Appendix A
Designer's Risk Assessment

HS1
Rev 11

ARUP

Hazard Identification and Risk Assessment
(Including Particular Risks & Other Significant Risks)

Job Number	268401-00
Page Number	1 of 8

Project	**BusConnects Core Bus Corridor - Preliminary Design**			**Design Issue or Element**			Blanchardstown to City Centre Core Bus Corridor Scheme		
Stage	**Scheme Stage**			**Pre-Tender Stage**			**Other (Clarify)**		
	Name	Hand Initial	Date	Name	Hand Initial	Date	Name	Hand Initial	Date
Designer / PM	Brian Devlin	BD	09/05/22						
Project Coordinator	Denis Crowley	DJC	09/05/22						

	Hazard	**Design Mitigation measures**	**Other Possible Mitigation Measures (including measures by Contractor on site)**	**Residual Risk Assessment following mitigation measures**		
				Likelihood	**Severity**	**Risk Rating**
1	Conflict between construction traffic and construction staff/members of the public/traffic. Parking	Design involves modification to existing road – Unable to avoid the potential for conflicts. A construction strategy document has been prepared which has been used to input into the Environmental Impact Assessment Report (EIAR) construction chapter, which is being submitted as part of the planning application for this scheme. The EIA construction chapter includes details on how vehicles, cyclists and pedestrians will be impacted and safely catered for, during the works.	(a) The interface with traffic movements from any adjoining sites would need to be addressed in conjunction with adjacent landowners / tenants / contractors. (b) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety. (c) Contractor to submit method statements for review by the Employer's Representative.	L	H	M
2	Delivery of construction materials on existing roads resulting in possible incidents.	Designed Works dictates the need for delivery of construction materials – Unable to avoid.	(a) Warning signage for site personnel/members of the public. (b) Adequate temporary diversion signage where required (Pedestrians /Traffic). (c) Contractor to submit traffic management proposals.	L	H	M
3	Modifications to existing vehicular movements resulting in accidents due to unfamiliarity.	Requirements to keep roads open to traffic generally will be stipulated in the works contract. A construction strategy document has been prepared which has been used to input into the Environmental Impact Assessment Report (EIAR) construction chapter, which is being submitted as	(a) The interface with traffic movements from any adjoining sites would need to be addressed in conjunction with adjacent contractors.	L	H	M

Likelihood of Hazard occurring
L = Low (Seldom)
M = Medium (Reasonably Likely)
H = High (Certain/Nearly certain)

Severity of Harm
L = Minor Injury/Illness
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Refer to Arup Health & Safety Designer's Handbook and Detailed Design Project Flowchart for guidance on form sign off and issue to PSDP.

	Hazard	Design Mitigation measures	Other Possible Mitigation Measures (including measures by Contractor on site)	Residual Risk Assessment following mitigation measures		
				Likelihood	Severity	Risk Rating
		part of the planning application for this scheme. The EIA construction chapter includes details on how vehicles, cyclists and pedestrians will be impacted and safely catered for, during the works. This construction chapter includes traffic management measures to mitigate this risk.				
4	Impact by mobile plant	No design mitigation measures possible to reduce the risks.	(a) All construction staff to receive safety induction on this matter (b) Construction staff to wear high visibility clothing at all times.	L	H	M
5	Damage to mapped or unmapped existing underground services resulting in water leakage resulting in flooding with the potential to cause traffic accidents.	The Specification and notes on the Tender/Contract Drawings will set out the obligations of the Contractor in identifying underground services. Accurately locate all underground services based on information available. Slit trenching to be used to identify underground services. Record drawings, where available, have been received from all known utility providers to ascertain the potentially affected utilities and map areas of key risk. Ground Penetrating Radar survey has been carried out where there is a risk of the scheme impacting on critical utilities (e.g. high-pressure gas mains). The survey information will be made available to tenderers and it is planned to supplement this with further utilities investigation works.	(a) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety. (b) Ensure that where necessary, appropriate utility provider personnel are present on site during exploration works. (c) Contractor to liaise with the statutory utilities	L	M	L
6	Striking underground or overhead cables resulting in electrocution	All known underground and overhead services will be shown on the Tender/Contract Drawings and it is planned that slit trench surveys will be undertaken to confirm locations, where diversions are anticipated and road widening occurring. Ground Penetrating Radar survey has been carried out where there is a risk of the scheme impacting on critical utilities.	(a) Contractor to submit method statements for review by the Employer's Representative. (b) Works in vicinity of electric cables to be carried out in accordance with ESB requirements. (c) Care should be taken with overhead cables to ensure that no contact is made with excavator. Observance of all overhead cables during all site works should be undertaken.	L	H	M

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7	Testing and commissioning of power cables resulting in electrocution.	No design mitigation measures possible to reduce the risks.	(a) Contractor to submit method statements for inspection by the Employer's Representative.	L	H	M
8	Damage to existing gas pipes causing leakage, explosion and / or illness to operative.	Record drawings have been requested from all known utility providers to ascertain the potentially affected utilities and map areas of key risk. Ground Penetrating Radar survey has been carried out where there is a risk of the scheme impacting on critical utilities (e.g. high-pressure gas mains). The survey information will be made available to tenderers and it is planned to supplement this with further utilities investigation works.	(a) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety. (b) Ensure that where necessary, appropriate utility provider personnel are present on site during exploration works. (c) Contractor to liaise with the statutory utilities.	L	H	M
9	Damage to existing asbestos water mains requiring repair resulting in exposure to asbestos dust.	Asbestos main locations have been mapped from record drawings. It is not intended to undertake any diversion of asbestos water mains.	(a) Specialist Contractor to be appointed if asbestos main is damaged.	L	H	M
10	Conflicts and damage to existing structures.	Existing structures along the route which will be impacted have been identified. Following this a further exercise has determined the impact of the scheme on these structures, e.g. from changes to kerb alignment etc. An assessment of these structures has been carried out to determine their suitability for the intended use and where modifications to the structure are required, a preliminary design has been carried out.	(a) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety., in particular where working over water is required for example.	M	M	M
11	Construction of/modification to bridges/major retaining walls/overhead sign gantries/bus interchange canopies. Falling from height Heavy lift operations resulting in instability, objects falling from height Working adjacent to live traffic Temporary stability of works Dust Access/Egress Parking	The designers consider the works to be capable of safe construction by a competent contractor using adequate resources. A temporary works designer shall design all temporary works for the works and assess the various stages of construction to ensure stability of the works during construction. Design to include safe means of access for maintaining structures.	(a) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety.	L	H	M

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12	Trespassing by public/local residents or other third parties when site is unattended.	Tender documents will specify the need for signage to direct pedestrians away from works. Tender documents will specify the need for fencing of site and maintaining a secure site.	(a) Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety. (b) Sides of all open excavations to be protected with warning tape/fencing as appropriate. (c) Work to be carried out in accordance with contract documents.	M	M	M
13	Unauthorised access during working hours.	Tender documents will specify the need for signage to direct pedestrians away from works. Tender documents will specify the need for fencing of site and maintaining a secure site.	(a) Adequate security and proper housekeeping and maintenance of site.	M	M	M
14	Interference with fuel, construction materials, flammable materials.	Tender documents will specify the need for fencing of site and maintaining a secure site.	(a) Adequate security and proper housekeeping and maintenance of site.	L	H	M
15	Visitors to site could be at risk of injury due to unfamiliarity.	No design mitigation measures possible to reduce the risks.	(a) Visitors must report to site office upon arrival and obtain a safety induction (b) Personal Protective Equipment to be provided for visitors.	L	M	L
16	Excavating in areas which could be accessed by members of the public.	Traffic management plan to be put in place by the Contractor for delivery/removal of plant to/from the site. This will include details on how property owners can safely enter and exit their property. Site to be secured each evening before finishing of works for the day.	(a) The contractor is responsible for the safe management of all open excavations. All such excavation should have appropriate barriers/fencing around them so as to prevent access to the general public. All open excavations should be covered with appropriate sheeting material when not in use. (b) The contractor shall take particular cognisance of pedestrian and cyclist safety. All traffic management proposals must be in line with Chapter 8 of the Traffic Signs Manual.	L	H	M

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17	Construction personnel falling into excavation.	Excavation depths will be minimised as standard.	Site personnel are to be competent and trained, so as to avoid accidental falls into excavations. All open excavations should be covered with appropriate sheeting material when not in use.	L	H	M
18	Health Hazards: Noise/Vibration, Dust Inhalation, Manual Handling	The specification for the works will require road wetting and sweeping to reduce the level of dust generated. The level of noise generated will also be required to adhere to the relevant guidance and legislation and monitoring will be specified where required. The detailed design shall ensure that appropriately sized precast/preformed elements for manual handling are specified.	Detailed control measures are to be developed by the contractor to mitigate all risks to health and safety, including a planned sequence of work, and issue of suitable PPE such as high visibility vests, etc.	L	M	L
19	Risk of exposure to chemicals, solvents or biological substances while carrying out the works. Risks associated with working with bitumen, bituminous liquids i.e. tack coat, sealing joints with molten bitumen, cementitious products, thermoplastics and road marking materials on the project. Risks associated with removal of road markings i.e. inhalation of dust and fumes by Contractor personnel and by members of the public. Risk of exposure to Weil's disease Risk of exposure to asbestos during demolition	It is not possible to eliminate the risks associated with chemical or biological substances by design.	The Contractor's welfare facilities should have a hot water supply for washing purposes. Contractor to continuously monitor excavated soil for possible contaminants. Detailed control measures are to be developed by the Contractor to mitigate all risks to health and safety, including a planned sequence of work, suitable emergency plans, and issue of suitable PPE as per the requirements of: • Safety Health and Welfare at Work (Construction) Regulations 2013 • Safety Health and Welfare at Work (General Application) Regulations 2007 • Safety, Health and Welfare at Work (Chemical Agents)	L L L L L	M M M H H	L L L M M

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			Regulations, 2001 Chemicals Act 2008 and Chemicals Amendments 2010			
20	Tolka River Culvert extension: Risk of drowning in the river or flooded excavations Risk of sudden ingress of water into areas where work is taking place Risk of falling into river or other bodies of water Risk of flooding Risk of strong currents or flood waters washing away temporary works such as props, scaffolding etc Risk of falling from height Confined space entry Dust Access / Egress Parking	The nature of works requires the Contractor to work adjacent to the Tolka River. The designers consider the works to be capable of safe construction by a competent contractor using adequate resources. Where works are to be carried out near the river channel, suitable temporary works will be required. These should be designed by a competent Temporary Works designer. Similarly, temporary work items such as dewatering of excavations and propping of sides of deep excavations are to be designed and implemented by the Contractor. All temporary works are to be designed to withstand floods or other conditions which may arise on the sites due to the particular nature of the sites. All temporary works for culvert widening are to be designed by a competent Temporary Works designer.	A suitable emergency procedure to be put in place, incorporating the use of a lifeboat, lifebuoys, safety ropes, harnesses etc. A suitable warning system regarding water levels in streams to be put in place. On each site a site-specific risk assessment is to be carried out by the Contractor prior to commencement of the maintenance task and the Method Statement is to address the necessary site-specific mitigation measures. Detailed control measures are to be developed by the contractor to mitigate all risks to health and safety, including a planned sequence of work, and issue of suitable PPE and as per the requirements of: • Safety Health and Welfare at Work (Construction) Regulations 2006 • Safety Health and Welfare at Work (General Application) Regulations 2007	L	H	M
21	Risk of injury or death to operatives and members of the public due to trees, branches or felling materials (i.e. chainsaws) falling during the felling of trees. Risk of injury or death to operatives due to falling from a height during the felling of trees. Risk of injury or death to operatives and members of the public due falling trees coming into contact with overhead line.	It is not possible to eliminate the hazards associated with the felling of trees in a scheme of this nature. The works specified are considered capable of safe execution by a competent contractor using safe systems of work and the appropriate levels of resources and equipment.	It is considered that these risks should be capable of safe management and control by a competent contractor using safe systems of work and the appropriate levels of resources and equipment.	L	H	M

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	Hazard	Design Mitigation measures	Other Possible Mitigation Measures (including measures by Contractor on site)	Residual Risk Assessment following mitigation measures		
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22	Conflict between cyclists and pedestrians at bus-stops – particularly at shared landing zones.	A standardised design guidance booklet has been created as part of the preliminary design suite of documents. This standardises the approach to the design of, among various other elements, bus stops. Where possible, island bus stop arrangements are the preferred option as they reduce the level of potential conflict between cyclists and pedestrians at bus stops. Where space constraints do not allow for the island bus stop arrangement, an alternative arrangement is proposed, with cyclists to be stopped by a signal when a bus is approaching. E.g. Outbound bus-stop at Old Cabra Road / Navan Road Junction.	a) New Bus stop arrangement to be trialled prior to implementation.	M	M	M
23	Conflict between buses and cyclists at bus-stops – particularly where cycle lane is not segregated.	A standardised design guidance booklet has been created as part of the preliminary design suite of documents. This standardises the approach to the design of, among various other elements, bus stops. Where possible, island bus stop arrangements are the preferred option as they reduce the level of potential conflict between cyclists and pedestrians at bus stops. Where space constraints do not allow for the island bus stop arrangement, an alternative arrangement is proposed, with cyclists to be stopped by a signal when a bus is approaching.	a) Ensure that bus drivers are adequately trained in interacting with cyclists at bus stop locations.	L	H	M
24	Conflict between left turning cars and straight-ahead cyclists at junctions (e.g. Prussia Street/North Circular Road Jn)	A standardised design guidance booklet has been created as part of the preliminary design suite of documents. This standardises the approach to the design of, among various other elements, signalised junctions. Segregated 'Protected-style' junctions are	No other mitigation measures	M	M	M

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		preferred where feasible, providing physical protection for cyclists from turning vehicles. A flashing amber signal will be used to alert motorists to potential conflict as set out in the BusConnects Preliminary Design Guidance Booklet.				
25	Conflict between right turning cyclists and other traffic.	All right turn movements by cyclists at junctions will be signalised and cyclists will, where space allows, have a dedicated cycle lane to accommodate right turn movements. Jug turns have been used where space constraints mean protected kerbs cannot be provided e.g. at Navan Road / Nephin Road junction.	No other mitigation measures	L	M	M
26	Knock-on effect of proposed traffic management measures on the adjoining road network.	The safety implication of any proposed traffic management measures must be fully taken into account with mitigation measures such as: • Traffic calming measures for residential streets; • Turning bans and one-way sections to mitigate rat-running A study has been carried out identifying the areas where traffic will likely redirect to. Detailed traffic modelling has also carried out to more accurately quantify the likely increase in traffic on the adjoining road network, and detailed mitigation measures have been proposed at a number of locations. Details are provided on the General Arrangement Drawings.	Appropriate monitoring of traffic management measures should be put in place to ensure that they are adhered to.	M	L	L
27	Conflict between cars and pedestrians/cyclists at priority junctions.	A standardised design guidance booklet has been created as part of the preliminary design suite of documents. This standardises the approach to the design of, among various other elements, priority junctions. This guidance provides a suite of options for designers to consider with pedestrian and cyclist safety at the core of the decision-making process. Where practicable, raised table treatment at	No other mitigation measures	M	M	M

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		priority junctions will be provided, with corner radii as per DMURS.				
28	Road users' understanding and adoption of new traffic management measures such as proposed Bus Gates, one-way systems and turn bans.	Signage and road marking strategy has been developed to ensure that new traffic management measures are legible.	Information campaign to be disseminated informing the public of the new changes.	M	L	L
29	Coordination with external projects i.e. FCC Snugborough Road Bridge Widening.	Potential scheme interactions have been mapped, and design drawings have been assessed for coordination where available. Direct contact has been made with the individual designers to agree tie-in details. The Snugborough Junction Upgrade scheme is being undertaken under a separate contract, currently in progress.	No other mitigation measures	L	L	L
30	Coordination with stakeholders along the route e.g. Cabra Garda Station, Grangegorman Development Authority, Curam Care Homes.	Consultation has taken place with key stakeholders to identify potential issues and to mitigate these through design where feasible. A problem identification audit has been carried out on the route to identify potential issues with the existing arrangement.	No other mitigation measures	L	L	L
31	Existing cellars along the route.	A cellar survey has been carried out to identify the location of cellars and the potential impact on them has been assessed as part of the preliminary design. Some landowners have also been consulted with respect to potential cellars. It is concluded on this basis that no cellars along the scheme will be knowingly impacted.	No other mitigation measures	L	M	L
32	Potential conflict between pedestrians and vehicular traffic at Bus Stops proposed on N3 dual carriageway section at Mill Road.	Design has introduced a 2m separation (island) between general traffic lanes and bus lane at proposed stops at Mill Road. In addition, a vehicle restraint system will be specified in the contract documents to mitigate against errant vehicles colliding with passengers / stationary bus.	No other mitigation measures	L	H	M

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33	Cyclists on street along Castleknock Manor, potentially coming into conflict with vehicles.	Street carries low level of vehicles and this street will act as a Quiet Street, as part of a secondary cycle network. Design will encourage cyclists to assume priority, with motor vehicles travelling slowly. Length of Quiet Street is approx. 460 m.	Local Authority may wish to consider banning overtaking movements by vehicles of cyclists and introduce advisory speed limit, if deemed necessary.	L	M	L
34	Risk associated with excavation of contaminated ground.	The GI included geo-environmental laboratory testing. The results did not show presence of contamination. The geo-environmental results will be included in the Contract Package.	Detailed control measures are to be developed by the contractor to mitigate all risks to health and safety and issue of suitable PPE and as per the requirements of: • Safety Health and Welfare at Work (Construction) Regulations 2013 • Safety Health and Welfare at Work (General Application) Regulations 2007 • AGS Guidance on Site Investigation Asbestos Risk Assessment, February 2013 Use appropriate PPE. Contractor should remain vigilant for evidence of contamination (e.g. discolouring, bad smells, evidence of asbestos materials, *etc*.). Wash hands, forearms and face that may have been exposed to contaminated material before eating, drinking or smoking.	L	L	L
35	Risks associated with asbestos	The GI included geo-environmental laboratory testing. The results did not show presence of asbestos. The geo-environmental results will be included in the Contract documents.	Contractor should remain vigilant for evidence of contamination. Use appropriate PPE	L	M	L
36	Presence of pigeon, perhaps also rats, droppings on site. Contraction of leptospirosis (Weil's Disease) causing extreme illness or death.	No design mitigation.	Good hygiene to be maintained on site. Hands to be washed prior to beginning and after finishing works. Contractor and personnel to wear gloves when handling soils, drilling equipment, or anything	L	H	M

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			contaminated with soil or pigeon/rats droppings.			
37	Risks associated with Invasive Species. No non-native invasive species was found within the footprint of the proposed scheme.	No design mitigation.	The Invasive Species Management Plan will be developed prior to the commencement of any on-site works for the Proposed Scheme.	L	L	L
38	Works to footpath and carriageway on Old Cabra Road railway bridge, over live railway line. Objects falling from height Working adjacent to live traffic Dust	The designers consider the works to be capable of safe construction by a competent contractor using adequate resources.	Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety.	L	H	M
39	Risk associated with Works adjacent to LUAS line	Design involves modification to existing road – Unable to avoid the potential for conflicts. The designers consider the works to be capable of safe construction by a competent contractor using adequate resources. Contractor to liaise with TII in advance of works in vicinity of LUAS line.	Detailed Control measures are to be developed by the Contractor to mitigate all risks to health and safety.	L	H	M

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