Appendix A
Designer's Risk Assessment

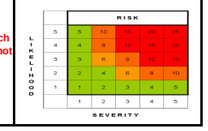
JACOBS®

DESIGN HAZARD ELIMINATION AND RISK REDUCTION REGISTER (ROI)

Latest Review Date	

Phase	
C	Construction
M	Maintain / Clean
U	Use as Workplace
D	Demolish
Project Name:	Upgrade Programme – Package B
Project Number:	32110901
Design Package:	
Client:	National Transport Authority

Probability	Worst Potential Severity (WPS) of Impact	Risk Rating
1: Highly Unlikely 2: Unlikely 3: Possible 4: Likely 5: Highly Likely	1: Nil or slight injury / illness, property damage or environmental issue. 2: Minor injury / illness, property damage or environmental issue. 3: Moderate injury or illness, property damage or environmental issue. 4: Major injury or illness, property damage or environmental issue. 5: Fatal or long term disabling injury or illness. Significant property damage or environmental issue. 10. Multiple fatalities and catastrophic event	NOTE: The purpose of Risk Rating is to determine which risks are significant. It is a subjective assessment and not an absolute or precise determination



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Risk ID.	Formal Review Description	Phase	Particular or Non-Particular Risk (if applicable)	Activity	Potential Hazard	Person(s) Most at Risk	Prob	WPS	Initial Risk Rating	Discipline	Design Measures to Eliminate Hazards	Design Measures to Reduce Risk	Residual Prob	Residual WPS	Residual Risk Rating	Residual Risk Description	Included on Drawing No(s) or other doc. (give ref.)	Action By (Name or Role)	Target Date	Revised Target Date	Date Action Complete	Tracker Status	Comments	Primary Legislation
U1	5: Design Stage Review	C	1. Falling from height	Excavation of trenches, pits, chambers and manholes for utility installations.	Potential to fall from ground level into open excavation.	Construction	3	4	12	Civil / Structural	It has not been possible to completely eliminate the identified hazard relocation of services are going to be required due to the nature of the works. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible.Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider.	Depths of the excavations will be limited to a max of 1.5m deep where possible. This therefore simplifies the construction and reduces severity of the fall.	2	3	6	Falling from height - All utility provider & survey information will be supplied to the contractor	Trench excavations deeper than 1.2m will be highlighted on the relevant utility drawings.	**Utilities Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
U2	5: Design Stage Review	C	2. Burial under earthfalls	Excavation of trenches, pits, chambers and manholes for utility installations.	Excavation, installation and backfilling of deep pipes. Even shallow excavations can result in trench collapse so it is important to never be complacent. Installation / Maintenance of pipes and manholes in the areas of high water table .	Construction	3	5	15	Civil / Structural	It has not been possible to completely eliminate the identified hazard relocation of services are going to be required due to the nature of the works. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible.Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Burial under earth fall. Engulfment due to trench or slope collapse - All utility provider & survey information will be supplied to the contractor.	Trench excavations deeper than 1.2m will be highlighted on the relevant utility drawings.	**Utilities Lead**	Detailed design stage	NA	TBC		Typical risk on construction site is forseeable by the contractor.	2013 Const Regs (PSDP)
U3	5: Design Stage Review	C	4. Chemical or biological substances	Working to complete the cut-in and connections to the existing sewer main. Working on existing sewer manhole lids and chambers.	The biological hazard associated with working on sewer infrastructure incl. the toxic gases that can be found in sewers.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of and work with the existing sewerage network has been reduced as far as possible.	Existing sewers will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Chemical or biological substances	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		Typical risk on construction site that needs to be mitigated and managed by the contractor.	2013 Const Regs (PSDP)
U4	5: Design Stage Review	C	6. Work near high-voltage power lines	Excavation in proximity to High voltage underground lines. Working under existing overhead high voltage lines.	Electrocution by coming in contact with high voltage conductors by service strike or contact with overhead lines.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Electrocution by coming in contact with high voltage conductors by service strike or contact with overhead lines.	High voltage cables will be highlighted on the relevant utility drawings.	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U5	5: Design Stage Review	C	12. Assembly or dismantling of heavy prefabricated components	Working adjacent to existing structures, including retaining structures. Possible use of precast chambers if proposed by the contractor. Heavy watermain pipe - e.g. 450mm DI. Precast protection Slabs may be used by contractor and require craneage.	Being crushed or entrapped by heavy object. Manual handling injury.	Staff	4	5	20	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	5	15	Being crushed or entrapped by heavy object. Manual handling injury.	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U6	5: Design Stage Review	C	13. Interaction with traffic	Working in the vicinity of live traffic at all interfaces of the works. There is also the interaction with construction traffic throughout the site.	Operative being struck by vehicle. Pedestrian being struck by plant or vehicle.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Operative being struck by vehicle. Pedestrian being struck by plant of vehicle.	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U7	5: Design Stage Review	C	15. Vicinity of gas mains or installations	Excavation of trenches, pits, chambers and manholes for utility installations.	Service strike on live gas main	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Service strike on live gas main	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U8	5: Design Stage Review	C	16. On or adjacent to pressure mains	Excavation in the vicinity of public utilities, watermains, gas main, sewer rising main.	Service strike on live gas main, water main, rising sewer main.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Service strike on live gas main, water main, rising sewer main.	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U9	5: Design Stage Review	C	17. Confined spaces	Manhole and chamber entry as required. Deep Trench excavation.	Engulfment by hazardous gases.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Engulfment by hazardous gases.	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)
U10	5: Design Stage Review	C	20. Interaction with the public	All Service Installations along live areas and at interface points will involve exposure of the public to work areas and vehicles.	Member of the public coming in contact with a work vehicle or entering the worksite.	Staff	4	10	40	Civil / Structural	It has not been possible to completely eliminate the identified hazard. Diversion of existing utilities and work with the existing sewerage network has been avoided where possible. All utility provider & survey information will be supplied to the contractor.	Existing utilities will be retained in situ and protection details will be installed where this is technically acceptable by the service provider. This therefore reduces the quantity of work of this nature.	3	10	30	Member of the public coming in contact with a work vehicle or entering the worksite.	N/A	**Utilities Lead**	Detailed design stage	NA	TBC		The contractor needs to consider and mitigate against this risk by the development and implementation of a RAMS.	2013 Const Regs (PSDP)

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H1	5: Design Stage Review	C	7. Exposure to drowning	Construction of Frank Flood Bridge	Operative falling into the Tolka River during construction of the Frank Flood Bridge	Construction	2	4	8	Civil / Structural	A number of other design options were assessed to see if the cycle and foot way could be facilated on the existing bridge however they could not be due to the constrained nature of the existing bridge. Therefore it has not been possible to eliminate the identified hazard because works next to the watercourses are required as part of the proposed structure	Maximise use of off site fabrication to minimise time spent adjacent to water.	2	3	6	Exposure to drowning	Presence of watercourse will be highlighed on the relevant drawings.	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
H2	5: Design Stage Review	C	1. Falling from height	Installation of new traffic signal equipment, including gantry signals	Potential fall from height during installation process	Construction	3	4	12	Transport/Traffic	Limit overhead gantries only to locations where lower signal equipment cannot be accommodated. There are some locations where overhead gantries cannot be avoided therefore hazard has not been completely eliminated.	Provide NAL sockets or similar to support easier installation. Where feasibile sufficient space is available for a MEWP for installation/maintenance.	2	3	6	Falling from height	Locations where access may prove difficult for installation or maintenance will be highlighted on the relevant drawings.	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
H3	5: Design Stage Review	M	13. Interaction with traffic	Maintaining signal equipment close to live traffic	Operative struck by live traffic	Construction	3	4	12	Transport/Traffic	Signal equipment is required throughout the scheme so it has not been possible to completely eliminate this hazard. Suitable clearance of all signal equipment from live carriageway has been provided.	Sufficient space parking for maintenance vehicles in vicinity of each signal site has also been considered.	2	2	4	Risk of collision of live traffic with construction site	Locations where access may prove difficult for maintenance due to restricted space will be highlighted on the relevant drawings.	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
H4	5: Design Stage Review	M	13. Interaction with traffic	Installation/ maintenance of drainage in/adjacent to live carriageways	Working in the vicinity of live traffic.	Construction	3	4	12	Transport/Traffic	It has not been possible to completely eliminate the identified hazard works and maintenance next to existing road is required as part of the works. Existing drainage has been retained where feasible,	Lower maintenance drainage solutions have been provided. An outline traffic management plan for the construction phase has been developed and provide to the contractor for consideration and further development	2	3	6	Risk of collision of live traffic with construction site	Constrained areas where access for maintenance or construction will be difficult have been highlighted on the relevant drainage drawings.	**Utilities Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
H5	5: Design Stage Review	C	4. Chemical or biological substances	Milling or excavation for road pavement	Encountering hazardous materials / contaminated ground during carriageway works, e.g. tar	Construction	2	4	8	Civil / Structural	The proposed design has reduced the need for new pavement construction where possible by retaining the existing pavement. Some new pavement is required so it has not been possible to completely eliminate the hazard.	Detailed pavement investigation surveys will be carried out to identify environmental issues and reduce risk. Do not disturb where possible / if removal is necessary, strictly follow EA guidance.	1	2	2	Potential ground contamination	Any areas of know contamination will be highlighted on the pavement drawings	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
H6	5: Design Stage Review	D	18. Significant demolition	Demolishing boundary walls where road widening is proposed (Scheme wide)	Crushed / buried under construction debris	Staff	3	4	12	Civil / Structural	The proposed design has avoided or reduced the impact on existing boundaries where possible however it has not been possible to eliminate the identified hazard as some boundaries will be impacted in order to provide the minimum required cross section.	The impact on boundary walls has been minimised where possible through the alignment design through adjustment of the horizontal alignment and/or localised narrowing of cycle lanes and/or footpaths.	2	4	8	Crushed/buried under construction debris	N/A	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
H7	5: Design Stage Review	C	13. Interaction with traffic	Working near live traffic	Vehicle collision against working area	Construction	3	4	12	Transport/Traffic	Where possible existing kerb lines are being maintained to minimise/reduce the construction impact and therefore the interaction with live traffic. The hazard cannot be completely eliminated.	Works phasing and construction stage traffic management plan has been produced and should be further developed by the contractor in line with Chapter 8 of the Traffic Signs Manual Consideration should be given to phasing of works and carrying out inline works at night time.	2	4	8	Risk of collision of live traffic with construction site	N/A	**Highways Lead**	Detailed design stage	NA	TBC		This risk will be reviewed at detailed design stage	2013 Const Regs (PSDP)
H8	5: Design Stage Review	C	20. Interaction with the public	All construction works at interface points with live areas along the scheme	Works adjacent to public roads will involve risk of accidents due to conflict between road vehicles/users and site vehicles/personnel	Public	4	5	20	All Disciplines	Where possible existing kerb lines are being maintained to minimise/reduce interaction with live traffic. It has not been possible to eliminate this risk as the site includes area of a live road network.	An outline traffic management plan will be developed and provide to the contractor for consideration and further development in line with Chapter 8 of the Traffic Signs Manual. Disruption to pedestrian movements should me minimised through the provision of alternative walkways and crossing points where necessary.	3	5	15	Member of the public coming in contact with a work vehicle or entering the worksite.	N/A	**Highways Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
H9	5: Design Stage Review	C	20. Interaction with the public	All construction works (Scheme wide)	Opposition to construction work, protesters	Construction	3	3	9	All Disciplines	Early engagement with land owners, stakeholders and community groups through Public Consultations and Community Forums, taking account of feedback	Maintain dialogue with key land owners and stakeholders.	2	3	6	Member of the public coming in contact with a work vehicle or entering the worksite.	N/A	**Highways Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
H10	5: Design Stage Review	C	20. Interaction with the public	Construction of Frank Flood Bridge	Risk of accidents/collisions between construction traffic/machinery and vulnerable road users	Public	3	5	15	Civil / Structural	The construction the new adjacent structure of Frank Flood Bridge is an essental part of the scheme so the hazard cannot be eliminated.	Sequencing of the works should be carefully considered so that pedestrians/cyclists can use the existing Frank Flood bridge whilst the new adjacent structure is being constructed.	2	3	6	Member of the public coming in contact with a work vehicle or entering the worksite.	N/A	**Highways Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
H11	5: Design Stage Review	C	20. Interaction with the public	Removal, relocation and/or installation of street fuurniture	Lifting operations in constrained locations could result in strikes with members of the public and/or with adjacent buildings/structures.	Public	3	5	15	Civil / Structural	The proposed design aims to reduce the need for removal and relocation of street furniture where possible by maintaining existing kerb lines but the need to remove/relocate/install street furniture cannot be completely eliminated.	Sequencing of the works should be carefully considered so that pedestrians/cyclists are redirected away from lifting operations. Consideration should also be given to night time working for more significant lifting operations.	2	3	6	Member of the public coming in contact with a work vehicle or entering the worksite.	N/A	**Highways Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D1	5: Design Stage Review	C	7. Exposure to drowning	Creation of new ponds and Swales giving rise to deep water when in operation	Risk of drowning	Public	3	5	15	Civil / Structural	Use of tree pits, filter drains and source measures to reduce pond/swale size	Shallow slopes applied to ponds/Swales to reduce likelihood of fall. Pond depths typically designed for 0.5m water to reduce risk of drowning	1	5	5	Risk of drowning cannot be fully eliminated as ponds/swales remain	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D2	5: Design Stage Review	C	2. Burial under earthfalls	Deep excavation of road to install and connect new gullies.	Risk of excavation collapse, burial	Construction	3	5	15	Civil / Structural	Design standard has been adjusted to remove requirement for gulley replacement where existing kerb lines are retained	Combined side/surface entry gulley proposed to reduce frequency and number of connections/excavations	2	5	10	Risk remains as new gulley still need to be installed	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D3	5: Design Stage Review	C	2. Burial under earthfalls	Creation of new ponds and Swales giving rise to deep water when in operation	Risk of excavation collapse, burial	Construction	3	5	15	Civil / Structural	Use of tree pits, filter drains and source measures to reduce pond/swale size/need	Shallow slopes applied to ponds/Swales to reduce excavation depth.	1	5	5	Risk of excavation collapse cannot be fully eliminated as ponds/swales remain	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D4	5: Design Stage Review	C	7. Exposure to drowning	Failure of drainage due to intense storms before it is operational	Risk of flooding	Construction	4	4	16	Civil / Structural	Design standard has sought to minimise extent of new drainage works although hazard cannot be eliminated due to requirement for work	Design standard has sought to minimise extent of new drainage works although risk cannot be reduced due to requirement for work	4	4	16	Risk remains as drainage works are inherent works requirement	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)

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D5	5: Design Stage Review	C	Not Applicable	Service strike during excavation/installation of new drainage infrastructure	Service strike	Construction	5	5	25	Civil / Structural	Design standard has minimised extent of new drainage works e.g. none required where kerb lines retained and no change in impermeable area	Full assessment of other services carried out with clash detection during design process	5	3	15	Risk remains, full GPR survey required to further reduce risk	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D6	5: Design Stage Review	C	Not Applicable	Failure of brick or other sewers during connection by new works	Sewer collapse and failure, burial	Construction	3	5	15	Civil / Structural	Cannot be eliminated at this stage, connections to existing sewer network required for functional drainage system	Cannot be reduced at this stage, connections to existing drainage system required	3	5	15	Risk remains, condition survey of existing sewers should be completed to ascertain existing condition	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
D7	5: Design Stage Review	C	Not Applicable	Operation of road drainage network and treatment	Pollution incident due to failure of drainage interceptors	Public	3	4	12	Civil / Structural	Cannot be eliminated, use of vehicles on highway and outfalls to surface water network/streams required	SuDS measures include passive treatment include sediment filtration which have a very low probability of failure	3	3	9	Requirement for interceptors which could fail remains as insufficient space allowed for full SuDS measures	N/A	**Drainage Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
ST1	5: Design Stage Review	C	13. Interaction with traffic	Working in close proximity to a live carriageway (scheme wide)	Operative struck by live traffic	Construction	3	5	15	Civil / Structural	The impact on existing boundaries has been eliminated or reduced through the horizontal alignment design as far as possible. The impact on existing boundaries cannot be completely avoided due to the nature of the works.	Maximise use of off site fabrication to minimise time spent on the road. Designate sufficient temporary site boundaries. The Designer anticipates that adequate work space will be provided so that vehicle restraint barriers can be in place between the workspace and live traffic.	1	5	5	Operative struck by live traffic also a constrained work space introduces the risk of an operative being struck by reversing construction traffic	Extent of site boundary to be clearly conveyed on drawings.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will need to be reviewed at detailed design stage. Contractor to review extent of temporary works and method of seperation.	2013 Const Regs (PSDP)
ST2	5: Design Stage Review	C	2. Burial under earthfalls	Construction of retaining walls (Scheme wide)	Collapse of walls or collapse of temporary slopes	Construction	3	5	15	Civil / Structural	Avoid the need for modification or construction of retaining structures via restriction of highway corridot where practical	Sufficient space designated for temporary worksd to accommodate 1:1.5 battered slopes to ensure slope stability.	2	5	10	Operative buried due to collaspe of excavation due to encountering unexpected ground condition or surcharge from constructio plant.	Extent of site boundary to be clearly conveyed on drawings and indicative battered slopes shown on wall sections.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will need to be reviewed at detailed design stage when more comprehensive geotechnical information is avalible. Constractor to ensure adequate exclusion zones for construction plant at top of slope to avoid surcharge.	2013 Const Regs (PSDP)
ST3	5: Design Stage Review	C	4. Chemical or biological substances	Impregnation of concrete (Scheme wide)	Inhalation of hydrophobic pore liner which can be a hazarderous substance	Construction	4	3	12	Civil / Structural	None. Transport Infrastructure Ireland requirement for surface impregnation of all exposed concrete	None.	4	3	12	Exposure to hazaderous chemical materials during application of hydrophobic pore liner.	Risk to be called up on drawings.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	Application of impregnation material to be carried out in accordance with CC-SPW-02000 section 3. Contractor to ensure suitable method statement developed to mitigate risk during works	2013 Const Regs (PSDP)
ST4	5: Design Stage Review	M	1. Falling from height	Inspection and maintenance of retaining walls (scheme wide)	Falling from top of wall during inspection and maintenance acitvities.	Maintenance	3	4	12	Civil / Structural	None. Maintenance on walls is a requirement of the asset owner.	Introduction of safety barriers or upstands to provide a physical barrier to an unprotected drop. Provide adequate access around structure to facilitate maintenance activities.	1	4	4	Slips, trips and falls when accessing the areas behind the walls.	Requirements for saftey barriers to be include on wall section drawings.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
ST5	5: Design Stage Review	C	Not Applicable	Manual Handling (Scheme wide)	Risk of musculoskeletal injuries from heavy lifting or repetitive tasks at low level.	Construction	4	3	12	Civil / Structural	None. Some instances of manual handling required.	Maximise use of off site fabrication to limit work required on site and take advantage of plant assisted works.	2	3	6	Risk of musculoskeletal injuries from heavy lifting or repetitive tasks at low level.	N/A	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
ST6	5: Design Stage Review	C	12. Assembly or dismantling of heavy prefabricated components	Lifting operations for precast retaining wall elements (Scheme wide)	Clash with overhead utilities. Suspended load striking operatives	Construction	3	4	12	Civil / Structural	Avoid precast elements where overhead utilities pose significant risk.	None. Construction of precast elements will require lifting operations.	2	4	8	Suspended load striking operatives	N/A	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
ST7	5: Design Stage Review	M	1. Falling from height	Maintenance and inspection of Frank Flood Bridge	Operatives falling into the Tolka River	Maintenance	3	3	9	Civil / Structural	None. Inspection and maintenance activities are a requirement during design life	Detail structure such that critical elements are easily inspectable. New parallel structure to be aligned such that sufficient space is created to allow for access for maintenance and inspection activities.	1	3	3	Operatives falling into the Tolka River	Seperation between structures demonstrated on drawings. Inspection platforms and acecss to key elements demonstrated on drawings.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
ST8	5: Design Stage Review	C	20. Interaction with the public	Construction of retaining walls in residential gardens	Disruption of access to properties and excessive noise.	Construction	4	2	8	Civil / Structural	Implement local restrictions of highway corridor at locations where access may be impedded where practical	None. Wall must be constructed. Residents to be informed prior to construction of impacts and measures taken to maintain access during works.	2	2	4	Disruption of access to properties and excessive noise.	Access locations to be called up on drawings	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage	2013 Const Regs (PSDP)
ST9	5: Design Stage Review	C	1. Falling from height	Installation of footbridge at Frank Flood Bridge	Risk of falling when splicing sections of the footbridge	Construction	3	4	12	Civil / Structural	None. There is a requirement to work at height when splice connections are made	Maximise use of offsite fabrication to minimise number of connections. Where practical avoid welded splices.	2	4	8	Risk of falling when splicing sections of the footbridge	Construction sequence drawings to demonstrate splices required.	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage.	2013 Const Regs (PSDP)
ST10	5: Design Stage Review	C	7. Exposure to drowning	Works in and around the Tolka River	Operatives falling into River and drowning	Construction	3	4	12	Civil / Structural	None. Works are required to take place in and around the Tolka River	Maximise off site fabrication to reduce work requirement on site.	2	4	8	Operatives falling into River and drowning	Works in rivercourse highlighted on construction sequence drawings	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage. Contractor should avoid works in high flow conditions	2013 Const Regs (PSDP)
ST11	5: Design Stage Review	C	Not Applicable	Works to the Frank Flood Bridge Parapets	Damage to a culturally significant feature and increased likilhood of errant vehicles impacts	Public	3	3	9	Civil / Structural	Proposed structure designed to minmise obstruction of view from west approach. Distance between parapet and traffic face reduced. This increase in risk canot be eliminated	Risk of errant vehicle collision to be mitigated via maintaining a minimum set-back of 0.6m and introduction of a Trief Kerb. Original parapet ballstrudes to be resintated to retain character of bridge	2	3	6	increased likilihood of errant vehicles impacts	Mitigation measures via kerb introduction shown on drawings	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage.	2013 Const Regs (PSDP)
ST12	5: Design Stage Review	C	6. Work near high-voltage power lines	Substructure works for Frank Flood Bridge	Striking of a buried 38kV High Voltage Asset during piling or excavation	Construction	3	5	15	Civil / Structural	Proposed realignment of HV asset via new thrust bore under the river	None. Hazard removed from works area	1	5	5	Hazard eliminated	Diversion proposals shown on drawings	**Structures Lead**	Detailed design stage	NA	TBC	CLOSED	This risk will be reviewed at detailled design stage.	2013 Const Regs (PSDP)
G1	5: Design Stage Review	C	Not Applicable	Construction of retaining walls	Foundation insufficient bearing capacity for structure.	Construction	3	5	15	Civil / Structural	None.	Design ground investigation to confirm ground conditions at each structure prior to detailed design and construction.	1	5	5	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G5	5: Design Stage Review	C	Not Applicable	Ground investigation design prior to design fix.	GI design no longer applicable due to changes in alignment and structure locations.	Construction	4	4	16	Civil / Structural	Complete GI design only once route alignment and structure locations are confirmed.	Design GI for all possible structural options if investigations to be completed prior to design fix.	1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G6	5: Design Stage Review	C	Not Applicable	Design and construction of structural foundations	Unanticipated thicknesses of made ground at structure foundations	Construction	3	4	12	Civil / Structural	Design ground investigation to determine the characteristics of founding strata at each structure location and determine the extents of any made ground.	Design remediation of areas of unanticipated made ground.	1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G7	5: Design Stage Review	U	Not Applicable	Design and construction of structural foundations	Excess settlement of structures due to low strength founding strata.	Operations	3	5	15	Civil / Structural	None.	Design ground investigation to confirm ground conditions at each structure prior to detailed design and construction.	1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G8	5: Design Stage Review	C	2. Burial under earthfalls	Construction of replacement retaining walls	Failure in retention of material behind existing retaining wall on demolition for replacement wall construction.	Construction	2	5	10	Civil / Structural	None.	Design ground investigation to determine the properties of the retained material to enable a suitable temporary works design for the replacement of the wall.	1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G9	5: Design Stage Review	C	Not Applicable	Construction of structural foundations	Inundation of excavations for structural foundations due to high groundwater table	Construction	3	5	15	Civil / Structural	None.	Design ground investigation and groundwater monitoring to determine groundwater regime at location of structures.	1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G10	5: Design Stage Review	C	Not Applicable	Construction of structural foundations	Striking utilities assets	Construction	2	5	10	Civil / Structural	None.	Design to determine location of any utilities in the vicinity of the structures foundations and provide information	1	5	5	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G11	5: Design Stage Review	C	Not Applicable	Construction on Frank Flood Bridge	Lack of information on backfill material over and around existing bridge structure to inform structural design.	Construction	4	4	16	Civil / Structural	Design ground investigation to examine the composition and determine the properties of the backfill of the bridge structure.		1	4	4	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)
G12	5: Design Stage Review	C	Not Applicable	Design and construction of new bridge structure at Frank Flood Bridge	Lack of geotechnical information for north bank of river due to insufficient GI data caused by space confined by utilities.	Construction	3	5	15	Civil / Structural	Complete full utilities survey of area of north bank of Tonka River to inform further ground investigation. Design ground investigation to obtain geotechnical data.		2	4	8	None. Obvious risk to a competent contractor	N/A	**Geotechnical Lead**	Detailed design stage	NA	TBC			2013 Const Regs (PSDP)