



C422 – Tottenham Court Road
Urban Realm Design Risk Management Schedule
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Revision:	Date:	Prepared by:	Checked by:	Approved by:	Reason for Issue:
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2a. Stakeholder Review Required? YES NO

Stakeholder submission required: LU NR DLR RfL LO Other: _____
 Purpose of submission: For no objection For information

This document has been reviewed by the following individual for coordination, compliance, integration and acceptance and is acceptable for transmission to the above stakeholder for the above stated purpose.

Sign: _____ Role: _____ Name: _____ Date: _____
 Sign: _____ Role: _____ Name: _____ Date: _____

2b. Review by Stakeholder (if required):

Stakeholder Organisation	Job Title	Name	Signature	Date	Acceptance
					<input type="checkbox"/>
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					<input type="checkbox"/>

3. Acceptance by Crossrail:

	Crossrail Review and Acceptance Decal	
	This decal is to be used for submitted documents requiring acceptance by Crossrail.	
<input type="checkbox"/>	Code 1. Accepted. Work May Proceed	Reviewed / Accepted by: Name: [Redacted] Position: [Redacted] Date: [Redacted] Signature: [Redacted]
<input type="checkbox"/>	Code 2. Not Accepted. Revise and resubmit. Work may proceed subject to incorporation of changes indicated	
<input type="checkbox"/>	Code 3. Not Accepted. Revise and resubmit. Work may not proceed	
<input checked="" type="checkbox"/>	Code 4. Received for information only. Receipt is confirmed	
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Document History (Continued):

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1 Introduction

1.1 Purpose of the Document

To issue the Design Risk Management Schedule for the Urban Realm and Highway Works.

Guidance notes (see guidance notes page for more details)
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 * Risks should be considered in a logical sequence relating to the location/operational environment, constructability/installability, operability (normal/emergency), maintainability (inc routine cleaning, replacement, etc), and alteration/decommissioning/dismantling/demolition, and should be categorised against those headings.
 CIRIA guidance documents C662, C663, C611, C607, etc provide a useful checklist and detailed guidance on the identification of risks to be considered during design and how those risks might be addressed - see detailed guidance notes for more details
 † Significant residual risks are those which are unusual, not obvious, difficult to manage, or where critical design assumptions apply. The documentation by designers of residual risks that cover well-known and understood hazards should be avoided.

Ref	Risk Category* (and Phase where appropriate, eg. location/environment, construction, operation, maintenance, alteration/demolition)	Work Element/Location (where appropriate)	Hazard or Risk Issue Identified	Risk Management Owner	Design ERIC Action Required (eg. hazard elimination/risk mitigation action, information to be provided to others)	Significant Temporary Works Requirements/Management Arrangements and/or any Special Erection/Installation Sequences or Requirements	Design Action Status/Final Resolution Notes (eg. traceability of ERIC action, communication of significant residual risk, critical design criteria, etc.)	Significant Residual Risk [†] (Y/N)	Date Logged/ Reviewed	Raised By
Location/Environment										
L01	Location/Environment	Works within Existing Highway	Working on live roads / footways. Traffic Management and segregation of public and site pedestrians, and public and construction traffic.	Principal Contractor	Pedestrian and vehicle access requirements to be detailed on the drawings	Principal Contractor to prepare RAMS for traffic management proposals	Refer to relevant Traffic Management Plan drawings	No	06/01/2017	WSP PB
L02	Location/Environment	All construction works/Site wide	Dealing with the public / local residents inc. language barriers. Not all local residents speak English. Possible abuse and assault from the public / squatters and their animals.	Principal Contractor	N/A	All temporary signage used to be clear and use symbols as much as possible. Site staff to be briefed on public liaison / interfacing and how to deal with a difficult situation should one arise. A person to be nominated on site to speak with the public / residents to keep them informed and intervene if an issue arises.	Principal Contractor documentation	No	06/01/2017	WSP PB
L03	Location/Environment	All construction works/Site wide	Working in close proximity to adjacent highway and building schemes	Principal Contractor	Identify work area boundaries of adjacent schemes to check if abutting or overlapping. Adjust own work area boundary if possible. Access and coordination requirements to be detailed on a drawing.	Principal Contractor to liaise accordingly with the relevant contractors of the adjacent schemes. RAMS for traffic management proposals to take these adjacent works into account.	Refer to C422 site extents drawings and ensure coordination with adjacent sites is maintained	Yes	06/01/2017	WSP PB
Construction/Installation										
C01	Construction/Installation	Works within Existing Highway	Working on live roads / footways. Traffic Management and segregation of public and site pedestrians, and public and construction traffic.	Principal Contractor	Pedestrian and vehicle access requirements to be detailed on the drawings	Principal Contractor to prepare RAMS for traffic management proposals	Refer to relevant Traffic Management Plan drawings	No	06/01/2017	WSP PB
C02	Construction/Installation	All construction works/Site wide	Dealing with the public / local residents inc. language barriers. Not all local residents speak English. Possible abuse and assault from the public / squatters and their animals.	Principal Contractor	N/A	All temporary signage used to be clear and use symbols as much as possible. Site staff to be briefed on public liaison / interfacing and how to deal with a difficult situation should one arise. A person to be nominated on site to speak with the public / residents to keep them informed and intervene if an issue arises.	Principal Contractor documentation	No	06/01/2017	WSP PB
C03	Construction/Installation	All construction works/Site wide	Working in close proximity to adjacent highway and building schemes	Principal Contractor	Identify work area boundaries of adjacent schemes to check if abutting or overlapping. Adjust own work area boundary if possible. Access and coordination requirements to be detailed on a drawing.	Principal Contractor to liaise accordingly with the relevant contractors of the adjacent schemes. RAMS for traffic management proposals to take these adjacent works into account.	Refer to C422 site extents drawings and ensure coordination with adjacent plots are maintained	Yes	06/01/2017	WSP PB
C04	Construction/Installation	All construction works/Site wide	The location of existing utilities. There is the potential risk that lowering of utilities may be required.	Designer	Create 3-D model of all underground obstructions and utilise to coordinate proposed services and drainage works. Advise the Employer on the need for a detailed services survey including the careful hand digging of trial holes. Add a warning note to relevant drawings.	Diversions of existing services may be required to enable the proposed scheme.	3D model of the existing and as built utilities has been developed by the Designer and presented to the Principal Contractor in the form of a series of plans and sections, and as a NavisWorks model.	Yes	19/05/2017	WSP PB
C05	Construction/Installation	All construction works/Site wide	Existing utility/drainage covers may need to be realigned to avoid clashes with proposed kerblines/drainage/street furniture, and raised or lowered to suit new levels. In some cases reconstruction of chambers/pits may be required where there is no scope within the extents of the chamber to move the cover.	Designer	Create a set of drawings highlighting the clashes between existing covers and the proposed works. Advise the Principal Contractor on the need for a survey of existing covers on site so that the actual location of the covers can be verified and the clash confirmed.	Diversions of existing services may be required to enable the proposed scheme.	A set of Utility Cover Clash drawings has been created by the Designer. The Principal Contractor is currently undertaking cover surveys to determine what covers remain and their actual location. The Designer will show the remaining covers on the General Arrangement and Site Clearance drawings and all surveyed existing covers will be logged in a schedule in the Highways Specification.	Yes	19/05/2017	WSP PB
C06	Construction/Installation	Drainage works	Connection of drainage to deep public sewers.	Designer	Avoid new connections wherever possible by reusing existing existing drainage connections.	Deep connections may require special construction techniques.	Drainage amended following feedback from the Contractor on site conditions to avoid deep drainage wherever possible.	Yes	19/05/2017	WSP PB
C07	Construction/Installation	Groundworks	Unidentified utilities within the works boundary	Groundworks Contractor	Reduce likelihood by obtaining latest utilities plans and results of utilities survey. Use non-intrusive service detection methods prior to breaking ground. Vigilance during construction for signs of backfilled excavations or trenches.	Principal Contractor to coordinate utilities works.	Refer to the existing topographic surveys, advanced utilities diversions drawings and proposed utility layout drawings for details of existing and proposed services layouts. Warning note added to drawings.	Yes	06/01/2017	WSP PB

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C08	Construction/Installation	Groundworks	Shallow basements / vaults / structures present beneath footway / highway	Groundworks Contractor	Urban realm design to incorporate internal survey of known structures and apply an assumed wall thickness of 337mm to ensure all installations avoid any clashes where reasonably practicable	Principal Contractor to coordinate utilities works including any known sub-surface structures	Refer to the existing internal basement and vault 3D model along with existing surface topographic surveys, advanced utilities diversions drawings and proposed utility layout drawings for details of existing and proposed services layouts. Warning note added to drawings. Refer to C422-LAO-C-RGN-N105_WS089-50005 'Stage D+ Report on Cellars' for further details.	Yes	06/01/2017	WSP PB
C09	Construction/Installation	Groundworks	Unidentified contamination and/or asbestos encountered on site	Groundworks Contractor	Undertake Ground Investigation to determine the likelihood	Principal Contractor to prepare RAMS	Refer to the relevant ground investigation report	Yes	06/01/2017	WSP PB
C10	Construction/Installation	Groundworks	Instability of temporary excavations	Groundworks Contractor	Ground investigation data to be used to inform temporary works design.	Principal Designer to liaise with Principal Contractor	Refer to the relevant ground investigation report	No	06/01/2017	WSP PB
C11	Construction/Installation	Groundworks	Geotechnical design recommendations are not taken through to construction	Principal Contractor	Groundworks to take account of ground conditions	N/A	Refer to the relevant ground investigation report	No	06/01/2017	WSP PB
C12	Construction/Installation	Drainage works	Connection into live sewer	Principal Contractor	Identify connections to live sewers on drawings	Principal Contractor to prepare RAMS	Refer to C422 drainage drawings	No	06/01/2017	WSP PB
C13	Construction	Drainage works	Proposed sewers to be constructed in existing highway	Groundworks Contractor	Drainage designers to minimise the amount of construction required in or adjacent to live carriageways. If construction of this type of activity can't be eliminated then the construction methodology should be considered within the design to eliminate any possible risks	Temporary works may need to be provided for trench support. A traffic management plan shall be produced by the main contractor to demonstrate that hazards to the construction workers and road users have been minimised	Refer to C422 drainage drawings	No	06/01/2017	WSP PB
C14	Construction	Utilities	Lead in time required to divert services	Principal Contractor	Identify required diversions in preparation for utility install and remaining urban realm works	Advanced utility diversion works to be undertaken prior to urban realm works to ensure programme is unaffected	Principal Contractor to liaise with utility companies where necessary to arrange diversions prior to progression of urban realm works	No	06/01/2017	WSP PB
C15	Construction	Works within Existing Highway	Working on live roads / footways. Traffic Management and segregation of public and site pedestrians, and public and construction traffic.	Principal Contractor	Pedestrian and vehicle access requirements to be detailed on the drawings	Principal Contractor to prepare RAMS for traffic management proposals	Refer to relevant Traffic Management Plan drawings	No	06/01/2017	WSP PB
C16	Construction	Drainage Works	Working in deep trenches	Drainage Designer	The designer is to minimise the depth of drainage where possible. Where deep drainage is necessary this should be noted on the drainage drawings	Trench support may be required. Principal Contractor to prepare RAMS	Deep drainage minimised.	Yes	19/05/2017	WSP PB
C17	Construction	Manual Handling	Injury from improper lifting techniques	Principal Contractor	Provision of mechanical lifting aids for items heavier than 20kgs. If mechanical lifting aids are impractical a risk assessment should be undertaken which identifies the appropriate control measures required to avoid risk of injury from manual handling	Principal Contractor to prepare RAMS to protect site workers from improper lifting techniques associated with manual handling	Warning note added to drawings. Principal Contractor documentation.	Yes	06/01/2017	WSP PB
C18	Construction	All construction works/Site wide	Dealing with the public / local residents inc. language barriers. Not all local residents speak English. Possible abuse and assault from the public / squatters and their animals.	Principal Contractor	All signage used to be clear and use symbols as much as possible. Site staff to be briefed on public liaison / interfacing and how to deal with a difficult situation should one arise. A person to be nominated on site to speak with the public / residents to keep them informed and intervene if an issue arises.	Principal Contractor to prepare a strategy of how to liaise with the public and local residents, taking into consideration language barriers.	Principal Contractor documentation	No	06/01/2017	WSP PB
C19	Construction	All construction works/Site wide	Debris and falling / thrown objects from adjacent sites / sub-plots	Principal Contractor	Identify work area boundaries of adjacent schemes.	Principal Contractor to prepare RAMS to protect site workers from debris from adjacent sites / sub-plots	Refer to C422site extents drawings and ensure coordination with adjacent plots are maintained	Yes	06/01/2017	WSP PB
C20	Construction	Confined Spaces	Risks from noxious fumes, reduced oxygen levels, or a risk of fire. Other dangers may include flooding/drowning or asphyxiation from some other source such as dust, grain or other contaminant.	Principal Contractor	Compliance with Health and Safety matters on any trench / manhole is obligatory and a permit to enter a confined space is required	Principal Contractor to ensure that if access into confined spaces are unavoidable, suitable access equipment, breathing apparatus and trained operatives to be utilised at all times.	Warning note added to drawings. Principal Contractor to record all confined space accesses through a permit system to ensure that all the necessary equipment and competencies are in place prior to commencement of works.	Yes	19/05/2017	WSP PB

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Maintenance										
M01	Maintenance	Access to drainage and utilities assets site wide	Maintenance access to proposed services / drainage / valves / street lighting within carriageway	Services / Drainage Designer	Designers are to consider the location of all manholes, chambers, street lighting columns and other items that will require maintenance. A location should be chosen which provides the least risk to the person providing maintenance. Drawings have been issued to WCC and their maintenance and access comments have been addressed by the Designer and Architect.	N/A	Services are to be located within proposed footways where possible. Proposed Surface Water Drainage manholes to be located outside of wheel tracks of vehicles where possible. Lighting column and sign posts to be located outside of vehicle swept paths. Risk of articulated vehicles and large fire appliances striking lighting columns and street furniture remains.	Yes	06/01/2017	WSP PB
Operational										
Op01	Operational	Highway Alignments	10.52m refuse vehicle and 7.9m / 12m fire vehicles overrun of pedestrian areas. Shared use space areas with flush kerbs to the carriageway are likely to encourage pedestrians to use the full width of available footway/carriageway, and thereby increase the risk of potentially getting injured by a vehicle.	Designer	Designers are to undertake swept path analyses of the various vehicles that will be driving through the scheme, to highlight where this overrun occurs and to locally strengthen the footway accordingly. Kerb radii, carriageway alignment and pavement finishes design for the proposed shared use space to be reviewed as far is practical to achieve the scheme purpose and minimise risk to pedestrians. Swept paths have been issued to WCC for their review and approval.	N/A	In accordance with Manual for Streets 2, the aim of including flush kerbs so that there is no level difference between pedestrians and vehicular traffic indicates that the street is to be shared equally by all users of the highway. Indication of implied priority for motor vehicles is removed, as is a physical and psychological barrier to pedestrians which might discourage their using the full width of the highway. Ramps are introduced as gateway treatments to the shared space to indicate to motorists that they are entering a place where they need to drive at low speed and with caution, and to encourage them to adjust their behaviour prior to encountering significant numbers of pedestrians. The shared space is proposed in granite setts to differentiate it from the traditional bituminous carriageway with kerb upstands. Designers have provided a flush 300mm wide granite kerb to provide a horizontal delineation between the main carriageway and the pedestrian footway to make all parties aware that it is a shared space with various modes of transport. However there still remains a risk of vehicles injuring pedestrians as a result of the increased number of pedestrians using the station.	Yes	19/06/2017	WSP PB
Op02	Operational	Highway Alignments	In areas where there is a change in levels between flush kerbs and a kerb upstand, large vehicles mounting the footway in these areas are likely to be unstable.	Designer	Designers are to undertake swept path analyses of the various vehicles that will be driving through the scheme, to highlight where this overrun occurs and to locally strengthen the footway accordingly. In areas where level differences are proposed, i.e. there is a kerb upstand, the design is to be reviewed to ensure that large vehicles are on a straight alignment before they encounter the level difference. Swept paths have been issued to WCC for their review and approval.	N/A	The junction designs throughout the scheme are in accordance with Figure 6.3 of Manual for Streets (M/S) in which smaller corner radii at junctions are specified in order to maintain pedestrian desire lines, encourage drivers to turn slowly, and increase cycle and car speed compatibility (as per Fig 6.15). Also, in accordance with M/S, with small corner radii, the footway will be strengthened locally in order to allow for larger vehicles to occasionally overrun the corner. Following the swept path analyses, the larger vehicles are generally on a straight line before they have to mount the kerb in order to slowly negotiate the junction corner. The Designer has submitted Stage E drawings including the swept path drawings for WCC's review and approval on 16/01/17.	No	19/05/2017	WSP PB

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Op03	Operational	Highway Alignments	Vehicular overrun of basements and cellars.	Designer	Advise Client on the need for a detailed survey of the basements and cellars. Inform the Contractor of the risks.	N/A	Where existing cellars/basements that are not properly backfilled by the previous contractor, the designers have developed a method statement on how to proceed when localised areas have been identified by the Contractor as soft spots. Where existing cellars/basements may or may not be affected by construction traffic; CRL confirmed that a pre-construction survey of the existing cellars has been carried out, and that a post-construction survey will be undertaken by CRL at the end of the project. Warning note has been added to drawings.	Yes	19/05/2017	WSP PB
Op04	Operational	Highway Alignments	Vehicle access into Goslett Yard	Designer	Designers are to undertake swept path analyses of the various vehicles that will be driving into Goslett Yard, to highlight where manoeuvrability issues occur and where traffic management will be required. Swept paths have been issued to WCC for their review and approval.	N/A	For the articulated vehicle, traffic management will need to be put in place in Charring Cross Road to allow the vehicle to reverse into Goslett Yard and drive out again after.	Yes	24/05/2017	WSP PB