicles, including small businesses, which may require/benefit from charge point access if they are undertaking local servicing and trades activities.

To facilitate ease of use, a 'pay as you go' model should be adopted where possible, with simple cost plans. Over the summer, the Government announced that it expects all newly installed rapid or higher-powered charge points to provide 'pay as you go' debit or credit card payment options by April 2020. They also signalled they expect industry to develop a roaming solution across the charging network, allowing electric vehicle drivers to use any public charge point through a single payment method without needing multiple smartphone apps or membership cards.

Some operators are considering differential charging for different users which may help with charger availability for those who have a higher operational need.

Booking systems could be considered in some instances. This would allow people to book a charge point for a certain time, providing greater reassurance that they will be able to secure parking at a charge point to recharge their vehicle. Some operators have implemented queuing systems to mitigate missed booking slots.

Interoperability

Interoperability among charging networks is a key enabler for use. Private service roaming platforms which act as a clearing house for charging transactions could be a future solution. Open Charge Point Protocol (OCPP) is another step toward interoperability of stations providing a common means of communication between themselves and among networks. A standards organisation, eMI3, is advancing OCCP to create the ability to roam among networks. BEAMA is working on a guide covering interoperability and we recommend checking their website for updates on progress.

Design life of charge point

At the end of the operational contract, all charging apparatus and cabling must be removed and any groundworks made good, returning it to the previous status unless the assets are taken over by another service provider. Consideration should also be given to how the charge point infrastructure might be disposed of if it is no longer required. Recycling options should be considered as much as possible. If the charge point is taken over by another provider then consideration needs to be given to this.

Safety

Consideration needs to be given to the safety of charging infrastructure, particularly in relation to the electrical elements of the charge point and what precautions need to be taken should the charge point be damaged or struck in an accident, for example. This is particularly important in relation to the feeder pillar infrastructure.

Parking controls and enforcement consideration

It is important to make sure that parking spaces next to charge points can be accessed easily by EV drivers, ensuring this could be done through local parking enforcement and providing dedicated EV bays where possible.

Controlled parking zones (CPZs) are in place in boroughs to reduce traffic congestion, improve road safety and promote other forms of transport as part of a London-wide transport strategy. The key objective of a CPZ is to reduce and control non-essential parking and assist residents, short-term visitors and local businesses. Within any CPZ, only those residents or businesses within the zone are entitled to permits. An incremental pricing structure for second and subsequent permits also assists in minimising the number of permits issued to individual residents and helps discourage multiple car ownership.

CPZs comprise various types of parking bay such as: permit holder bays (for use by resident or business permit holders and those with visitor permits); shared use bays (for permit holders and pay and display parking); and pay and display only bays (where permits are not valid). In a CPZ, hours and parking tariffs vary and signs indicate the hours of operation within the zone, during which time parking restrictions apply. Any parked vehicle that does not display a valid permit or voucher during operational hours may be issued with a Penalty Charge Notice (PCN). Local authorities are responsible for the enforcement of parking, usually carried out by Civil Enforcement Officers (CEOs) and through the use of CCTV cameras. CEOs adhere to two Codes of Practice which have been agreed with London Councils for on-street parking enforcement and the use of CCTV. More information is published on the London Councils' website.

New parking bays and changes to restrictions require a Traffic Regulation Order (TRO).

Boroughs may wish to consider introducing dedicated parking bays solely for the use of electric vehicles. A benefit of doing so means that local residents and businesses with electric vehicles will find it easier to secure parking next to a charge point. Non-dedicated bays located next to charge points may be used by all vehicle types, and this means non-EVs could take up parking spaces that could otherwise be used by an EV for charging.

Disabled parking

It will be important to provide designated charge points that are accessible spaces for disabled users, especially as there is already a lack of accessible parking in London. Alongside the general design principles, charge points for disabled users will require specific considerations to include users with reduced manual dexterity. Please refer to the DfT's Inclusive Mobility and British Standard BS 8300 to meet the needs of disabled people.The previous section titled 'Design of EV charge point locations' outlines in more detail some of these requirements, including diagrams of suggested designs.

Maintenance

Public trust in the availability of existing charging infrastructure is a large factor in realising the switch to EVs.

Fault reporting

Operators of charge points should clearly display who to contact in the event of a fault, and in many cases it will be the operator themselves who will be the main point of contact. A process for the reporting of faulty charge points should be in place, addressing any faults within a timely fashion and customers should be notified if possible with advice of alternative nearby charge points. Contracts could include penalties or fines to ensure charge points are fixed within an acceptable timeframe.

Crime and disorder

An agreement should be reached to address the following points:

- Agree approach to securing all charge points (including through production and delivery phases) and assets used in relation to the agreement
- Security precautions (including charge point design and on-street payment methods) employed to prevent misuse and theft of card details and other personal information
- Approach to data sharing with regard to data being stolen, for example through a cyber attack
- Strategy to be implemented when crime occurs, including at on-street locations
- Approach to monitoring internal security matters including but not limited to access control
- Reporting of incidents

Security

As part of the bidding process for procuring EV charge points, bid responses should outline how the provider will meet applicable UK security legislation including complying with the Data Protection Act 1998 and Counter-Terrorism Act 2008. A draft security policy should identify where responsibility for security lies for the services. The draft security policy should cover, as a minimum, the following:

- A security plan of how the operator will manage and protect confidential information including personal data, service systems integration and availability. The plan should indicate activities where it is expected the customer or other third parties should be involved
- Security measures for the services and service systems provided as well as the testing approach to demonstrate this
- Description of the approach for managing security breaches
- Communication links from the service system(s) to third parties
- Security measures for the removal of any customer and third-party data and security and/or related configuration information in the event of disposal of equipment or surplus equipment being resold or donated to another party

Data

Building up a picture of where charging infrastructure exists can be helpful for users to identify the location of available charge points, but also to help plan for the future and to identify gaps in the charging network across London. A final step in the process of installing a charge point should be to register it in the following ways:

Zap-Map

Zap-Map is a UK-wide map of EV charge points and aims to help EV drivers locate and navigate to available charge points. You can register new charge points through their website: https://www.zap-map.com/add-a-charge-point/

National Chargepoint Registry

The National Chargepoint Registry (NCR) was established by the UK government in 2011 to provide a public database of publicly-funded charge points across the UK. This was created in support of the government's objective to promote the use and sales of ultra- low emission vehicles. The government's Office for Low Emission Vehicles (OLEV) requires that all publicly funded charge points are registered on the NCR. OLEV is currently exploring options and engaging with industry on the best approach to making accurate data on all publicly accessible charge points freely available.

Collecting usage data

Where possible, usage data should be collected. This provides information on the level of use at charge points, how long they are being used for and for what types of vehicle. This can help to plan for the future expansion of charge points and detail where there is higher demand.

Appendix A - Glossary

BEAMA	British Electrotechnical and Allied Manufacturers – UK trade association for manufacturers and providers of energy infrastructure technologies and systems.
BEV	Battery Electric Vehicle. A vehicle powered by a battery, which can be plugged into an electricity source to recharge. Also know as 'pure' or '100 per cent' EVs, they have zero tailpipe emissions.
CEO	Civil Enforcement Officers. CEOs are responsible for enforcing parking, traffic and other restrictions and laws in England and Wales.
CIL	Community Infrastructure Levy. A planning charge introduced by the Planning Act 2008 as a tool for local authorities in England and Wales to help deliver infrastructure to support the development of their area.
CPZ	Controlled Parking Zone. An area where parking is restricted during certain hours of the day.
DNO	Distribution Network Operator. A company licensed to distribute electricity in the UK. They are responsible for distributing energy and maintaining the electrical supply system. In the London region there are two DNOs: UK Power Networks and Scottish & Southern Energy.
DPD	Development Plan Document**.** DPDs are planning policy documents which make up the Local Plan. They help to guide development within a local planning authority area by setting out the detailed planning policies, which planning officers use to make their decisions on planning applications.
Electricity supplier	Electricity company to whom the user pays their electricity bill. In the UK there are six companies which are the predominant electricity suppliers (British Gas, EDF, E.ON, npower, Scottish Power and SSE). There are also many smaller suppliers, some with a green energy focus such as Ecotricity and Octopus.
ENA	Energy Networks Association. The industry body funded by the UK gas and electricity transmission and distribution licence holders.
EV	Electric vehicle. A vehicle that uses an electric motor for propulsion, comprising ones that run solely on batteries, as well as plug-in hybrids (PHEVs) that have an attached petrol or diesel engine to power the battery engine.
EVCP	Electric vehicle charging point. This is the infrastructure provided to enable electric vehicles to recharge batteries. They come in a number of forms ranging from small charge points contained within existing infrastructure such as lamp columns, to larger rapid chargers which provide a quicker charge for vehicles such as taxis through hubs, which are locations with six or more charge points grouped together.
Feeder pillar	Controls electricity outputs to devices and buildings, including lighting, signalling and charge points. Charge points will need to be connected to a feeder pillar in order provide an electric charge.
Fast charge point	A charge point that provides power from 7kW to 22kW AC, and typically fully charges an EV with a 22 kWh battery in three to four hours. Common fast connectors are a tethered Type 1 or a Type 2 socket (via a connector cable supplied with the vehicle).
GULCS	Go Ultra Low City Scheme. A programme by the Office for Low Emission Vehicles within the Department for Transport. It aims to provide funding for local authorities in the UK that encourages people to consider switching to an electric car.
ICE	Internal combustion engine. An engine that generates motive power by burning petrol, diesel, oil, or other fuel with air inside the engine, the hot gases produced being used to drive a piston or do other work as they expand.
kW	Kilowatt. A measure of one thousand watts of electrical power.
LIP	Local Implementation Plan. A statutory transport plan produced by London boroughs which brings together transport proposals to implement the strategy at a local level.
LGV	Light Goods Vehicle. A motor vehicle (such as a van) with a gross vehicle weight of less than 3.5 tonnes.
MAQF	Mayor's Air Quality Fund. A £22 million fund over 10 years to support projects by London boroughs to improve air quality.

Mobile Charging Units	Charging unites that are either attached to another vehicle or moveable from charge position to the vehicle; often applied in roadside assistance to provide charge to an EV vehicle with a low battery.
Open access	Charging point which all users can access (ie not restricted access).
OLEV	Office of Low Emission Vehicles. OLEV works across government to support the early market for ultra-low emission vehicles. It is part of the Department for Transport and the Department for Business, Energy & Industrial Strategy.
PCN	Penalty Charge Notice. PCNs are mainly associated with parking and issued when a driver parks a vehicle in contravention of the regulations. A PCN can also be issued for breaking some traffic rules or for not paying the fee for the congestion charge or low emission zone on time.
PHEV	Plug-in hybrid electric vehicle. An EV that combines a small plug-in battery with an internal combustion engine (ICE). These typically use the battery to drive the wheels at low speeds, or for a limited range, with the petrol- or diesel-fuelled ICE used for greater speeds and longer distances.
Restricted access	Charging point usage restricted to subscribers.
RFID	Radio Frequency Identification. A system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly by using radio waves.
SLA	Service Level Agreement. A SLA is a contract between a service provider and its internal or external customers that documents what services the provider will furnish and defines the service standards the provider is obligated to meet.
SSEN	Scottish and Southern Electricity Networks**.** A distribution network operator for electricity covering parts of Scotland as well as central southern England and parts of London.
TfL	Transport for London. One of the Greater London Authority functional bodies, accountable to the Mayor, with responsibility for delivering an integrated transport strategy for London.
TMO	Traffic Management Order. TMOs are legal documents drafted and made by the local highway authority, usually under the Road Traffic Regulation Act 1984. They regulate the use of highways for movement and parking and also off-street parking areas by drivers of vehicles and/or pedestrians within the local authority area.
UKPN	UK Power Networks**.** A distribution network operator for electricity covering South East England, East of England and London.

Transport for London
Surface Transport

Management System Document – Procedure

Technical Approval of TfL Sponsored Highway Schemes

Document reference: SQA-1900 - issue: 2

1 Purpose

These documents sets out the Highways Technical Approvals process for projects promoted and managed internally by TfL that affect any aspect of the highway for which TfL is the Highway Authority. For projects promoted by external parties (eg developer led projects), please refer to SQA-0489.

2 Background

2.1 Statutory Position

The Highways Act 1980 imposes a number of duties on highways authorities, primarily the duty to maintain under Section 41 and the duty to assert and protect public rights to enjoyment of the highway under Section 130.

In any action against a highway authority, it is a defence to prove that it had taken such care as in all the circumstances was reasonable to secure that the highway was not dangerous for traffic (including pedestrians).

In presenting that defence it is not sufficient to show that the authority had arranged for a competent person to carry out the works unless it can also prove that it had given proper instructions and that they had been carried out as per Section 58 of the Highways Act.

It follows that to safeguard it against litigation a highway authority may not simply rely on the reputation and competence of a third party, unless it has itself taken sufficient care to ensure that the services being provided are to the appropriate standards.

2.2 The Technical Approval Authority (TAA)

The Highways Technical team within the Asset Management Directorate (AMD) is the Technical Approval Authority (TAA) on behalf of TfL Surface Transport for Highways assets. AMD is the Highway Authority and discharges all duties and functions of the Highways Act 1980 on behalf of TfL, and the TAA represents AMD in many of these functions. TAA also represents the interests of the Overseeing Organisation for the TLRN and is responsible for assessing and granting any DMRB departures from standard.

The Highways Technical team is able to call on extensive knowledge in highway design and construction, highway standards, highway legislation, and traffic regulations.

The Highways Technical team does not design, appraise, or manage the design, costs, and programme of a project, however can assist with the above if necessary,

through technical advice, experience of products and materials, identification of risks to the build elements, knowledge of asset maintenance treatments, and knowledge of UK and International specifications. Requests for advice should be sent to Highways-TAA@tfl.gov.uk, and typically be accompanied by a WBS code. It remains the duty of the Sponsor of a given project to ensure compliance with all legislation.

In terms of Pathway, the Highways Technical team is the Subject Matter Expert for all highways assets.

3 The Highways Technical Approval Process

3.1 General Description

The objectives of Highways Technical Approval (HTA) is to give increased assurance that any new or amended highway assets are in accordance with relevant legislation; comply with British and European standards, as well as asset specific guidance; are economic to build and maintain; and do not introduce any unnecessary risk to the Highway Authority.

HTA applies to all proposals within or near to the TfL Highway Authority boundary. It applies to all forms of construction including repairs, improvements, and disposal of highway assets, with the exclusion of routine maintenance activities. HTA is independent of, and compliments, Structures Technical Approval.

HTA will consider all aspects of the proposed design that affect the buildability[1], legality, operability, and maintainability of all highways assets as categorised in the Specification for Highways Works (SHW) and within the LoHAC contract. Designs will be assessed against any relevant standards and specifications, including Streetscape Guidance. Note that series 1600 – 2500, and series 5000 of the SHW are covered by colleagues in AMD Structures, so are excluded from Highways Technical Approval.

HTA does not in any way modify or reduce the contractual and statutory responsibilities of any party for the work carried out, the legal responsibilities of professional engineers, or confer any other approval of the proposals. The 'Approval' of HTA is an agreement on behalf of the asset owner to alter the highway assets, and does not absolve the sponsor from obtaining any other approval required to work on the TfL highway (e.g. TMAN, Permits etc).

It is mandatory for all proposals to be submitted and obtain Technical Approval at the end of Pathway stage 4 (Detailed Design) prior to the project commencing works on site. Highways Technical Approval can be considered to have been granted upon receipt of a signed **Detailed Design – Approval Certificate**. Any changes to the

[1] Buildability in a HTA sense differs from the PPD buildability reviews in that PPD generally consider alternative options to reduce cost and construction risk, whereas HTA generally considers ancillary risk and avoidance of unapproved design alterations.

design through the Build phase may require resubmission for an additional Approval Certificate, depending on the scale of the change.

It is strongly recommended that a project is submitted at the end of Pathway stages 2 and 3 (Feasibility and Concept Design) to highlight any potential issues early and to de-risk future stages. When a Feasibility/Concept submission is suitably developed, an **Approval in Principle** (AIP) will be issued confirming that the Highways Technical Team believe the design is in a sufficient position to move to the next stage. If the AIP is not issued, the Highways Technical Team do not believe the design should progress, but the Sponsor can choose to do so anyway at risk

The standard response time from submission to decision is 28 calendar days for all types of submission. For smaller projects or for earlier design stages, the actual response time can be, and frequently is significantly less. It should be noted that multiple iterations and submissions may be required to obtain Technical Approval. For very large and/or complex projects, a different response time or submission regime may need to be agreed in advance. For advice, please contact Highways-TAA@tfl.gov.uk.

Should a dispute arise between the project Sponsor and the Technical Approvals team member, the initial escalation point should be to the Highways Manager (Technical) for AMD and the relevant Senior Portfolio Sponsor for RSM-S. If resolution is still unable to be achieved, the final escalation point for a decision is the Head of Highways and Head of Sponsorship.

A step by step guide of the overall process is given in section 4.

3.2 Relevant Documents

The required documents to obtain Technical Approval for the completion of each stage will vary widely depending on the size, scope, and complexity of the project. The list of documents described below is therefore not exhaustive, but gives an indication of typical requirements at the end of each stage. Each document will not always be required for every project – advice from Highways-TAA@tfl.gov.uk should be sought if the Sponsor is unsure (* indicates a required document, {P} refers to a document from the Pathway suite of products).

Feasibility (Stage 2)

- General Arrangement drawing*
- Highways Approval Document (HAD)*
- Vehicle Tracking of appropriate vehicles
- Operational Concept {P}
- Maintenance Concept {P}

Concept (Stage 3)

- Highways Approval Document*
- Updated General Arrangement drawing*

- Concept drawings for each SHW series (can be combined into one or more drawings)
- Indicative Cross-sections
- AIP from Feasibility (Highways Approval Document)
- Updated Vehicle Tracking
- Operational Readiness Plan {P}
- Maintenance Readiness Plan {P}
- Investigation reports (CBR, Cores, GPR {all types}, Drainage, Lighting, Utilities, Arboriculture, Pavement Design, Duct survey, etc)
- Design assumptions and calculations
- Departures from Standard
- Asset Ownership details (electrical supplies, utility covers, Highway boundary etc)

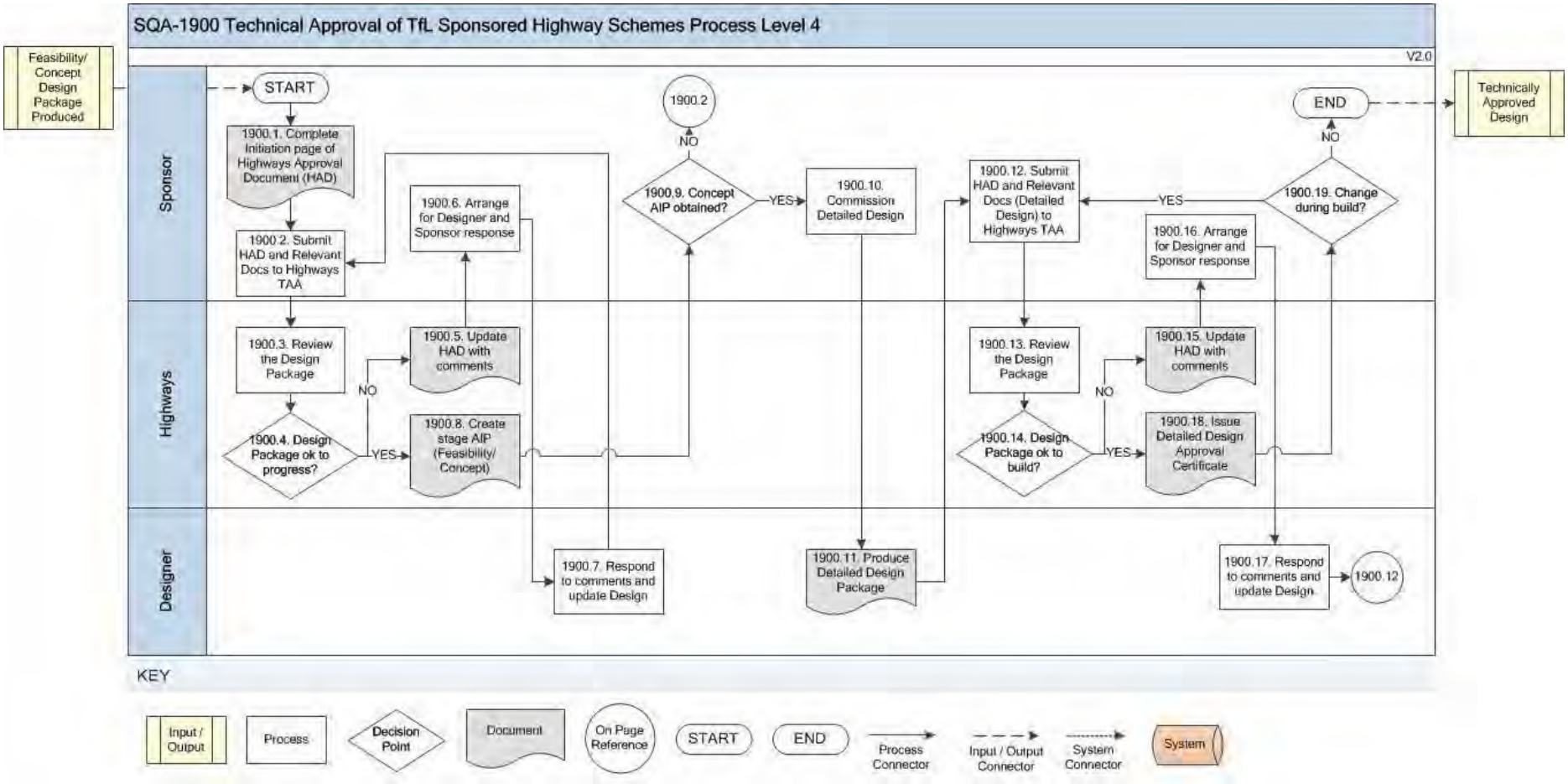
Detailed (Stage 4)

- Highways Approval Document*
- Detailed Design drawings for each SHW series (can be combined into one or more drawings)*
- AIP from Concept (Highways Approval Document)
- Operational Readiness Plan {P}
- Maintenance Readiness Plan {P}
- Design calculations (pavement, drainage, lighting etc)
- Departures from Standard
- Any appropriate information not provided at Concept (Stage 3)
- Evidence of any legal processes required by the Highways Act 1980

Build (Stage 5)

- Similar documents to Detailed Design when a change is required to the design during build.

4 Procedure Flow



A Visio version is available here.

5 Procedure Description

Inputs:

- Feasibility (or subsequent) Design Package

1900.1. Complete Scheme Initiation page of Highways Approval Document (HAD)

The Sponsor completes the first tab of the Highways Approval Document, which provides basic project information to the Technical Approvals team about the project. Note that the Sponsor may choose to delegate this task to the Project Manager

1900.2. Submit HAD and Relevant Documents to Highways TAA

The Sponsor submits the HAD and Relevant Documents (refer to section 3.2 for a description of the relevant documents at each stage) to the Highways-TAA@tfl.gov.uk inbox. Note that the Sponsor may choose to delegate this task to the Project Manager.

1900.3. Review the Design Package

The allocated Technical Approvals team member will review the submitted package in line with section 3.1

1900.4. Design Package recommended to proceed?

The Technical Approvals team member makes an assessment on whether the Package is suitable to progress to the next design stage

If the answer is NO, please refer to step **1900.5.**

If the answer is YES, please refer to step **1900.8.**

1900.5. Update HAD with comments

The Technical Approvals team member provides itemised commentary on the second tab of the HAD highlighting issues that require resolution prior to making a positive recommendation to proceed, and returns the HAD to the Sponsor

1900.6. Arrange for Designer and Sponsor response

The Sponsor requests the Designer to provide a response to each of the issues raised by the Technical Approvals team member in the relevant column of the HAD. The Sponsor should also provide commentary on items that are relevant to the Sponsor. It is often beneficial at this stage for the Sponsor to arrange a meeting with the Technical Approvals team member and Designer to discuss each of the issues in person.

1900.7. Respond to comments and update Design

The designer completes their response to each of the issues in the HAD, and updates the Design Package where appropriate. The Sponsor should review each response prior to resubmitting at step 2. Note that the Project Manager may facilitate this process, but it is essential that the Sponsor reviews and responds to each comment as not all are specifically design related.

1900.8. Create stage AIP (Feasibility/Concept)

Once the Design Package is considered sufficiently developed to progress to the next design stage, the Technical Approvals team member should produce either a "Feasibility Approval In Principle" (at the end of Feasibility Design), or a "Concept Approval In Principle" (at the end of Concept Design). This certifies that Highways TAA is happy for the Stage Gate to be signed

1900.9. Concept AIP obtained?

If the AIP issued in step 8 is a Feasibility AIP, repeat steps 2-8 for the Concept Design package. If the AIP issued in step 8 is a Concept AIP, proceed to step 11

If the answer is NO, please refer to step **1900.2.**

If the answer is YES, please refer to step **1900.11.**

1900.10. Commission Detailed Design

The Sponsor requests a Designer to produce a Detailed Design Package for the project

1900.11. Produce Detailed Design Package

The Designer produces the Detailed Design Package using the information provided from the Concept AIP. Concurrently, the Sponsor should be producing the relevant Pathway documentation.

1900.12. Submit HAD and Relevant Docs (Detailed Design) to Highways TAA

Once the Detailed Design Package is complete, the Sponsor submits the HAD and Relevant Documents (refer to section 3.2) to the Highways-TAA@tfl.gov.uk inbox.

1900.13. Review the Design Package

The allocated Technical Approvals team member will review the submitted package in line with section 3.1.

1900.14. Design Package acceptable to build?

The Technical Approvals team member makes an assessment on whether the Package is suitable to be approved for Build.

If the answer is NO, please refer to step **1900.16.**

If the answer is YES, please refer to step **1900.19.**

1900.15. Update HAD with comments

The Technical Approvals team member provides itemised commentary on the second tab of the HAD highlighting issues that require resolution prior to approving the design to Build, and returns the HAD to the Sponsor.

1900.16. Arrange for Designer and Sponsor response

The Sponsor requests the Designer to provide a response to each of the issues raised by the Technical Approvals team member in the relevant column of the HAD. The Sponsor should also provide commentary on items that are relevant to the Sponsor. It is often beneficial at this stage for the Sponsor to arrange a meeting with the Technical Approvals team member and Designer to discuss each of the issues in person.

1900.17. Respond to comments and update Design

The designer completes their response to each of the issues in the HAD, and updates the Design Package where appropriate. The Sponsor should review each response prior to resubmitting at step 12. Note that the Project Manager may facilitate this process, but it is essential that the Sponsor reviews and responds to each comment as not all are specifically design related.

1900.18. Issue Detailed Design Approval Certificate

Once the Design Package is sufficient to be approved, the Technical Approvals team member should issue a “Detailed Design – Approval Certificate”. This certifies that Highways TAA is content that the project can progress to build. It does not accept any design liability on behalf of TfL.

1900.19. Change during build?

Upon any form of design change becoming necessary, the appointed TA should be consulted to determine whether a full resubmission is required, or a verbal/email confirmation is sufficient. Should a substantial change be required to the design, a resubmission of the Relevant Documents may be required as determined by the appointed TA. It is recognised that changes during delivery are often crucial in terms of timescales, so priority will be given to assessing these over projects in other stages of design.

Outputs:

- Technically Approved Design

6 Relevant Documentation

- Glossary
- Pathway
- Specification for Highways Works
- SQA-0489 Arranging s278 Agreements - Developer Implemented Schemes
- SQA-8185 Highways Approval Document - Internal
- The Highways Act 1980

7 Document Control

Issue	Date	Change Summary	Author	Checker	Approver
1.1	18/09/15	First Issue	Highways Technical Approvals Engineer (L Pan)	Highways Technical Manager (H Micallef)	Head of Highways (N Aldworth)
2.0	16/12/16	Full rewrite following 12 months of operation v2	Highways Technical Approvals Manager (R Cooper)	Highways Technical Manager (H Micallef)	Head of Asset Operations (N Aldworth)

Transport for London
Surface Transport

Management System Document – Procedure

Road Safety Audit

Document reference: SQA-0170 - issue: 1

Contents

1 Purpose

This document describes the Procedure that must be followed when carrying out Road Safety Audits (RSAs) on the Transport for London Road Network (TLRN), its assets and locations managed or maintained by TfL (such as Station forecourts and footways). It should be noted that TfL is also Traffic Authority for roads in proximity to the TLRN and this Procedure must also be followed when undertaking RSAs in these locations.

This procedure will also be followed when TfL undertakes RSAs on non-TLRN schemes (e.g. Borough schemes), with the exception of Trunk Road locations, which must be carried out in accordance with the latest Road Safety Audit Standards in the Design Manual for Roads and Bridges (DMRB), currently HD19/15. This Procedure is commended to all others involved in commissioning and undertaking RSAs on non-TLRN schemes in London.

An RSA considers the road safety implications of all measures, their impact on the network under all anticipated operating conditions, and their road safety implications on all types of road user. Fundamental to the principle of an RSA, is ensuring that due consideration is given to the effects of any proposal on all road users and especially all vulnerable user groups, generally regarded to include the very young, the elderly, people with a disability, pedestrians, cyclists and riders of powered two wheeled vehicles. In some cases, the specific needs of equestrians will also need to be considered.

This is in accordance with the following:

- Mayor's Transport Strategy, Chapter 5, Part 3
- Safe Streets for London – The Road Safety Action Plan for London 2020

2 Background / Scope

This Procedure is **mandatory** and must be followed without exception to identify when a Road Safety Audit is required and set the standard and process for carrying out RSAs.

The **mandatory** workflow process for Road Safety Audits undertaken internally by Transport for London is shown in Section 3.

The **mandatory** workflow process for Road Safety Audits undertaken by all other parties, including those employed under TfL Contracts, developers and third parties is shown in Section 5.

This Procedure will be subject to frequent revision to ensure it reflects current best practice. Users of this Procedure should ensure they are using the most recent

version, a copy of which will be available on TfL's website. Notifications of updates will be sent to registered interested parties. If you wish to be included on this distribution list please notify TfLSafetyAudit@tfl.gov.uk.

This Procedure shall apply to:

- All measures proposed on the TLRN, its assets and locations managed and maintained by TfL (including where TfL is the Traffic Authority) that involve permanent changes to the highway;
- Works carried out under agreement with TfL resulting from developments alongside or affecting the TLRN;
- Temporary Traffic Management Schemes lasting longer than 3 months or where it is anticipated that the proposals are likely to have a significant impact on the highway network or road safety concerns have been identified. Phased traffic management schemes where each phase is less than 3 months, but the combined total of all phases exceeds 3 months, must be audited; and,
- Like for like replacements where there is a known collision risk. For example, the replacement of a non-passively safe traffic sign in the same location where it has been previously struck by errant road users on numerous occasions.

The RSA will not include:

- A technical check to ensure compliance to standards.
- Non-safety related issues (although discretion is given to Auditors to provide comment on these issues separately within the standard Road Safety Audit reporting method).
- Issues relating to the stability of any structure, or the structural integrity of any proposed element or method of construction.
- Construction and maintenance issues as covered by current Construction Design and Management (CDM) Regulations. The RSA covers only the future operational road safety of the scheme. Overseeing Organisation Project Clients, Sponsors and Directors should make themselves aware of current Health & Safety legislation and consider the implications of their instructions to Design Teams and Road Safety Audit Teams in terms of Health & Safety.
- Traffic signal design / safety checks which are covered by separate TfL Procedures. These exist to ensure that all aspects of safety are considered during the design stage so that the traffic signal scheme can be implemented, operated, maintained and decommissioned in a safe manner and the design accords with the requirements of CDM. Those

design / safety checks do not replace the necessity for an RSA in accordance with this Procedure.

- A definitive judgement on which option is preferable if separate options are submitted for audit. The RSA Team will assess each option individually and make recommendations accordingly. The decision on which option to develop will remain entirely with the Client Organisation.

The RSA is not an opportunity to:

- Query why other measures are not being proposed;
- Comment on the operational characteristics of the proposals where there are no adverse safety implications; or,
- Suggest alterations or additions to the proposals which are not as a result of a specified safety concern.

No part of an RSA report should be regarded as a direct instruction to include, remove or amend any scheme element. Responsibility for designing the scheme lies with the Design Organisation and as such the Audit Team will accept no design responsibility for any changes made to a scheme following the completion of an RSA Report.

All pre-construction RSAs have a maximum shelf life of two years and should be repeated if the next stage in the scheme's development has not begun within two years following completion of the RSA. This is to ensure that the schemes interface with the current highway network and its current usage is assessed. Similarly, RSAs should be repeated if any element of a scheme is significantly changed, or the highway layout is substantially altered, subsequent to an RSA having been undertaken.

Road Safety Audit Stages and Associated Milestones

Road Safety Audit is not a single Procedure undertaken once for each scheme. An RSA and its subsequent actions shall be undertaken following completion of specific stages of a scheme's development. The scheme design must be sufficiently progressed such that all significant features are clearly shown to a degree that would enable it to progressed to the next stage of the design or proceed to construction accordingly. These stages are:

a) Stage 1: Completion of Preliminary Design / Conceptual Design

b) Stage 2: Completion of Detailed Design

As a guide, the following information should be provided as appropriate:

- General arrangement details (fully dimensioned)
- Site clearance details

- Traffic signs and road markings
- Drainage alterations
- Street lighting alterations
- Traffic signal details and traffic signal staging alterations
- Carriageway and footway level alterations
- Swept path analysis
- Surfacing and material details / specifications

c) Stage 3: Completion of Construction

To be undertaken as soon as practicable after the works are complete. The Client may also deem it prudent to carry out an RSA on a scheme prior to full completion, so that any significant issues arising can be addressed with immediacy. Where an RSA is carried out before a scheme is complete, a further RSA will also be carried out as soon as practicable upon completion.

Under normal circumstances, a Stage 3 RSA should be completed as soon as reasonably practicable, but within 3 months following completion of a scheme. A scheme is regarded to be complete and operational from the date construction ceases on site, the location is open to the general public and all traffic management has been removed. Consideration should be given to allow a period post construction for the modified layout to bed-in.

d) Stage 4: Monitoring

Stage 4 RSAs are not routinely undertaken on TfL schemes. TfL monitors the performance of highway engineering schemes through the Traffic Accident Diary System (TADS). Where TADS identifies an emerging collision problem, the Client should commission a Stage 4 RSA. Stage 4 RSAs are purposely not shown on the workflow in Section 3 and Section 5.

At stage 4, the collision records are analysed in detail to identify the locations at which personal injury collisions have occurred, where collisions appear to arise from similar causes or show common factors and how the scheme may have affected collision patterns and rates. Comparisons with control data such as Collision Risk in Greater London, will also be undertaken to identify collision patterns and trends. The Stage 4 Audit report will comprise of an analysis of the collision data to identify the impact of problems and recommendations at previous Audit stages; details of other notable events that have occurred since construction where this is known to the Audit Team; identify any road safety problems linked to the scheme and indicated by the data analysis and observations during any site visits undertaken. The reports should make recommendations for remedial action.

If a pattern of collisions are identified during the hours of darkness, it may be prudent to consider a night time site visit supplementary to the daytime visit.

- A Stage 4a RSA will be prepared using 12 months of collision data from the first full month after the scheme became operational and 36 full months of collision data from prior to the commencement of construction works.

- A Stage 4b RSA is prepared using 36 months of collision data from the first full month after the scheme became operational and 36 full months of collision data prior to the commencement of construction works. The Client Organisation must decide if a Stage 4b RSA needs to be prepared. This decision may be led by the results of the Stage 4a report, the scale of the changes instigated by the original scheme, TADS outputs and any issues highlighted since the completion of the scheme.

e) Supplementary Road Safety Audit stages

In addition to the defined stages specified above, it may at times be beneficial to conduct Interim or combined Stage 1 & 2 audits as follows:

- For large, complex schemes, particularly with accelerated programmes, the Client Organisation may consider at any time during the design or construction stages, that it is appropriate to undertake an Interim RSA. Interim RSAs shall be carried out following the same procedure as for the formal Audit stages, which must still be undertaken in full. Where applicable, the Audit Team, Client and Designer can meet if considered necessary to enable the Design Organisation to explain their designs and the Audit Team to explain any identified problems and recommendations.

- Combined Stage 1 & 2 RSAs can be carried out on the overall design of smaller and simpler schemes. Combined Stage 1 & 2 RSAs may have the disadvantage of identifying potential safety issues late in a scheme's development when corrective action may be more difficult. It is envisaged that schemes such as road marking alterations, traffic signing schemes and small footway modifications would fall under this category. Stage 1 and Stage 2 Road Safety Audits must not be combined as purely a cost and/or programme saving measure.

In exceptional circumstances, such as when auditing unique and complicated schemes to tight deadlines, it is permissible to deviate away from this Procedure to suit the specific scheme circumstances. The decision to change the way in which Audits are undertaken can only be made by TfL's Road Safety Audit Manager without exception. In all cases, written approval must be sought and the reasons for modifying the Road Safety Audit Procedure must be stated within the Audit report.

f) Pre Stage 1 Road Safety Audit comments

For large complicated schemes or for schemes with multiple possible options, it may be beneficial to enlist the help of Road Safety Audit to provide advice on the potential road safety implications of the proposals to assist optioneering. Providing this advice does not preclude the necessity to undertake a formal Stage 1 Road Safety Audit.

In providing advice the RSA team will not form part of the project team and will remain impartial. Providing pre-Stage 1 advice does not prevent the same Auditors from undertaking the formal Audit of the proposals.

Retention of Records

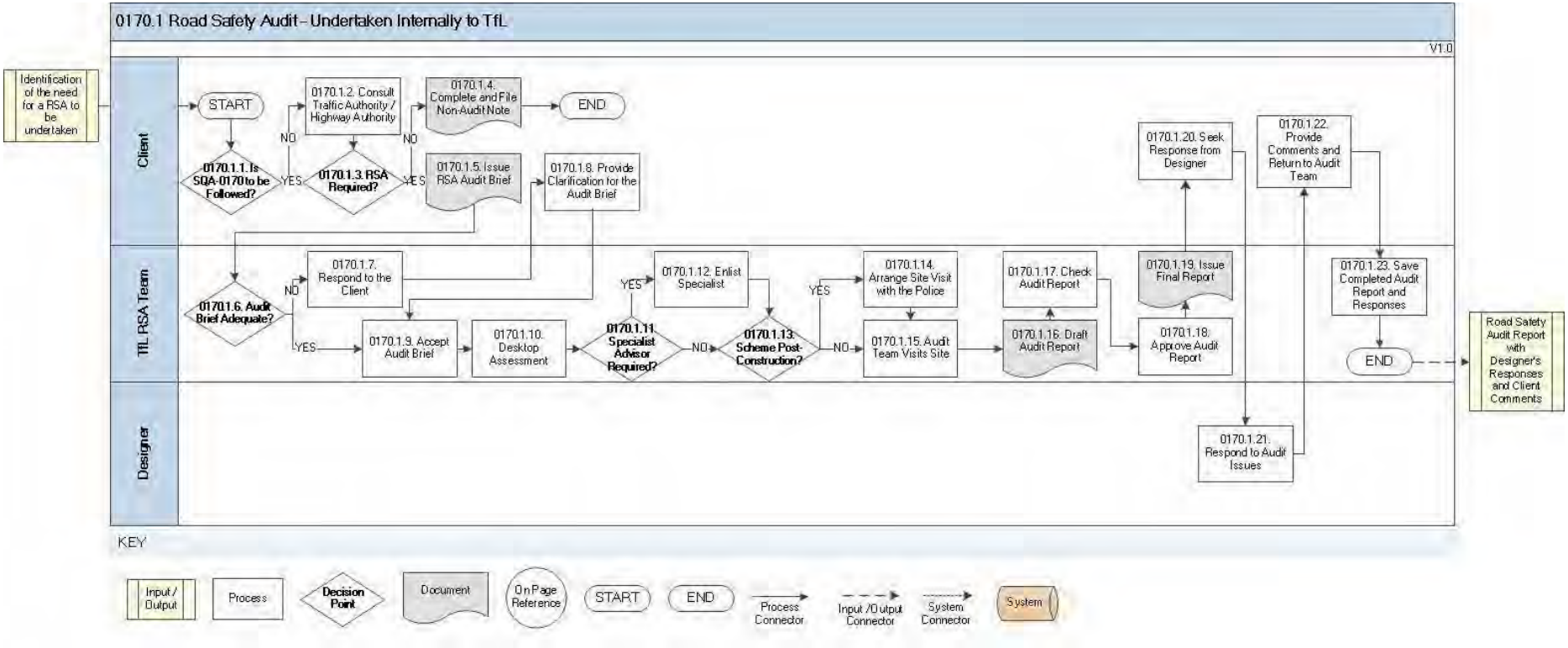
In accordance with TfL's document retention Policy for Road Safety Audit reports and related information, these records must be retained for a period of 21 years from the date the report is issued.

It is the responsibility of any Client Organisation's external to TfL to ensure all Road Safety Audits are retained in accordance with their own Policy.

Filing and retention arrangements for Road Safety Audits must pay due regard to complying with the Freedom of Information Act.

3 Procedure Flow 1

Where an Audit Team internal to TfL is to be appointed



A Visio version is available here: LINK.

4 Procedure Description 1

Where an Audit Team internal to TfL is to be appointed:

Inputs:

- Identification of the need for a Road Safety Audit to be undertaken.

0170.1.1. Is SQA-0170 to be followed?

The Client should identify the ownership of the road network / asset. If the proposal is located on or affects the TfL road network, land or assets, or if a non-TLRN road is to be audited by the TfL RSA Team, SQA-0170 must be followed.

This requirement specifically excludes the scenario where a Road Safety Audit is required on the Highways England road network. In this scenario, the requirements of the Design Manual for Roads and Bridges HD19 must be followed.

If the answer is YES, please refer to step **0170.1.3**.

If the answer is NO, please refer to step **0170.1.2**.

0170.1.2. Consults Traffic Authority and/or Highway Authority

The Client liaises with the Traffic Authority and/or Highway Authority to ascertain the requirements for Road Safety Audit.

0170.1.3. RSA Required?

Does the scheme constitute a change to the highway as outlined in Section 2 of this Procedure and therefore requires an RSA to be carried out?

If the answer is YES, please refer to step **0170.1.5**.

If the answer is NO, please refer to step **0170.1.4**.

0170.1.4. Client Completes and Files Non-Audit Note

If the Client deems that an RSA is not required for the scheme, they must complete a Non-Audit Note stating the reasons that an RSA will not be undertaken and retain the document within the project file.

0170.1.5. Client Completes and Sends RSA Audit Brief to TfL RSA Team

The Client compiles the Audit Brief consisting of a completed Audit Brief Checklist and any drawings and further supporting information necessary to assist the Audit Team. Details of what drawings and further information may be required can be discussed with TfL's RSA Team, but as an absolute minimum the Audit Brief Checklist and a General Arrangement drawing should be provided.

0170.1.6. Audit Brief Adequate?

TfL RSA Team assesses if the Audit Brief has the necessary information required to undertake the Audit.

If the answer is YES, please refer to step **0170.1.9**.

If the answer is NO, please refer to step **0170.1.7**.

0170.1.7. Respond to the Client

TfL RSA Team responds to the Client indicating why the Audit Brief has not been accepted or seeks clarification.

0170.1.8. Provide Clarification for Audit Brief

The Client provides the TfL RSA Team with clarification or additional drawings and information as required.

0170.1.9. Accept Audit Brief

The Audit is added to the central repository database, prioritised accordingly and the internal Audit Team selected by the Road Safety Audit Manager.

The Audit Team will comprise of at least two persons, one of which will lead the Audit (Team Leader), the other (Team Member) will provide technical expertise to assist the Audit Team Leader.

The educational and experience requirements of the Audit Team are at the discretion of TfL's Road Safety Audit Manager. As a general principle, educational and experience requirements for internal Road Safety Auditors will exceed the mandatory requirements for Auditors external to TfL.

On occasions an individual with the appropriate training, skills and experience may accompany the RSA Team as an Observer in order for them to gain experience of the Audit process and they are actively encouraged to contribute. As a minimum an Observer must have undertaken a 10-day formally structured and recognised Collision Investigation or Road Safety Engineering course and have a minimum of 1 year's Collision Investigation or Road Safety Engineering experience.

0170.1.10. Desktop Assessment

The appointed Audit Team collects the latest collision data and carries out analysis to ascertain any underlying collision patterns. This data is to be used to determine current safety concerns which may not be discernible from the site visit alone and builds a greater appreciation of the future operation of the proposals. A desktop assessment of the drawings and information supplied is carried out prior to visiting the site.

0170.1.11. Specialist Advisor Required?

If there are any unusual or specialist measures to be audited, then the Audit Team Leader may elect to appoint an appropriate specialist to advise the RSA Team.

If the answer is YES, please refer to step **0170.1.12**.

If the answer is NO, please refer to step **0170.1.13**.

0170.1.12. Enlist Specialist

Audit Team identifies a Specialist Advisor and obtains their comments, advice and suggestions. It may be necessary to visit the site together.

The Police, Specialist Advisors and Observers do not form part of the formal Audit Team and are not required to be members of the Society of Road Safety Auditors (SoRSA) or meet the requirements of the formal Audit Team Members.

0170.1.13. Scheme Post-Construction?

The Audit Team identifies if the scheme has already been constructed and therefore requires a Police visit / comments and a night-time site visit.

If the answer is YES, please refer to step **0170.1.14**.

If the answer is NO, please refer to step **0170.1.15**.

0170.1.14. Arrange Site Visit with the Police

At Stage 3, the Team Leader shall invite representatives from the Police to accompany the Audit Team to offer their views for the Audit. Where it proves not possible to arrange a mutually convenient time, the Police will be invited to submit their views in writing. To expedite the Audit process, the Audit Team may visit the site and compile the Audit report in advance of the Police visit, at which time the Audit may be issued in draft.

At Stage 3 and in addition to the daylight site visit, all members of the Audit Team should visit the site of the scheme together during the hours of darkness to identify hazards particular to night-time operation. Seasonal variation will sometimes necessitate undertaking night-time site visits at a late hour. In such cases, the Team Leader may elect to defer the night time site visit, particularly if the personal safety of the Audit Team is considered to be an issue. When deferring the night-time site visit, the Audit report will be issued in draft form until such time as the night-time site visit is undertaken. Night time site visits may not be deferred for more than three months from the daytime site visit.

At the Team Leader’s discretion, and in consultation with the Client Organisation and TfL Road Safety Audit Manager, the site may not require a visit during the hours of darkness. In such instances the reasons for not visiting the site at night must be stated within the Audit report. It should be noted that choosing not to visit the site at night should be adopted only in exceptional circumstances.

0170.1.15. Audit Team Visits Site

At each stage of the Audit process, all members of the Audit Team must visit the site of the scheme together during daylight hours. The Audit Team must consider the measures from the perspective of all the road users that may be anticipated to use the scheme. Where appropriate, a combination of driving, walking and cycling through the scheme may be used to assist their evaluation and ensure that they have a comprehensive understanding and appreciation of the scheme. The Audit Team should also consider the effects of different weather conditions and site conditions that may affect the operation of the scheme.

Where the Audit Team identifies an immediate safety concern, they should notify the Client as soon as reasonably practicable. This is particularly important for problems identified during the Stage 3 RSA process.

The Audit Team Leader liaises with the Client, Police and Specialists Advisors as necessary in order to ensure the Audit report can be appropriately completed. It may be necessary to revisit the site.

0170.1.16. Draft Audit Report

The Audit Team compiles the Audit report at pre-construction, post-construction or Stage 4. The problems and recommendations in the Audit Report should be set out in a logical sequence. The use of headed sections and the details of those headed sections are at the Audit Team Leader's discretion. The Audit Team must avoid the use of superfluous headings for which no issues have been identified.

Road Safety issues that are beyond the scope of the RSA but that the Audit Team believes should be brought to the attention of the Client Organisation, may be included within Section 4 of the RSA report. These issues could include areas where repair or renewal may be required, operational concerns or existing poor provision. Such issues should be clearly identified as being beyond the scope of the RSA and should not be integrated into the main Problem and Recommendation section of the report.

Section 4 is not intended as an opportunity to provide a record of inspection of the existing site conditions. Only significant issues should be included as a large number of issues within this Section may remove focus from the genuine areas of concern. Existing issues and problems outside the geographical extents of the scheme should not normally be included within Section 4, unless they impact directly on the operation or delivery of the scheme.

0170.1.17. Check Audit Report

The draft Audit report shall be distributed amongst other members of the Audit Team to check and provide comments. Any necessary changes to the Audit report will be made, but the Audit Team Leader shall take responsibility for the content of the Audit report.

0170.1.18. Approve Audit Report

The amended draft Audit report will be read by the TfL's Road Safety Audit Manager or their delegated representative as appropriate, to ensure that the Audit report is understandable by those without a background in the field. The Audit Report approver will not instruct the Audit Team to modify the technical content within Road Safety Audit reports.

0170.1.19. Issue Final Report

The Audit Team Leader issues the Final Audit report to the Client and the Designer where appropriate.

0170.1.20. Seek Response from Designer

Where necessary, the Client sends the Audit report to the Designer and seeks their response to the Audit.

0170.1.21. Respond to Audit Issues

The Designer responds to each problem identified in the Road Safety Audit and this is recorded in the Designer's response areas of the Audit report. The response will contain details of how the problems identified in the Audit report will be resolved. Where the Designer disagrees with the problems or recommendations identified in the Audit report, or decides that the solutions recommended are not appropriate, the response justifies the alternative action to be taken. The Audit report is then signed off by the Designer and sent to the Client for comments.

It should be noted that the Designer must demonstrate due consideration of the problems raised when responding to the RSA report.

0170.1.22. Provide Comments and Return to Audit Team

It is the responsibility of the Client to review the RSA report and ensure that each problem identified is given due consideration by the Designer, adding comments in the relevant sections of the RSA report as appropriate.

The RSA report incorporating the Designer's and Client Organisation's comments is signed off by the Client Organisation and a copy is forwarded to the Audit Team Leader for information.

The Audit report is not an opportunity for the Client and the Designer to document their differences. Any disagreements relating to the progression of the proposals should be discussed and agreed separately. The agreed way forward should be documented within the Designer's response section. The Client Organisation is encouraged to use the Client section to provide background information to complement the Designer's decisions that may be beneficial to those reading the Audit report.

The Client Organisation should familiarise themselves with the requirements of CDM when issuing instructions to the Designer that could constitute a design decision.

With the agreement of TfL's Road Safety Audit Manager, alternative response / comment / sign-off roles and arrangements may be considered to suit local circumstances, but only with the approval of all parties involved.

The Client Organisation commissions the Design Organisation or others if applicable, in respect of changes required to the scheme arising from the Audit response. A scheme should be submitted for Audit again if significant changes are made to it as a result of an Audit.

The response sections of the Audit report must be completed and signatures added before the next stage in the scheme's development is begun.

0170.1.23. Save Completed Audit Report and Responses

The Audit Team Leader then saves the completed Audit report and responses within the central repository for their records. The Audit Team Leader ensures that all working documents supplied as part of the Audit Brief, including plans and maps are collated and retained. However, the record of Road Safety Audits is held by the Road Safety Audit Team for reference and should not be relied upon as a master record.

It is the responsibility of the Client Organisation to retain the master copy of the signed final Road Safety Audit Report incorporating the Road Safety Audit Response. Filing and retention arrangements for Road Safety Audits must pay due regard to complying with the Freedom of Information Act.

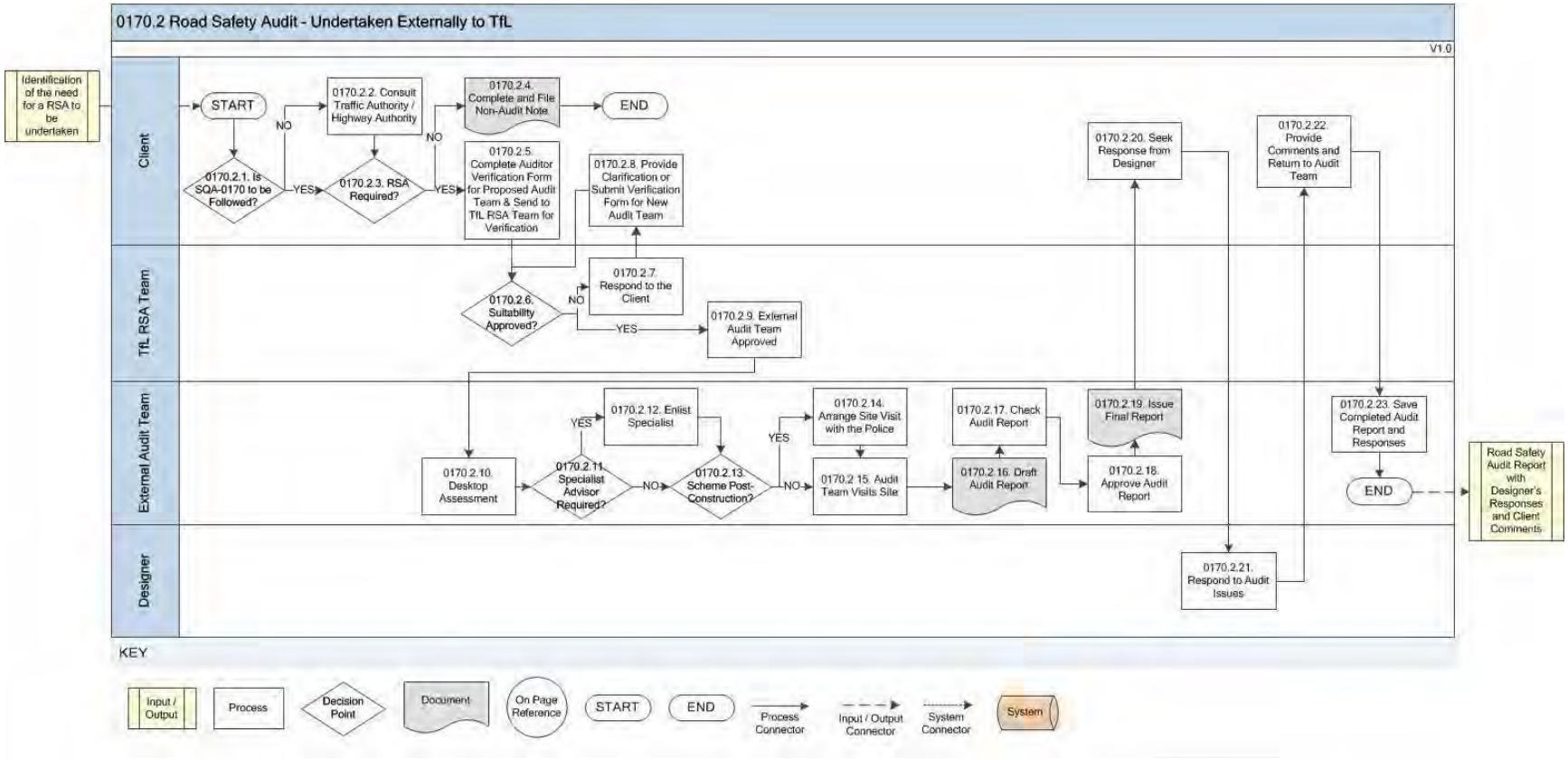
It is the responsibility of any Client Organisation's external to TfL to ensure all Road Safety Audits are retained in accordance with their own Policy.

Outputs:

- Road Safety Audit Report with Designer's Responses and Client Comments

5 Procedure Flow 2

Where an Audit Team external to TfL is to be appointed, including LoHAC contractors and private developers



A Visio version is available here: LINK.

6 Procedure Description 2

Where an Audit Team external to TfL is to be appointed, including LoHAC contractors and private developers

Inputs:

- Identification of the need for a Road Safety Audit to be undertaken.

0170.2.1. Is SQA-0170 to be followed?

The Client should identify the ownership of the road network / asset. If the proposals are located on or affect the TfL road network, land or assets, SQA-0170 must be followed.

If the answer is YES, please refer to step **0170.2.3**.

If the answer is NO, please refer to step **0170.2.2**.

0170.2.2. Consult Traffic Authority and/or Highway Authority

The Client liaises with the Traffic Authority and/or Highway Authority to ascertain the requirements for Road Safety Audit.

0170.2.3. RSA Required?

Does the scheme constitute a change to the highway as outlined in Section 2 of this Procedure and therefore requires an RSA to be carried out?

If the answer is YES, please refer to step **0170.2.5**.

If the answer is NO, please refer to step **0170.2.4**.

0170.2.4. Client Completes and Files Non-Audit Note

If the Client deems that an RSA is not required for the scheme, they shall complete a Non-Audit Note noting the reasons that an RSA will not be undertaken and retain the document within the project file.

0170.2.5. Complete Auditor Verification Form for Proposed Audit Team & Send to TfL RSA Team for Verification

The Client identifies the proposed Audit Team Leader, Team Member(s) and any Observers and instructs them to complete the Auditor Verification form. The Client collects this information and sends the completed forms to TfL RSA Team for verification.

TfL does not issue ‘blanket’ approval for Auditors external to TfL. Auditor approval is given on an Audit specific basis following demonstration of relevant Auditor

competency. Previous approval for an Audit on the TLRN is not approval for any subsequent or alternative Audits, all of which will need individual approval.

It is fundamental to the auditing process that no member of the RSA Team has had any design involvement with the measures being audited and will maintain this independence throughout.

The Audit Team will only be made up from individuals that have the necessary qualifications, adequate and relevant training, skills and experience. This will be assessed, without exception, through a formal verification process by way of the submission of the Auditor Verification Form to the TfL Road Safety Audit Manager. Road Safety Audit Teams comprised of highway design engineers with little or no experience of road safety work will not be accepted.

The Audit Team will comprise of at least two persons, one of which will lead the Audit (Team Leader), the other (Team Member) will provide technical expertise to assist the Audit Team Leader.

The **mandatory** minimum qualifications and experience for RSA Team Leader and RSA Team Member positions is as follows:

- Membership or Fellowship of the Chartered Institution of Highways and Transportation's (CIHT) Society of Road Safety Auditors (SoRSA).

- Completion of a 10-day formally structured and recognised Collision Investigation or Road Safety Engineering course (or equivalent 9-day condensed or modular course).

- A minimum of 4 years Collision Investigation or Road Safety Engineering experience (Team Leader), or a minimum of 2 years Collision Investigation or Road Safety Engineering experience (Team Member).

- Audit Team Leader - Completion of at least **5** Road Safety Audits in the past 12 months, and completion of at least **25** Road Safety Audits during their career as either a Team Leader or Team Member. Audit Team Leaders must demonstrate audit experience in a diverse range of Traffic Engineering measures.

- Audit Team Member - Completion of at least **5** Road Safety Audits in the past 24 months as either a Team Leader or Team Member.

- A minimum of 2 days certificated Continued Professional Development (CPD) in the fields of Road Safety Audit, Collision Investigation or Road Safety Engineering in the past 12 months.

In addition to the mandatory qualifications and experience, the following **preferred** experience for RSA Team Leader and RSA Team Member positions is as follows:

- An understanding of Transport for London's Cycle Design Standards.

- An understanding of Transport for London's Motorcycle Design handbook.
- An understanding of Transport for London's Pedestrian Design Guidance.
- An Understanding of Transport for London's Streetscape Manual,
- Training in the needs of vulnerable road users.

Road Safety Auditors should have an understanding of how best practice highway design principles may benefit road safety. It is not intended that Road Safety Auditors have extensive detailed design knowledge. However, they should have a reasonable understanding of design Standards and best practice design principles, and how the application of these can minimise collision risk.

The Auditor Verification Form must demonstrate that all formal members of the Audit Team are current Members or Fellows of the Chartered Institution of Highways and Transportation's (CIHT) Society of Road Safety Auditors (SoRSA), which will be checked. Membership of SoRSA (or equivalent) does not guarantee that Auditors will be given approval in all cases as the Auditor must demonstrate that they have experience relevant to the scheme being audited before approval will be given.

Auditors who are Members of an alternative recognised Professional Institute or Institution specific to Road Safety Audit may be accepted under some circumstances. In this circumstance the Auditor will need to apply for specific exemption which will be assessed on a case by case basis. Auditors who fall under this category should contact TfL RSA for details. Specific exemption may be given in writing by TfL Road Safety Audit Manager only if the Auditor as deemed suitable.

The TfL RSA Team reserves the right to check the validity of any information submitted as part of the verification process. This may include checking education and employment history as deemed appropriate. At the discretion of TfL, candidates may be requested to provide evidence of any document detailed upon the verification form such as Certificates, Audit Reports, Collision Studies and evidence of CPD. It is recommended that candidates retain up-to-date records of experience should this information be requested.

Audit reports completed by Auditors who have not passed this verification process in advance of the RSA being carried out will not be accepted under any circumstances.

0170.2.6. Suitability Approved?

TfL RSA Team assesses the suitability of the proposed Audit Team using the criteria identified in 0170.2.5.

If the answer is YES, please refer to step **0170.2.9**.

If the answer is NO, please refer to step **0170.2.7**.

Depending on the scope of the scheme, TfL RSA may decide to assist the Audit Team in the completion of the Audit. This is to ensure consistency across Audits completed by different suppliers, ensure Audits are completed correctly and to

provide additional information regarding the site and auditing in London generally, which may not be known to the Audit Team. If the TfL Audit Team wish to attend the RSA, this will be notified as part of the verification process.

0170.2.7. Respond to Client

TfL's Road Safety Audit Manager responds to the Client indicating why the proposed Auditor(s) have not been accepted and seeks further clarification or suggests appointing a new Audit Team.

0170.2.8. Provides Clarification or Submit Verification Form for New Audit Team

The Client provides the TfL RSA Team with clarification of the original Audit Team or may submit the Auditor Verification Form for a new Audit Team for verification.

0170.2.9. External Audit Team Approved

The TfL Road Safety Audit Manager informs the Client that the external Audit Team have been accepted to undertake the Audit.

0170.2.10. Desktop Assessment

The appointed Audit Team collects the latest collision data and carries out analysis to ascertain any underlying collision patterns. This data is to be used to determine current safety concerns which may not be discernible from the site visit alone and builds a greater appreciation of the future operation of the proposals. A desktop assessment of the drawings and information supplied is carried out prior to visiting the site.

0170.2.11. Specialist Advisor Required?

If there are any unusual or specialist measures to be audited, then the Audit Team Leader may elect to appoint an appropriate specialist to advise the RSA Team.

The Police and Specialist Advisors do not form part of the formal Audit Team and are not required to be members of SoRSA.

If the answer is YES, please refer to step **0170.2.12**.

If the answer is NO, please refer to step **0170.2.13**.

0170.2.12. Enlist Specialist

Audit Team identifies a Specialist Advisor and obtains their comments, advice and suggestions. It may be necessary to revisit the site together.

0170.2.13. Scheme Post-Construction?

The Audit Team identifies if the scheme has already been constructed and therefore requires a Police visit / comments and a night-time site visit.

If the answer is YES, please refer to step **0170.2.14**.

If the answer is NO, please refer to step **0170.2.15**.

0170.2.14. Arrange Site Visit with the Police

At Stage 3, the Team Leader shall invite representatives from the Police to accompany the Audit Team to offer their views for the Audit. Where it proves not possible to arrange a mutually convenient time, the Police will be invited to submit their views in writing.

At Stage 3 and in addition to the daylight site visit, all members of the Audit Team should visit the site of the scheme together during the hours of darkness to identify hazards particular to night-time operation. Seasonal variation will sometimes necessitate undertaking night-time site visits at a late hour. In such cases, the Team Leader may elect to defer the night time site visit, particularly if the personal safety of the Audit Team is considered to be an issue. When deferring the night-time site visit, the Audit report will be issued in draft form until such time as the night-time site visit is undertaken. Night time site visits may not be deferred for more than three months from the daytime site visit.

Audits completed by Audit Teams external to TfL must obtain the Client Organisations and TfL's Road Safety Audit Managers prior approval if it is decided the site does not require a visit during the hours of darkness. In such instances the reasons for not visiting the site at night must be stated within the Audit report. It should be noted that choosing not to visit the site at night should be adopted only in exceptional circumstances.

0170.2.15. Audit Team Visits Site

At each stage of the Audit process, all members of the Audit Team must visit the site of the scheme together during daylight hours. The Audit Team must consider the measures from the perspective of all the road users that may be anticipated to use the scheme. Where appropriate, a combination of driving, walking and cycling through the scheme may be used to assist their evaluation and ensure that they have a comprehensive understanding and appreciation of the scheme. The Audit Team should also consider the effects of different weather conditions and site conditions that may affect the operation of the scheme.

Where the Audit Team identifies an immediate safety concern, they should notify TfL via Customer Services as soon as reasonably practicable. This is particularly important for problems identified during the Stage 3 RSA process.

The Audit Team Leader liaises with the Client, Police and Specialists Advisors as necessary in order to ensure the Audit report can be appropriately completed. It may be necessary to revisit the site.

0170.2.16. Draft Audit Report

The Audit Team compiles the Audit report at pre-construction, post-construction or Stage 4 using TfL's report templates. The problems and recommendations in the

Audit Report should be set out in a logical sequence. The use of headed sections and the details of those headed sections are at the Audit Team's discretion. The Audit Team must avoid the use of superfluous headings for features or road users for which no issues have been identified.

For consistency, **all RSA reports must use TfL's specific report templates without exception**. It is intended that all suppliers provide reports following the same layout and structure to ensure consistency in delivery. It is acceptable to modify the visual appearance of the front cover to include corporate branding and internal quality assurance information as appropriate. However, the report structure must follow TfL's standard layout must remain unchanged.

RSAs must be concise and understandable by those without a background in the field. The use of complicated engineering terminology should be avoided.

Road Safety issues that are beyond the scope of the RSA but that the Audit Team believes should be brought to the attention of the Client Organisation, may be included within Section 4 of the RSA report. These issues could include areas where repair or renewal may be required, operational concerns or existing poor provision. Such issues should be clearly identified as being beyond the scope of the RSA and should not be integrated into the main Problem and Recommendation section (Section 3) of the report.

Section 4 is not intended as an opportunity to provide a record of inspection of the existing site conditions. Only significant issues should be included as a large number of superfluous issues within this Section may remove focus from the genuine issues of concern. Existing issues and problems outside the geographical extents of the scheme should not normally be included within Section 4, unless they impact directly on the operation or delivery of the scheme.

0170.2.17. Check Audit Report

The draft Audit report shall be distributed amongst other members of the Audit Team to check and provide comments. Any necessary changes to the Audit report will be made, but the Audit Team Leader shall take responsibility for the content of the Audit report.

0170.2.18. Approve Audit Report

The amended draft Audit report will be read by another person beyond the Audit Team, preferably with Road Safety Audit experience, to ensure that the Audit report is understandable by those without a background in the field. The Audit Report approver will not instruct the Audit Team to modify the technical content within Road Safety Audit reports.

The ensure the requirements of this procedure are met, TfL RSA reserves the right to request a draft copy of any Audit report to review prior to it being issued as Final. The Client will be informed as part of the verification process if a draft copy of the Audit is required.

0170.2.19. Issue Final Report

The Audit Team Leader issues the Final Audit report to the Client, and the Designer where appropriate.

A copy of all RSA reports must be sent to the TfL RSA Team at the same time it is issued to the Client in final at TfLSafetyAudit@tfl.gov.uk.

0170.2.20. Seek Response from Designer

The Client sends the Audit report to the Designers and seeks their response to the Audit.

0170.2.21. Respond to Audit Issues

The Designer responds to each problem identified in the Road Safety Audit and this is recorded in the Designer's response areas of the Audit report. The response will contain details of how the problems identified in the Audit report will be resolved. Where the Designer disagrees with the problems or recommendations identified in the Audit report, or decides that the solutions recommended are not appropriate, the response justifies the alternative action to be taken. The Audit report is then signed off by the Designer and sent to the Client for comments.

It should be noted that the Designer must demonstrate due consideration of the problems raised within the RSA report when responding to the RSA report.

0170.2.22. Provide Comments and Return to Audit Team

It is the responsibility of the Client to review the RSA report and ensure that each problem identified is given due consideration by the Designer, adding comments in the relevant sections of the RSA report as appropriate.

The RSA report incorporating the Designer's and Client Organisation's comments is signed off by the Client Organisation and a copy is forwarded to the Audit Team Leader for information.

The Audit report is not an opportunity for the Client and the Designer to document their differences. Any disagreements relating to the progression of the proposals should be discussed and agreed separately. The agreed way forward should be documented within the Designer's response section. The Client Organisation is encouraged to use the Client section to provide background information to complement the Designer's decisions that may be beneficial to those reading the Audit report.

The Client Organisation should familiarise themselves with the requirements of CDM when issuing instructions to the Designer that could constitute a design decision.

The Client Organisation commissions the Design Organisation or others if applicable, in respect of changes required to the scheme arising from the Audit response. A scheme should be submitted for Audit again if significant changes are made to it as a result of an Audit.

The response sections of the Audit report must be completed before the next stage in the scheme's development is begun.

0170.2.23. Save Completed Audit Report and Responses

It is the responsibility of the Client Organisation to retain a copy of the signed final Road Safety Audit Report incorporating the Road Safety Audit Response. Filing and retention arrangements for Road Safety Audits must pay due regard to complying with the Freedom of Information Act. It is the responsibility of any Client Organisation to ensure all Road Safety Audits are retained in accordance with their own Policy.

Outputs:

- Road Safety Audit Report with Designer's Responses and Client Comments

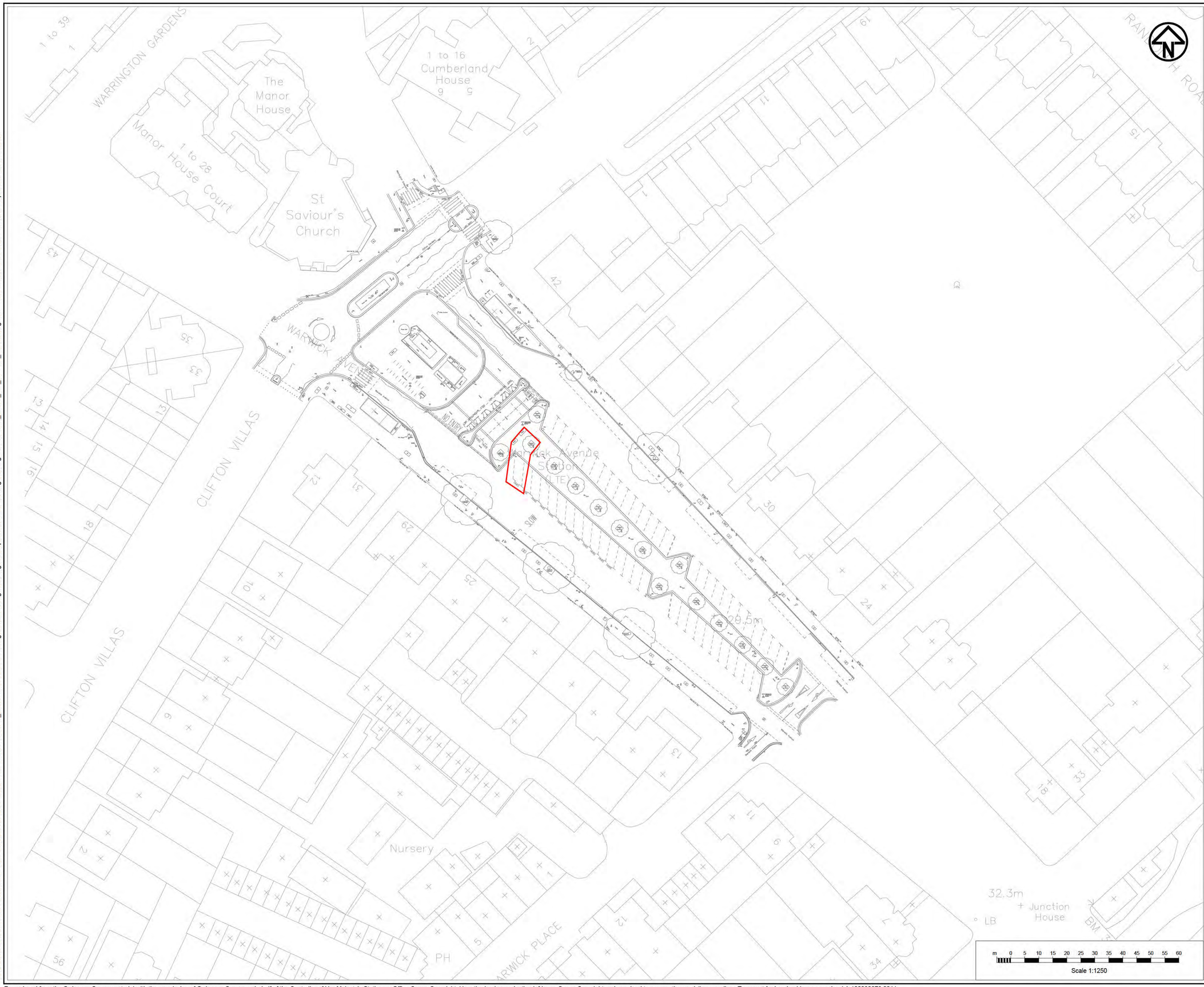
7 Relevant Documentation

- Auditor Verification Form
- Collision Risk in Greater London
- External Audit Brief Checklist
- External Post-Construction Audit Report
- External Pre-Construction Audit Report
- External Stage 4 Audit Report
- Glossary
- Internal Audit Brief Checklist
- Internal Post-Construction Audit Report
- Internal Pre-Construction Audit Report
- Internal Stage 4 Audit Report
- Non-Audit Note

NB: External Parties can also email TfLSafetyAudit@tfl.gov.uk to obtain any relevant documentation.

8 Document Control

Issue	Date	Change Summary	Author	Checker	Approver
Previous version 9 now archived and migrated to new SharePoint platform as version 1 on 26/02/16. Contact QMS@tfl.gov.ukto access archived versions.					
1	26/02/2016	Update onto new template. Process updated following revision.	L Pan (Highways Specialist Engineer)	B Schoenmakers (AMD QMS Support)	A Coventry (Road Safety Audit Manager)



Notes

1. All dimensions are in metres unless otherwise stated. Dimensions shown are for illustrative purposes. Contractor is to refer to relevant drawings for setting out details.
2. Do not scale from this drawing.
3. Layouts are a combination of both topographical survey and Ordnance Survey. Where topographical survey information is not provided on drawings, all dimensions shown have been measured on site. Clarification and discrepancies to be brought to the attention of the Site Engineer.

Key:

Application Site

REV	REV. DATE	PURPOSE OF REVISION	DRAWN	CHKD	APPRVD
06	12/09/2018	VIEWPORT REMOVED	RCM	AG	NM
05	04/06/2018	MINNOR AMENDMENT	UF	RCM	NM
04	21/05/2018	RELOCATE FP & PLANT NEW TREE	UF	RCM	NM
03	09/05/2018	RELOCATE FP TO NEW LOCATION	UF	RCM	NM
02	08/05/2018	NEW 2 no. PARKING BAYS	UF	RCM	NM
01	01/05/2018	PROPOSED NEW EV BAY BUILT-OUT	UF	RCM	NM
00	05/04/2018	FOR PLANNING APPLICATION	RCM	UF	NM

RINGWAY JACOBS
integrated engineering

LONDON HIGHWAYS ALLIANCE

FOR PLANNING ONLY

Project

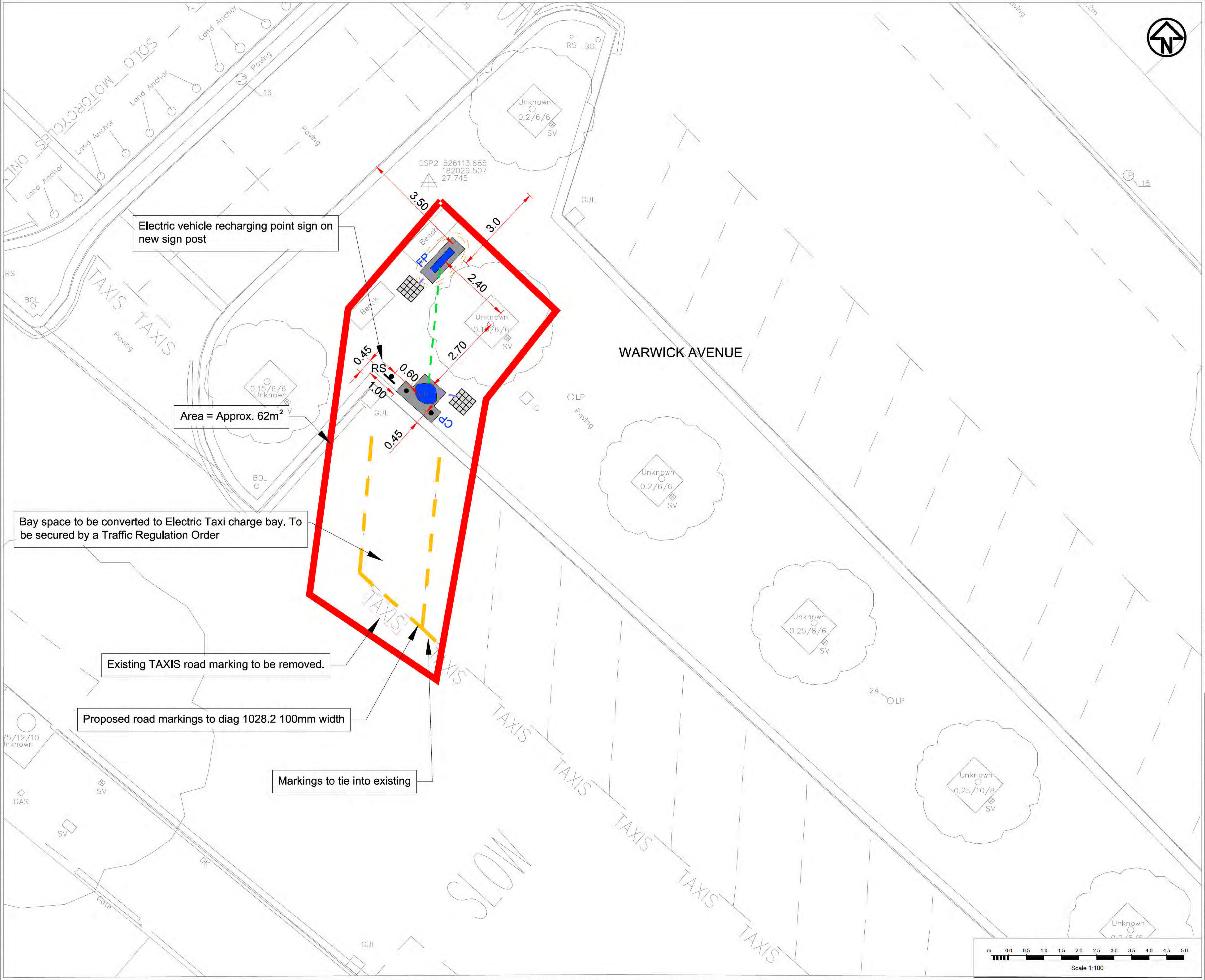
RAPID CHARGING INFRASTRUCTURE
WESTMINSTER - SITE ID: 174
OPPOSITE 27 WARWICK AVENUE

Drawing Title

SITE LOCATION PLAN

Drawing Status	FOR PLANNING APPLICATION	
Scale	1:1250 @ A3	DO NOT SCALE
Ringway Jacobs No.	NE2017_0190P	
Client No.	NE2017_0190P	
Drawing Number	NE2017_0190P_174_101	Rev 06

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.



File location: \\UKBRISTCSFP0000\TfL\01 LoHAC\03 LoHAC Schemes\05. Year 5 - 2017\NE2017_0190P - RCI Batch 9 Investigations\02 Design Drawings and Specification\03 Working Drawings\174\NE2017_0190P_174_101-103_REV06.dwg-103 User: Roberto Merchan Time: 12 September 2018 14:36:21

Notes

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2. Do not scale from this drawing.
3. Layouts are a combination of both topographical survey and Ordnance Survey. Where topographical survey information is not provided on drawings, all dimensions shown have been measured on site. Clarification and discrepancies to be brought to the attention of the Site Engineer.

Key:

- CP — Proposed Rapid Charging Point.
- FP — Proposed Feeder Pillar.
- Proposed earth mat, 600mm x 600mm with marconite surround. Location to be confirmed on site.
- RS — Proposed road sign.
- Proposed Electric Taxi bay 100mm wide intermittent line in Yellow.
- Proposed parking bay 100mm wide intermittent line in white.
- Proposed ducting 100mm dia in black at 450mm depth. Location to be determined on site.
- Proposed flexi-duct Ø50mm black at 450mm depth with 16mm² copper cable for earthing. Location to be confirmed on site.
- Existing Road Markings to be removed by hydroblasting.
- Application Site.
- Bollard

REV	REV. DATE	PURPOSE OF REVISION	DRAWN	CHKD	APPRVD
06	12/09/2018	VIEWPORT REMOVED	RCM	AG	NM
05	04/06/2018	MINNOR AMENDMENT	UF	RCM	NM
04	21/05/2018	RELOCATE FP & PLANT NEW TREE	UF	RCM	NM
03	09/05/2018	RELOCATE FP TO NEW LOCATION	UF	RCM	NM
02	08/05/2018	NEW 2 no. PARKING BAYS	UF	RCM	NM
01	01/05/2018	PROPOSED NEW EV BAY BUILT-OUT	UF	RCM	NM
00	05/04/2018	FOR PLANNING APPLICATION	RCM	UF	NM

RINGWAY JACOBS

FOR PLANNING ONLY

Project
RAPID CHARGING INFRASTRUCTURE
WESTMINSTER - SITE ID: 174
OPPOSITE 27 WARWICK AVENUE

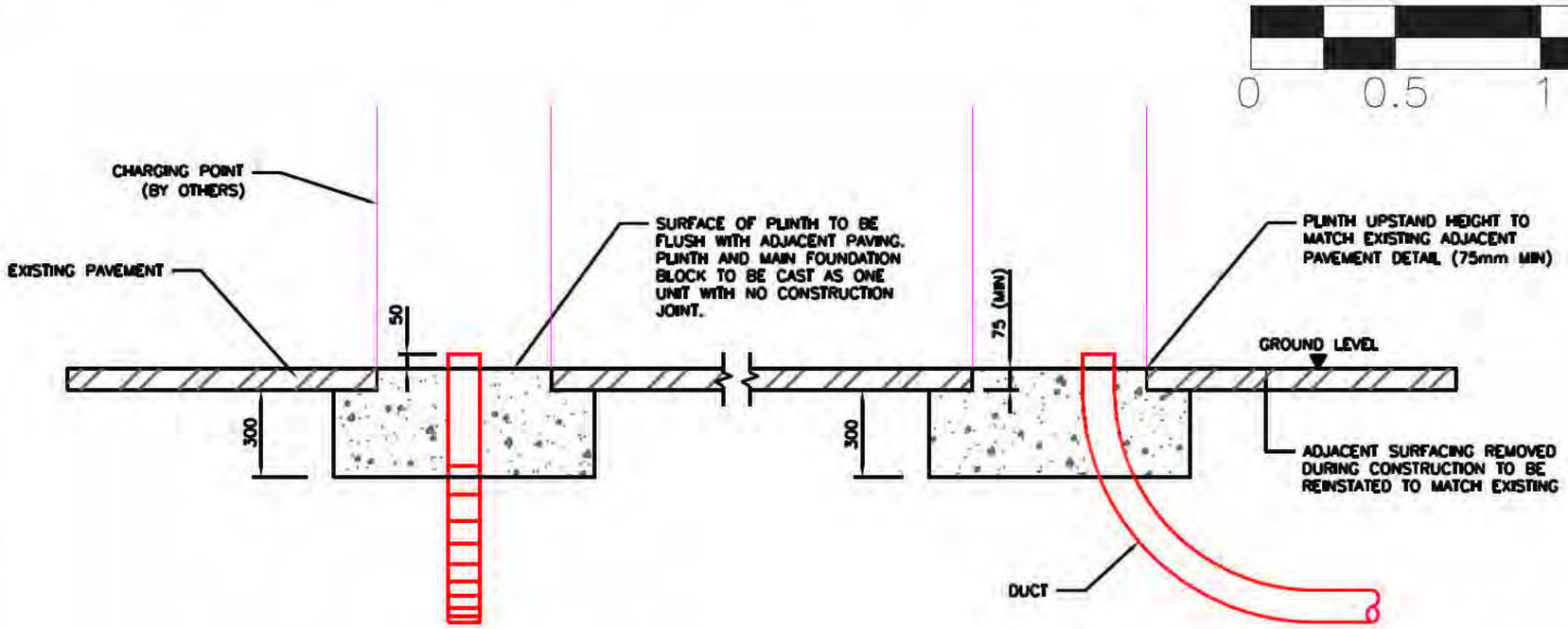
Drawing Title
PROPOSED LAYOUT

Drawing Status
FOR PLANNING APPLICATION

Scale	1:100 @ A3	DO NOT SCALE
Ringway Jacobs No.	NE2017_0190P	
Client No.	NE2017_0190P	

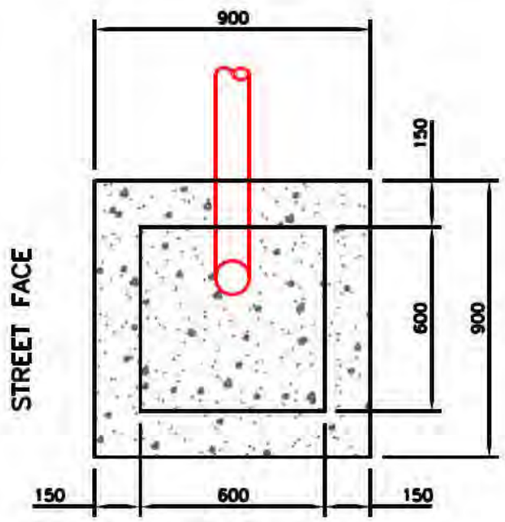
Drawing Number: NE2017_0190P_174_103 Rev: 06

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.



ELEVATION
SCALE 1:20

END VIEW
SCALE 1:20



PLAN
SCALE 1:20

DUCT LOCATION PLAN
SCALE 1:20

0 0.5 1 2 5

NOTES:

FOUNDATION CONCRETE TO BE CEM I CONCRETE OF COMPRESSIVE STRENGTH CLASS C30/37 WITH A MAX. WATER:CEMENT RATIO OF 0.5.

TOP SURFACE OF THE CONCRETE TO HAVE A CLASS U3 FINISH. BURIED SIDES OF THE CONCRETE TO HAVE A CLASS F1 FINISH.

THE DUCT SHALL BE POSITIONED IN THE FOUNDATION AS SHOWN. DUCTING DIRECTION SHALL BE AS GIVEN ON THE LAYOUT DRAWINGS

SUBGRADE AT FORMATION LEVEL TO BE CLEAN AND FREE FROM LOOSE MATERIAL OR DEBRIS. SUBGRADE TO HAVE A MINIMUM BEARING CAPACITY OF 30kPo. UNSUITABLE MATERIAL SHALL BE EXCAVATED AND REPLACED WITH LEAN MIX CONCRETE OR CLAUSE 803 MATERIAL, AS DIRECTED BY THE ENGINEER.

DESIGN ASSUMES MINIMAL HORIZONTAL LOADS. IF HORIZONTAL LOADS OTHER THAN WIND LOADING OR LATERAL LOADING OF 0.9kN AT 1.2m ABOVE GROUND LEVEL ARE EXPECTED PLEASE CONSULT THE ENGINEER.

SAMPLING AND TESTING FOR COMPRESSIVE STRENGTH TO BE CARRIED OUT IN ACCORDANCE WITH ANNEX B OF BS EN 206-1 AND ANNEX B OF BS 8500-1. 1 SAMPLE OF 3 CUBES IS TO BE TAKEN FOR EACH FOUNDATION. 1 CUBE IS TO BE TESTED AT 7 DAYS AND 2 CUBES AT 28 DAYS.

SAMPLING AND TESTING FOR CONSISTENCY (SLUMP TEST) IS TO BE CARRIED OUT IN ACCORDANCE WITH ANNEX B OF BS 8500-1. 1 SLUMP TEST IS TO BE CARRIED OUT FOR EACH CONCRETE DELIVERY.

ANCHOR BOLTS FOR CHARGE POINT CABINET ARE TO BE POST FIXED BY OTHERS.

Rev.	Date	Revision Description	Dm.	Prod.	Ver.	App.
000	08/2017	Initial Version	BC	BC	JM	ES

Purpose of issue - Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

Energy for generations
ESB Innovation, Two Gateway, East Wall Road, Dublin D03 A995 Ireland. **Tel:** +353 (0)1 676 5831 **Fax:** +353 (0)1 703 8088
Email: ecars@esb.ie **Web:** www.esb.ie

Client

Project: Transport for London RCP Framework

Contract: -

Production Unit: ESB eCars

Drawing Title: Rapid Charge Point Installation
Efacec QC45 Foundation

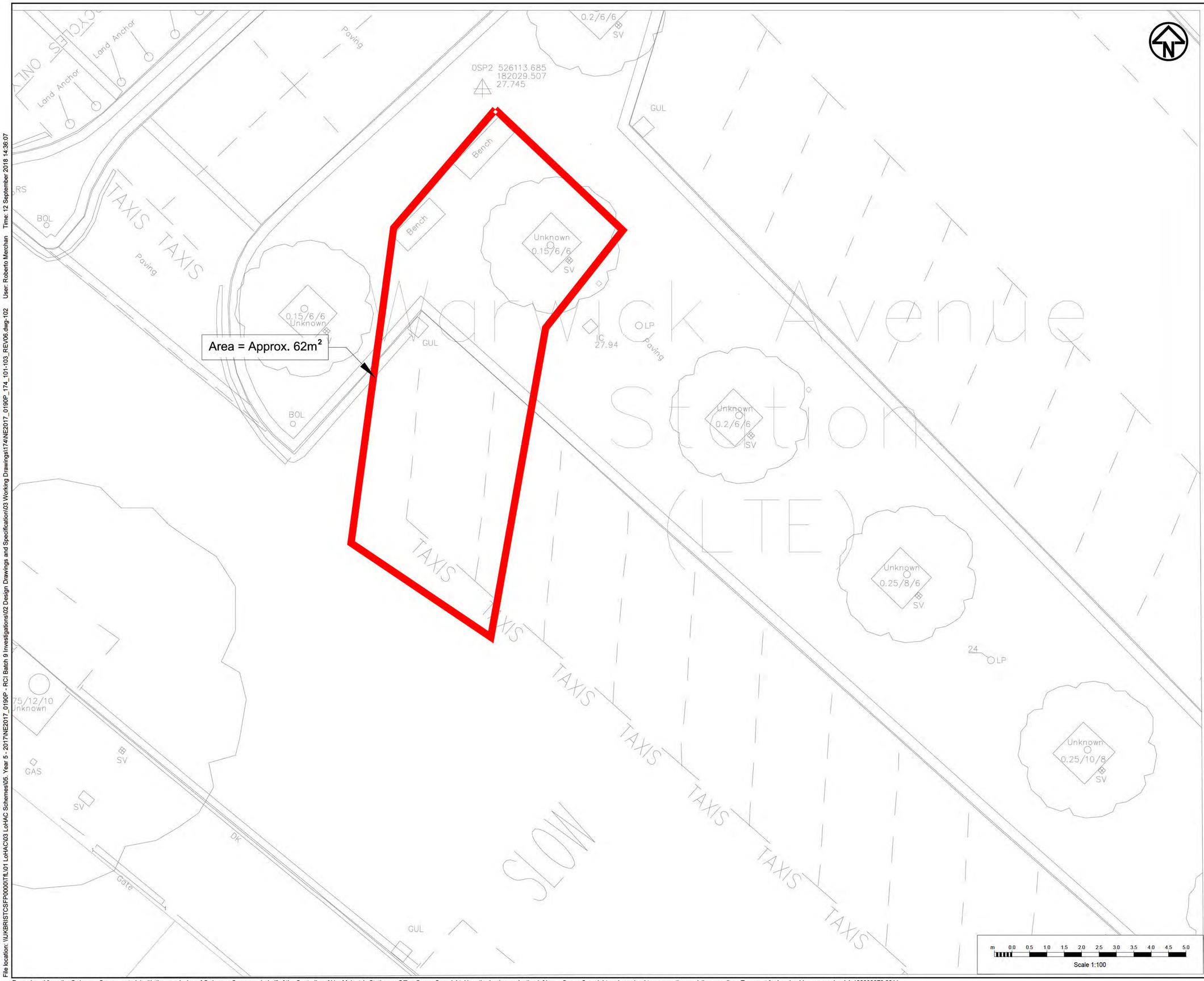
Detailed Civil Design

Standard Drawing

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
B.Carroll	B.Carroll	J. Mooney	E. Silke	15/08/2017

CLIENT REF	No. of Shts	SIZE	SCALE
Client Reference No.	1	A3	1:20

Drawing Number: ESB-001-011-000 SHEET REV



m 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Scale 1:100

Notes

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Key:

- Application Site
- Existing Road Marking
- LP — Existing Lamp Column
- RS — Existing Road Sign
- GUL — Existing Gully
- Existing Bike Stands
- BOX — Existing Box
- XX — Statutory undertakers cover (text may show IC, TP, WM, FH, SV, CATV or GAS)

REV	REV. DATE	PURPOSE OF REVISION	DRAWN	CHKD	APPRVD
06	12/09/2018	VIEWPORT REMOVED	RCM	AG	NM
05	04/06/2018	MINNOR AMENDMENT	UF	RCM	NM
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00	05/04/2018	FOR PLANNING APPLICATION	RCM	UF	NM

RINGWAY JACOBS
integrated with LONDON HIGHWAYS ALLIANCE

FOR PLANNING ONLY

Project

RAPID CHARGING INFRASTRUCTURE
WESTMINSTER - SITE ID: 174
OPPOSITE 27 WARWICK AVENUE

Drawing Title

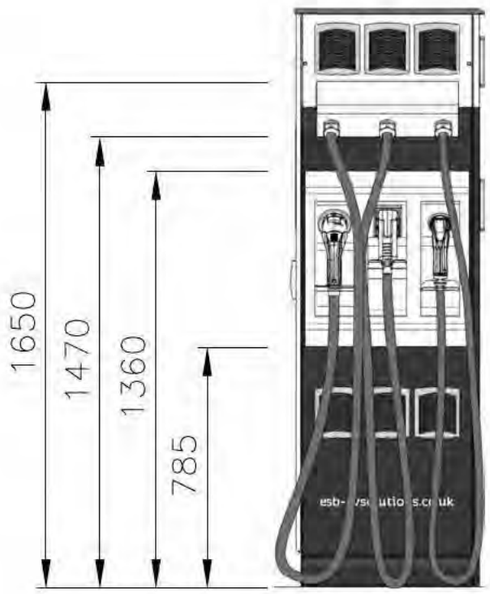
EXISTING LAYOUT

Drawing Status: FOR PLANNING APPLICATION

Scale	1:100 @ A3	DO NOT SCALE
Ringway Jacobs No.	NE2017_0190P	
Client No.	NE2017_0190P	
Drawing Number	NE2017_0190P_174_102	Rev 06

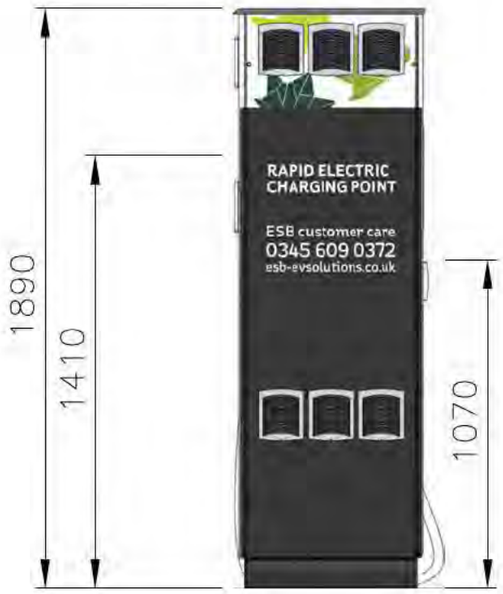
SIDE A
(UI)

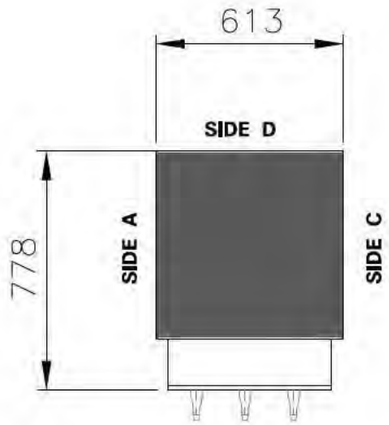
SIDE B



SIDE C

SIDE D





RAPID ELECTRIC CHARGING POINT
CLEANERAIR FOR LONDON
MAYOR OF LONDON
City of Westminster
TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

MATERIALS

Galvanized mild steel coated in a protective paint as standard.
These comply with the paint protection rating of ISO12944-2 class C4M.
Branded PVC Film Wrap Orajet-3651, Anti-Graffiti Coating.

CHARGE POINT
POLYESTER POWDER COATING
RAL 9005 (BLACK)

0 0.5 1 2 5

Rev.	Date	Revision Description	Drn.	Prod.	Ver.	App.
003	07/2018	Branding revised	RW	RW	BC	ES
002	01/2018	Branding revised	RW	RW	BC	ES
001	10/2017	Branding revised	RB	RB	BC	ES
000	09/2017	Initial Version	BC	BC	MOD	ES

Purpose of issue - Preliminary unless indicated
Tender ☒ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

Energy for generations
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Email: ecars@esb.ie **Web:** www.esb.ie

Client

Project: Transport for London

Contract: SS/CON/3158-007

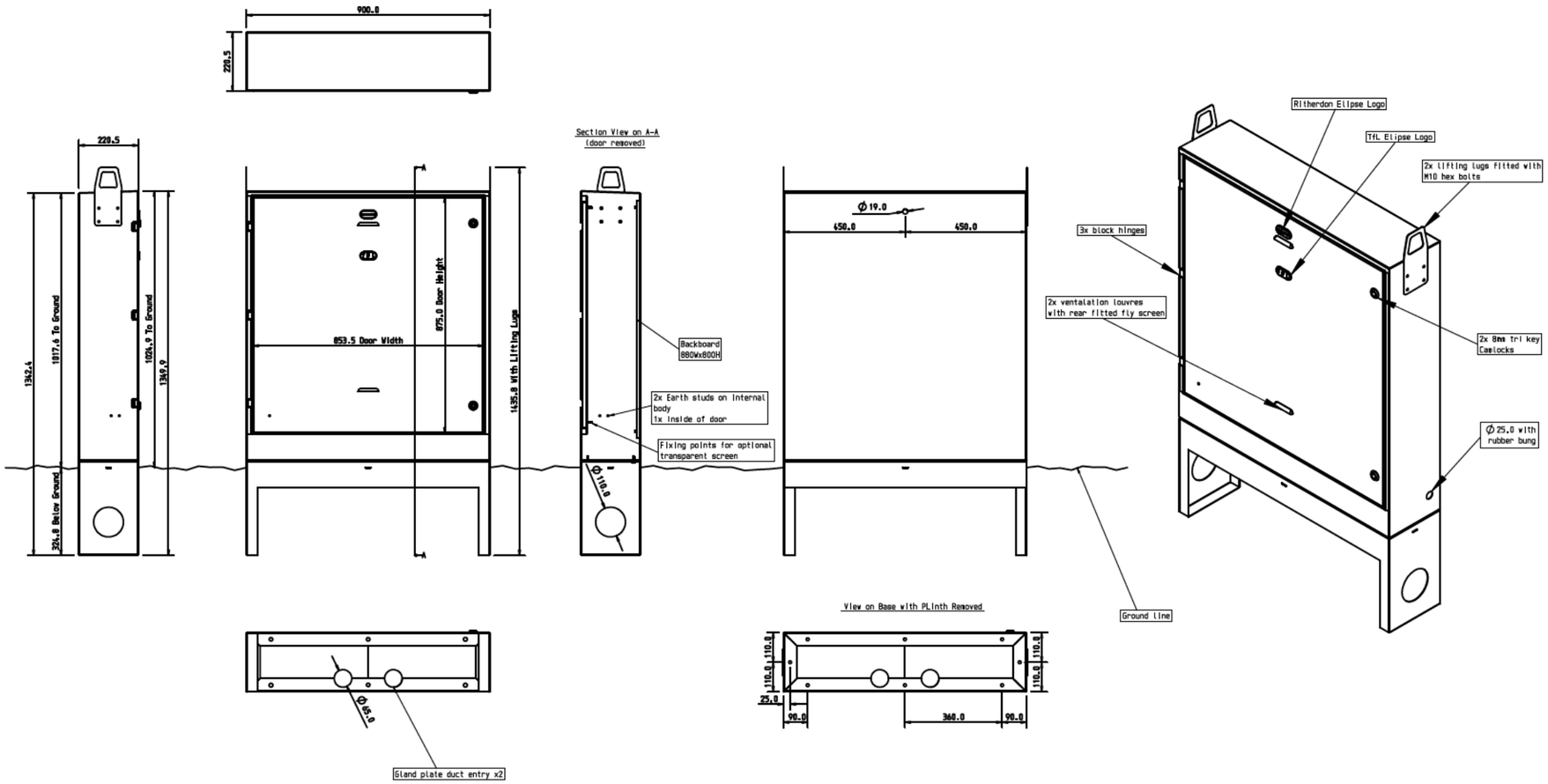
Production Unit: ESB eCars

Drawing Title: Rapid Charge Point Installation
Transport for London
Efacec QC45 Scale Design Drawings
3 Connector Multi-Standard
Elevation View

DRAWN	PRODUCED	VERIFIED	APPROVED	APPROVAL DATE
R.Wilson	R.Wilson	B.Carroll	E.Silke	13/07/2018

CLIENT REF	No. of Shts	SIZE	SCALE
	1	A3	1:20

Drawing Number: ESB-001-010-003
SHEET REV



DRAWN	Josh Eastham	DATE	23 . 08 . 2017
CHECKED	Mark Blease	DATE	23 . 08 . 2017
APPROVED	Mark Blease	DATE	23 . 08 . 2017

ISSUE	DATE	MOD. NO.	DRN

RITHERDON

TOLERANCES
WHOLE NUMBERS +/- 0.5
1 DECIMAL PLACE +/- 0.2
HOLES +/- 0.15
UNLESS OTHERWISE STATED

ALL OUTSIDE SIZES

MATERIAL: Stainless Steel

FINISH: RAL 9005 Black Anti-Graffiti Leatherette

TITLE: TfL RH900 Type C General Arrangment

SCALE	DRAWING NO.	[SHEET]	ISSUE
1:20 at A3	S 9840	2	-

Transport for London

INSERT DATE HERE

NOTICE UNDER SECTION 17 OF THE LONDON LOCAL AUTHORITIES AND TRANSPORT FOR LONDON ACT 2013

Transport for London under section 16(2) of the London Local Authorities and Transport for London Act 2013 is seeking to grant (INSERT CONCESSIONAIRE HERE) permission to provide and operate charging apparatus for electrically powered motor vehicles at (INSERT ADDRESS HERE). Specifically, the charging apparatus scheme is to involve the installation of (INSERT PROPOSAL DETAILS HERE).

INSERT PLAN EXTRACT HERE

In accordance with section 17(5) of the London Local Authorities and Transport for London Act 2013, representations in respect of the proposed scheme may be made via the following:

Email: ConsentsTeam@tfl.gov.uk

Postal Address: Consents Team
4th Floor, 4Y6
197 Blackfriars Rd,
Palestra, Southwark,
London SE1 8NJ

Representations are to be made through the period commencing DAY MONTH YEAR and ending DAY MONTH YEAR inclusive. All representations will be considered by Transport for London.

Standard

S1770 A1 Operational Technology Cyber Security - Governance

Contents

1 Purpose

This standard describes the governance organisation and associated roles and responsibilities for the delivery and assurance of cyber security for Operational Technology (OT) in Transport for London (TfL).

2 Scope

This standard applies to TfL staff and partners with responsibility for OT whenever a decision is being made relating to the cyber security of OT.

2.1 Definition of Operational Technology (OT)

Operational Technology is a collection of personnel, processes, hardware and software that can affect or influence the safe, secure and reliable operation of a physical process or asset.

These include, but are not limited to:

- Signalling for rail, road and marine transport, train management, Supervisory Control, and Data Acquisition (SCADA), building management and access control, Programmable Logic Controllers (PLCs), Remote Terminal Units (RTUs), intelligent electronic devices, networked electronic sensing and control, and monitoring and diagnostic systems.

In this context, process control systems include basic process control system and Safety-Instrumented System (SIS) functions, whether they are physically separate or integrated.

- Associated information systems such as advanced control, dedicated equipment monitors, graphical interfaces, process historians, and plant information management systems.
- Associated internal, human, network, or machine interfaces used to provide monitoring, control, and safety operations functionality.

As an owner and operator of physical transport assets, TfL has an extensive estate of OT systems and devices across a wide range of its underground and surface operations.

There are OT systems which are clearly OT such as traction power, tunnel ventilation, fire detection, and systems which are clearly IT such as HR and email. However, there are systems where the distinction is not as clear, such as CCTV and ticket barriers.

3 Requirements

This document defines the mandatory requirements for the governance and assurance of OT Cyber Security through internal processes, risk management, supply chain assurance and training.

It is aligned to the Network and Information Systems (NIS) Regulations (2018) and the International Electrotechnical Commission IEC 62443 series of standards for OT cyber security, in particular IEC 62443-3-3 system security requirements and security levels. It forms part of a wider framework of standards and guidance (see

R1770) for OT cyber security in TfL. The standard should be read in tandem with the associated guidance (G1770).

This standard is subordinate to P006 Operational Technology Cyber Security.

The minimum cyber security baseline[1] defined within S1771 Operational Technology Cyber Security – Projects and Upgrades is the set of minimum cyber security requirements for ALL new or upgraded OT which support TfL services. This baseline also represents the good practice approach which should be adopted for existing OT which supports TfL services, recognising that existing systems may not have been designed with these requirements in mind and therefore may not always support the tools or processes. The governance and assurance process must enforce the adoption of the minimum baseline requirements where possible and practical, with non-adoption risk assessed, justified, and documented.

The OT cyber security minimum baseline is intended to prevent the unauthorised disclosure of information to an entity actively searching for it using simple means with low resources, generic skills, and low motivation. These requirements are applicable to all OT assets including, but not limited to, Intelligent End Devices, Remote Terminal Units, Microcontrollers, Programmable Logic Controllers, Sensors, Actuators, Servers, Workstations, and Network Devices.

Each system must be subject to a risk assessment to determine its cyber risk and to identify any additional controls required above that of the established minimum-security baseline or concessions which might be necessary where the minimum baseline cannot be met. The risk assessment must be completed as part of the project lifecycle and must be maintained through the life of the system. Where a system does not have a cyber security risk assessment, the System Owner (as defined in Section 5) must ensure that one is completed as soon as possible.

A formal process, for example S1641 Concessions to Standards for LU, shall be used to manage any concessions or non-compliance to the minimum baseline cyber security requirements. The ongoing management of these concessions, as well as the status of any temporary mitigation measures, shall be a key element of any governance and assurance processes. Any risks arising from a concession must have be registered in the risk register, accepted, and owned by the system owner.

This document is intended to direct staff and partners working for TfL to understand and maintain the governance and assurance processes to protect against cyber threats, detect a cyber incident and respond to a cyber incident which could impact the OT which supports the delivery of TfL services safely and reliably.

Note that some requirements of the minimum cyber security baseline will have to be supported by organisational processes or shared services, and the scope of any governance or assurance process will have to be sufficiently broad to ensure that these supporting processes are effective.

[1] This is derived from the DfT Minimum Cyber Security Baseline

For example, if an individual move's role, there needs to be recognition at an organisational level that their access privileges must be reviewed, but the system must have appropriate mechanisms to ensure access controls can be enforced and updated.

It is important to note that this document complements Operational Technology Cyber Security – Projects and Upgrades (S1771) Operational Technology Cyber Security – Operations and Maintenance (S1772) and governance processes exist to ensure that the minimum cyber security baseline is maintained through the life of the system, that risks are updated regularly, and mitigations are managed to reduce risk to a level that is as low as reasonably practical and in line with risk tolerance.

Note that the governance of cyber security, in particular roles and responsibilities, will have to be adapted to fit the various business units and organisational structures across TfL. Each business unit will need to understand and establish how the management of cyber security best fits their own organisational structure.

Cyber security considerations or controls are grouped according to the following security principles and the components of each phase are explained in the following sections.

3.1 Governance

The requirement is that appropriate management policies and processes shall be implemented and maintained to govern TfL's approach to the security of network and information systems and ensure that responsibility is held at the appropriate level of the organisation.

The underlying principle is that TfL has appropriate management policies and processes in place to govern its approach to the security of network and information systems.

3.2 Risk Management

The requirement is that effective internal processes shall be implemented for managing risks to the security of network and information systems related to the delivery of essential services and communicating associated activities.

The underlying principle is that TfL takes appropriate steps to identify, assess and understand security risks to the network and information systems supporting the delivery of essential services. This includes an overall organisational approach to risk management.

3.3 Asset Management

The requirement is that effective internal processes shall be implemented for managing assets which form the OT systems which support the delivery of TfL services.

The underlying principle is that TfL has determined and understands everything required to deliver, maintain, or support networks and information systems for