Appendix F

Safety in Design Register

MacKays to Peka Peka EXPRESSWAY ALLIANCE

Design Risk Assessment Register

Author (Role): **JM -**
Approved By: **JD -**
Revision: **0**
Job No: **3320901**
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Stage of Design / Project: **90% Review - Prelim Design**

Project Name: **M2PP SID Workshop**

DESIGN RISK			Risk Matrix			MITIGATION MEASURES		Mitigated Risk & Resolution						RESIDUAL RISK		CLOSE OUT ISSUE		RESOLUTION
Ref	Hazard (Guideword)	Issue	C	L	RR	Risk Owner	Proposed Measure (at time of SiD meeting) (1 Eliminate, 2 Substitute, 3 Reduce, 4 Control)	C	L	RR	Client Approved	Design Status	Date	Risk Owner	Action Required	Responsibility to close out & include in design / contract	Date	
1 Construction																		
1.01	*Interfaces External to the Project*	Drainage at tie-ins to existing State Highway, risk of road traffic accidents.	4	4	H	Iain	Minimise number of culverts, identify simpler alternative construction methods to minimise worktime in live road. (eg directional drilling versus open trench)	4	3	M		Open	13/06/11					
1.02	*Egress / Access*	Unsafe worksite, due to flooding, water.	5	4	E	Iain	Investigation and knowledge of ground conditions/water levels. Consider time of year.	5	1	M		Open	13/06/11					
1.03	*Movement Direction*	Ground stability/haul roads for heavy plant and lifting operations. Rolling over.	5	4	E	Iain	Detailed assessment of ground conditions, ground improvement extent large enough.	5	2	M		Open	13/06/11					
1.04	*Load / Force / Energy*	Unsafe temporary access to trenches and pits.	5	4	E	Iain	Review existing ground conditions. Design and methodolgy, maintain design standards, trench shields.	3	2	M		Open	13/06/11					
1.05	*Natural Sources Impacting the Works*	Existing culverts settling/failing under preload or other construction. Flooding risk to SH 1, increased construction risk due to deeper trenches.	3	5	H	Iain	Design considering construction methodologies and materials at culverts where ground may settle	3	3	M		Open	13/06/11					
1.06	*Ergonomics*	Working around water at ponds, potential for slipping in.	4	2	M	Iain/Boyden	Methodology during planting, water level during planting.	4	1	L		Open	13/06/11					
1.07	*Heights / Depths*	Deep manholes, height, confined spaces, gases, groundwater.	5	4	E	Iain	Review locations and numbers required. Alternative methods for maintenance.	4	3	M		Open	13/06/11					
1.08	*Toxicity / Safety*	Handling of chemicals and toxic materials, causing health issues.	2	3	M	Iain	Review of final materials to be used in the construction.	2	3	M		Open	13/06/11					
1.09	*Toxicity / Safety*	Handling of heavy items.	3	3	M	Iain	Detailing of large components.	2	2	L		Open	13/06/11					
1.10	*Utilities/Services*	Injury resulting from relocating services.	4	3	M	Doug	Try to avoid services. Involve service providers when designing relocations/protectrion.	4	2	M		Open	13/06/11					
1.11	*Interfaces External to the Project*	Traffic hazards on live roads.	3	3	M	Kiran	Pavement design and methodologies to minimise construction time.	3	2	M		Open	13/06/11					
1.12																		
2 Operation/Maintenance																		
2.01	*Heights / Depths*	Confined spaces, access and egress to deep, long structures for maintenance.	5	3	H	Iain	Design to consider ease of ventilation, detailing of access/egress points.	5	1	M		Open	13/06/11					
2.02	*Interfaces External to the Project*	Public access into drainage structures. Drowning, injury.	5	3	H	Iain	Design to prevent unauthorised access. Fences, grilles etc.	5	1	M		Open	13/06/11					
2.03	*Egress / Access*	Access to swales/wetlands/outlets etc for inspections, maintenance. Potential for being struck by passing traffic.	3	2	M	Iain	Make provision for parking and access to drainage features for inspections.	3	1	L		Open	13/06/11					
2.04	*Egress / Access*	Access to bridge piers etc for inspections, maintenance. Slips and falls during maintenance.	3	2	M	Iain	Make provision for parking and access to bridge piers for inspections/maintenance.	3	1	L		Open	13/06/11					
2.05	*Interfaces External to the Project*	Repair of barriers next to live traffic lanes.	3	5	H	Doug	Use robust materials, provide clearances to give safe access.	3	3	M		Open	13/06/11					
2.06	*Interfaces External to the Project*	Maintenance of lights. Risk of traffic strike.	3	3	M	Doug	Reduce frequency of needed maintenance. Choice of lamp type, position of access panels.	3	2	M		Open	13/06/11					
2.07	*Interfaces External to the Project*	Pavement and median maintenance including barrier, being in or close to live lane.	3	3	M	Doug	Design materials, reduce maintenance requirements.	3	2	M		Open	13/06/11					
2.08	*Interfaces External to the Project*	Risk of pedestrians on/crossing expressway, traffic strike.	5	3	H	Doug/Marc	Design appropriate accesses. Design to prevent access where this is not wanted.	5	2	M		Open	13/06/11					
2.09	*Site Caused Environment*	Landscape maintenance, risk to personnel.	3	3	M	Boyden	Choose appropriate planting and offsets.	3	2	M		Open	13/06/11					
2.10	*Heights / Depths*	Removal of graffiti, risk of falling from heights, struck by traffic.	3	5	H	Iain	Minimise graffiti opportunities, surfaces which don't encourage graffiti, use coatings for easy removal.	3	3	M		Open	13/06/11					
2.11	*General Planning*	Maintenance in live traffic lanes, markings, signage.	3	3	M	Doug	Appropriate materials.	3	2	M		Open	13/06/11					
2.12		Future proofing drainage structures to avoid future construction related accidents	2	2	L	Iain	Design for the agreed design life.	2	2	L		Open	13/06/11					
3 Demolition																		
3.01	*Movement Direction*	Ground stability/work area for heavy plant and lifting operations. Rolling over.	5	4	E	Lucy	Detailed assessment of ground conditions, ground improvement extent large enough.	5	2	M		Open	13/06/11					
3.02	*Utilities/Services*	Damage to services during demolition.	3	3	M	Iain	Make location of services clearly visible.	3	2	M		Open	13/06/11					
3.03	*Documentation / Other*	Accidents due to unknown form of construction.	5	3	H	Iain	Provide good quality as-built records.	5	1	M		Open	13/06/11					
3.04	*Documentation / Other*	Accidents due to unknown form of construction.	5	3	H	NZTA	Keep the good quality as-built records.	5	1	M		Open	13/06/11					
3.05																		
3.07																		
3.08																		
3.09																		

Key;

Consequence: 1) Negligible 2) Minor 3) Serious 4) Extensive 5) Catastrophic

Likelihood: 1) Rare 2) Unlikley 3) Possible 4) Likely 5) Almost Certain

Level of Risk: L) Low M) Moderate H) High E) Extreme

Notes: Hazards considered are those that are project / site specific, non-standard / bespoke designs, special process, high hazard risks (e.g. non 'business as usual' hazards) that have been identified at the time of the review(s). Other risks will continue to a