

Wrights Rd Storage - Safety in Design Register, Detailed Design Phase

Project # E2131
Wrights Rd Storage
Site : Wrights Rd Canterbury

Session 1 Date / Time: 2:30-4:30pm on 12/08/2021
Session 1 Location: Teams meeting
Attendees:

- WIL - Principal Brent Walton
- WIL - Project Manager Onno Mulder
- Damwatch Engineering - Project Mgr Steve McNerney
- Damwatch Engineering - Designer Etaoin Out
- Damwatch Engineering - Designer Nigel Connell
- Constructor Bryce Ranger
- Constructor Cameron Rooney

ENVIRONMENT CANTERBURY
APPROVED
SUBJECT TO CONDITIONS
TO BE KEPT ON SITE
21 DECEMBER 2021

Date: 13/8/2021
Completed by: N Connell & E. Out
Reviewed by: S McNerney

Ref	RISKS ASSOCIATED WITH DESIGN ELEMENTS			Cause & Outcome	Dam Safety Critical?	Risk Matrix			Proposed Control	PROPOSED & APPROVED MITIGATION MEASURES (1 Eliminate, 2 Substitute, 3 Reduce, 4 Engineering Control, 5 Administrative)	Mitigated Risk & Resolutio				Status of Mitigation Measures	Date
	Hazard (Prompt or Prompt No.)	Site Factors & Controls (Prompt or Prompt No.)	Guideword or Guideword No.			L	C	LR			L	C	LR	Risk Owner		
1 Design																
1.01	Lack of coordination	Project	Communication	Lack of coordination within design build group. Delay in getting Resource Consent has resulted in dissolution of Design Build Team which is now regrouped within Damwatch Wellington	yes	2	4	H	5	Design Group re-established within Damwatch & REL. Follow up with contractor to confirm receipt of register and acknowledgement of actions. Undertake SiD (and Hazop) action audits throughout duration of project.	1	1	L	WIL/REL/DW		3/08/21
		Project	Communication	Coordination with design-build group constructor group and owner. Group risks not meeting obligations as PCBU.	yes	2	4	H	5	Design changes to be communicated to Ecan. Owner informed as part of Safety in Design process.	1	1	L	WIL/REL/DW		3/08/21
1.02	Lengthy consenting period	Project	Standards	During the lengthy consenting period, the regulations have changes, along with the standards, best practices and the latest guidelines, some of which impacting on the design of the scheme. Risk of design changes have knock on affect elsewhere.	yes	2	3	M	4	Review and update of existing design with respect to best practice and latest guidelines.	1	1	L	WIL/DW		
1.03	Earthquake	Embankment Stability	Earthworks	Earthquake shaking causing embankment settlement, distortion and cracking. Undetected embankment settlement leading to embankment failure.	yes	1	5	H	4	Site specific design for OBE and SEE earthquake loading in accordance with NZSOLD Guidelines with enhanced lining at pond corners to span potential embankment transverse cracking. Ample freeboard to prevent post seismic overtopping. Provision of instruments for monitoring seepage and movement: 15 standpipe piezometers and 18 crest survey marks installed to enhance embankment performance surveillance. TDR cable installed along all embankment crests, which continuously monitors deformation and alarms if crest movement is detected.	1	4	M	DW	Complete	3/08/21
		Concrete structures & embankment penetrations	Structures	Earthquake shaking causing embankment settlement, distortion and cracking	yes	1	5	H	4	Designed for OBE and SEE earthquake loading in accordance with NZSOLD Guidelines plus limited deformation to facilitate gate operation for SEE.	1	4	M	DW	Complete	3/08/21
		Pump Stations	Structures	Earthquake shaking causing damage to pump stations, unable to pump water from pond 2 into Tub, Distribution issue.	No	1	1	L	4	Designed for OBE and SEE earthquake loading in accordance with NZSOLD Guidelines plus limited seepage for SEE.	1	1	L	DW	Complete	3/08/21
		Communications	Emergency Requirements	Earthquake shaking causes loss of comms with the control system.	yes	4	3	H	4	Provision of back-up power supply. UPS provided in each of the control huts to ensure continuity	1	3	M	DW	Complete	3/08/21
		Overfilling	Earthworks	Extreme rainfall overfilling ponds, leading to overtopping and subsequent failure	yes	3	5	E	4	Designed to withstand PMP. Three emergency spillways provided and one fuse plug spillway to prevent overtopping of all the ponds. Low level gated outlets and pumps also provided, which would assist with preventing further intake and enabling dewatering. minimum of 1.5m freeboard available.	1	1	L	DW	Complete	13/08/21
1.05	Wind	Liner Uplift	Liner	Extreme wind lifting, tearing and carrying away sections of the liner	yes	1	4	M	4	Designed to withstand>1 in 100 wind speed. Ballasting detail to prevent uplift of liner during high winds.	1	3	M	DW	Complete	13/08/21
		Overtopping	Earthworks	Extreme wind generating waves in ponds which when full might overtop the embankments	yes	1	5	H	4	Designed to withstand>1 in 100 wind speed. Ample freeboard provided to allow for wave run up.	1	1	L	DW	Complete	13/08/21
1.06	Access	Site Access	Access	Public fall into ponds and drown or vandalise ponds.	yes	2	4	H	4	Provision of perimeter boundary fencing to keep public out locked gate	1	1	L	DW	Complete	13/08/21
		Embankment crest width	Earthworks	Insufficient crest width making access difficult around the site, with the potential to veer into one of the ponds.	yes	2	4	H	4	4m wide crest in accordance with NZSOLD Guidelines	1	3	M	DW	Complete	13/08/21
		Falling	Ponds	Site personnel fall into pond during inspections, surveillance or maintenance.	yes	1	4	M	4	Provision of pond safety ladders around the liner at 200m intervals.	1	2	L	DW	Complete	13/08/21
		Access to Structures	Structures	Potential injury to personnel while undertaking maintenance of structures.	yes	1	4	M	4	Handrailing Included on all structures accessible to the public and at high use areas within perimeter fence (pump station). Pond safety ladders provided adjacent to structures to enable safe access.	1	1	L	DW	In progress	13/08/21
1.07	Debris	Liner Damage	Liner	Pond 2 liner vulnerable to debris damage. Debris could pass into Pond 2 via the service spillway and tear the liner, leading to seepage through the embankment and potential embankment failure.	Yes	1	5	H	4	Construct trash boom in main canal, upstream of service spillway to prevent debris from entering Pond 2. Louvered screen provided on Buffer pond intake inlet. Liner performance requirements outlined in the technical specification.	1	1	L	DW	In progress	13/08/21
1.08	Unreliable flow reading	Instrument	Control system	Poor arrangement of G6 ultrasonic flow meter, leads to poor quality unreliable data.	No	4	1	M	4	Modifying arrangement of G6 ultrasonic flow meter, provides manhole to enable access and maintenance of flow meter as required.	1	1	L	DW	In progress	13/08/21
1.09	subground conditions unknown between Buffer Pond and Pond 1	Ground conditions	Foundation Treatment	Potential to encounter extensive seepage and reject material, potentially unstable	No	1	3	M	4	Additional investigations are planned in this area during tree clearing and pond excavation works. Clearing and investigation of this area is a priority during the construction sequence. Design to be revisited when subground conditions have been confirmed. Assess material when encountered, remove any reject material and provide treatment as necessary.	1	1	L	DW	Will be reviewed when ground conditions have been confirmed	13/08/21
1.10	Design of Control System	Control System	Electrical	Control system does not meet design intent, resulting in potential embankment failure and loss of life.	yes	1	5	H	5	Design review by qualified reviewer.	1	1	L	REL	Will be reviewed on completion of Control System Detailed Design	13/08/21
1.11	Leakage from pressurised penstock	Penstock	Embankment failure	leakage form pressurised penstock leads to internal erosion and dam failure	yes	1	5	H	4	Controlled by headgate.	1	2	L	DW	Complete	13/08/21

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Ref	RISKS ASSOCIATED WITH DESIGN ELEMENTS		Guideword or Guideword No.	Cause & Outcome	Dam Safety Critical?	Risk Matrix			Proposed Control	PROPOSED & APPROVED MITIGATION MEASURES (1 Eliminate, 2 Substitute, 3 Reduce, 4 Engineering Control, 5 Administrative)	Mitigated Risk & Resolution				Status of Mitigation Measures	Date
	Hazard (Prompt or Prompt No.)	Site Factors & Controls (Prompt or Prompt No.)				L	C	LR			L	C	LR	Risk Owner		
1.12	Working on our near water	Log Boom		Drowning	No	2	5	H	4	To reduce the risks of working near water, the log boom has been designed to be constructed on land. The log boom has been designed to direct the trapped debris towards the bank for removal with no need for entering into the canal water.	1	2	L	DW	Complete	13/08/21
2 Construction																
2.01	Access	Site Access	People, Plant and Machinery	Movement of vehicles, plant and machinery, materials on and off site resulting in potential injury to personnel on site.	No	1	5	H	3	Traffic Management Plan, Site Safety Plan, Construction Management Plan. (Traffic Management on site. Site induction and training of site personnel, and safety briefing of visitors to site to address moving equipment hazard. Ensure site access ramps are constructed at a safe gradient. Public not permitted on site. Perimeter fencing to be established around boundary and locked gate and sign in point. Contractor's site specific safety plan and construction methodology. Consider safety and access when selecting stockpile locations)	1	4	M	REL	Will be addressed in CMP, which REL will prepare 3 months prior to construction. Will also be addressed by their Traffic Management Plan and Site Safety Plan, which will also be prepared prior to construction.	
2.02	Traffic	Traffic Management	Traffic	loss of control, traffic accidents.	No	3	5	E	3	Provide traffic management off site if necessary. Maintain roads in safe condition and reinstate roads to pre-site conditions. Have fatigue policy in place and ensure it is implemented.	1	5	H	REL		
2.03	Flooding	Emergency Requirements	Natural Hazard/Inflow control	Flooding of works during construction due to extreme rainfall or mal-operation of main supply canal resulting in cost and programme impacts, potential injury to personnel working in area of ponds (buffer, 1 & 2).		1	5	H	3	Addressed by construction plan, monitoring weather forecasts during construction to prepare mitigation measures. EAP in place for construction. [Prioritise construction of buffer pond emergency spillway and fuse plug spillway as temporary works. Then prioritise tree clearing and subground investigations between buffer pond and Pond 1]	1	3	M	REL/WIL		
2.04	Manual Handling / Heavy Lifting	Work methods, training and competency	Load / Force	Manual handling of heavy items causing strain or crushing injury to personnel on or off site.	yes	1	4	M	3	Traffic Management Plan, Site Safety Plan, Construction Management Plan. Safety training of site personnel and safety briefing of visitors to site to address moving equipment hazard	1	3	M	REL		
2.05	Uplift	Liner Uplift	Wind	Wind damage to lining during placement resulting in injury to personnel	yes	1	4	M	4	Ballasting during construction. Ensuring anchor trenches are backfilled in a timely manner. Restriction on placing liner during high wind events.	1	1	L	REL		
2.06	Weather	Extreme frost or snow	Embankment	Voids in embankment fill causing subsequent embankment settlement/instability, leading to embankment failure and potential loss of lives	yes	1	4	M	4	Addressed by specification and Constructors best practice standard. remove frozen material prior to further placement	1	3	M	REL		
		Extreme heat	Liner	Expansion and subsequent contraction of the liner causing damage to liner, and potential seepage through liner, leading to potential embankment failure and subsequent loss of lives.	yes	1	4	M	4	Addressed by specification and Constructors best practice standard. Restriction on placing liner during periods of high temperatures.	1	3	M	REL		
		Visibility	Impaired visibility	Vision impaired by sun glare or fog, resulting in injury or loss of lives.	yes	1	4	M	4	Traffic Management Plan, Site Safety Plan, Construction Management Plan. Follow constructors best practice standard. Extra caution to be taken on site during periods of poor visibility. Ensure good communications.	1	4	M	REL		
2.07		Protestors		Unsanctioned public access on site, sabotaging construction works.	yes	1	4	M		Stop works until emergency services remove activists. Inspect construction works to confirm nothing has been vandalised. Appoint liaison person to communicate with activists.	1	2	L	REL		
2.08	Hazardous Substances	Dust	Impaired visibility & Contamination	impaired visibility, contaminated neighbour environment causing accidents, health problems associated with air and water pollution.	yes	1	3	M	4	Addressed by specification and Constructors best practice standard and dust control plan and construction management plan.	1	2	L	REL		
		Environment	Spills/clean-up	oil and other spills causing damage to the environment	yes	1	3	M	4	Addressed by specification and Constructors best practice standard. Have spill kits on site. Also considered in construction management plan.	1	2	L	REL		
2.09	Noise	Mobile Plant and Equipment	Hearing difficulty	Noise on site, may have a negative affect on site personnel's awareness, which could result in injury or loss of life. Also, potential for long term loss of hearing.	yes	1	3	M	4	Addressed by Constructors best practice standard. Maintain vigilance and good communications at all times. Wear hearing protection where required and as necessary. Also considered in construction management plan.	1	2	L	REL		
2.10		Mobile Plant and Equipment		Vandalism, damage or theft of mobile plant and equipment impacting on costs and programme	No	2	2	L	3,5	Contractors insurance. Perimeter fencing, locked gate. Also considered in Construction Management Plan.	1	1	L	REL		
2.11	Segregation	Embankment	Oversize component omitted from sampling, PSDs not representative	Preconstruction material sampling may not be representative of larger particle sizes in Zone 4 material sourced from the pond footprint. Design intent is to construct embankments from material sourced from the pond footprint without screening. There may be need to review the zone 4 grading envelope during construction	yes	3	3	H	4	Addressed by specification, Resource consent conditions or Constructors best practice standard. QA/QC manager on site, as well as Design Representative.	1	3	M	REL		
2.12	Inadequate Compaction	Embankment	QA/QC	Inadequate compaction, particularly around the structures, resulting in embankment failure and potential loss of life.	yes	2	5	H	4	Addressed by specification, Resource consent conditions or Constructors best practice standard. QA/QC manager on site, as well as Design Representative.	1	1	L	REL		

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2.13	Lack of Coordination	Supervisor competence/technical, communication and organisational skills	QA/QC	lack of coordination and enrolment resulting in unsatisfactory QA/QC, which could lead to low quality embankment and potential failure, with subsequent loss of lives.	yes	2	5	H	4	Addressed by specification, Resource consent conditions, Constructors best practice standard, and site supervision. Requires good communication between all parties, as well as timely responses from the QA/QC Manager and independent certifier if any issues have been identified.	3	3	H	REL/DW/WIL		
2.14	Lack of as-built record	Project	Documentation	Poor document record and management leads to lack of knowledge and poor understanding of dam behaviour.	yes	2	3	M	4	Addressed by specification, Resource consent conditions, Constructors best practice standard and site supervision. QA/QC, as-built drawings and construction report.	1	3	M	REL/DW/WIL		
2.15	General Site Safety	Site Conditions	Facilities	no toilets, car parking, site offices or smoko facilities. Poor hygiene, difficult to manage control on site, no shelter for personnel from extreme weather conditions.	no	1	3	M	1	Facilities including toilets, site offices and car parking will be provided.	1	1	L	REL		
2.16	Unsatisfactory Instrument Installation	Instrumentation	Embankment failure	Incorrect installation of instrumentation leads to incorrect readings, leading to false performance interpretation and potential for PFM to develop and progress undetected.	yes	1	4	M	4	Specialist instrument installation required for deformation survey markers, TDR and piezometers, and magflow	1	2	L	REL		
2.17	Covid19	Pandemic	Cost & Programme	lockdown causes impact on construction programme and costs	no	4	1	M	5	Covid Management Plan ion place	3	1	L	REL		
2.18	Fire	Vegetation	Cost & Programme	Forest fire impacts on site works and affects construction cost and programme, potential injury or loss of lives.	no	1	4	M	3	Controlled fire breaks around the perimeter, and water tanks on site. Vegetation control around site.	1	2	L	REL		
2.19	Earthquake	Embankment & Structures	Cost & Programme	Extreme earthquake event during construction works impacting on works carried out to date.	yes	1	5	H	3,5	Special post-earthquake inspection of all structures and construction works prior to progressing with works. And EAP in place and should be implemented if necessary.	1	2	L	REL		
2.20	Control System Set-up	Control System Installation	Electrical	Control system installation is carried out by incompetent personnel, resulting in control system not meeting design intent, resulting in potential embankment failure and loss of life.	yes	2	3	M	4	Control system to be set-up and tested by control system designer before commissioning stage. Control system to be reviewed by qualified reviewer.	1	2	L	REL		
2.21	Working on our near water	Log Boom		Drowning	No	2	5	H	4	Trash boom is to be installed on water by experienced marine contractors.	1	2	L	DW	13/08/21	
3 Commissioning																
3.01	Gates/pumps/control system failure	Gates/control system	Electrical	Gates, pump stations or control system do not work as intended, resulting in embankment overtopping, failure and subsequent loss of lives	Yes	2	1	L		Dry testing prior to filling and wet testing. Have Commissioning plan in place.	1	1	L	REL	DW will prepare commissioning plan, which will be issued to ECan for approval 3 months before commissioning starts.	
3.02	Earthquake	Seismic Event	Embankment Failure	Extreme earthquake event during commissioning fails dam.	yes	1	5	H	3,5	Special post-earthquake inspection of dam site. EAP in place. Dam designed for OBE and SEE earthquakes.	1	2	L	DW	DSMP. EAP and EEP will be updated before commissioning and will be reviewed by the independent certifier, with certificates issued to the RMA 3 months before filling.	
3.03	Stored Energy	Pond filling	Load / Force / Pressure / Head	Embankment failure causing extensive flooding and potential loss of life	Yes	2	5	H		Received sign off to proceed with commissioning, as per RC conditions. Emergency Requirements DSMP & EAP prior to commissioning & submission to Ecan before commencement of commissioning. Safety monitoring to detect development of a failure mode and initiation of remedial measures, formally addressed in commissioning report. Ponds filled in hold point stages, to assess performance. Enhanced surveillance carried out during commissioning period.	1	2	L	DW/REL		
		Maintaining at FSL	observation/data analysis	extreme rainfall event occurs while ponds are maintained at FSL, resulting in embankment overtopping and failure causing extensive flooding and potential loss of life	Yes	2	5	H		Monitoring weather forecast and drawing down ponds if necessary. Safety monitoring to detect development of a failure mode and initiation of remedial measures. Considered in commissioning plan and report.	1	4	M	DW/REL		
4 Operations and Maintenance																
4.01	Stored Energy	Emergency Requirements	Load / Force / Pressure / Head	Surveillance data indicating need for response - development of a failure mode leading to embankment failure, potentially causing extensive flooding and potential loss of life	Yes	3	4	H	4	Safety monitoring to detect development of a failure mode and initiation of remedial measures, formally addressed in commissioning and management report	1	4	M	WIL	DSMP, EAP and EEP will be updated before commissioning and will be reviewed by the independent certifier, with certificates issued to the RMA 3 months before filling.	
4.02	Incompetent Operations, Maintenance and Surveillance Personnel	Management	Competency	Untrained surveillance inspectors and operations and maintenance personnel, leading to PFMs progressing without detection.	yes	3	5	E	5	Appropriate dam safety training of all operations, maintenance and surveillance staff	1	4	M	WIL		
4.03	Public	Access	Access / Egress	Members of the public entering site and (1) drowning in the ponds or (2) vandalising the equipment that would result in the mal-function of the scheme and subsequent embankment failure and resulting in loss of lives.	Yes	3	4	H	4	Restrict public access on site throughout operation. Perimeter fence and locked gated access. Behaviour/performance/regular review of surveillance data/high frequency in 1st year. Also addressed by DSMP and EAP.	1	4	M	WIL		
4.04	Lack of management of DSIs	Emergency Requirements	Management	Dam safety Issues identified in the monthly reviews, IDSRs and CDSRs not being managed and addressed in a timely manner, leading to deterioration of the structure and the potential progression of PFMs.	yes	3	5	E	4	DSMS will cover management and timely resolution of DSIs, which will be documented in the DSMP.	1	4	M	WIL		
4.05	M&F	Structures and control	Maintenance	Inappropriate maintenance of mechanical/electrical equipment leading to wear and tear, mal-function, release of contents and potential loss of lives.	yes	3	4	H	2	Ensure routine maintenance and gate testing programme is established prior to operation (included power supplies and back-up power supplies). Replace components that have reached the end of their life cycle.	1	1	L	WIL		

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4.06	Embankment overtopping	Embankment	Embankment failure	Rainfall, mal-operation or control system failure leading to embankment overtopping; failure causing extensive flooding and potential loss of life	Yes	2	4	H		Emergency spillways / Control system alarms. Training, site specific knowledge, PFMs, vigilance	1	2	L	WIL	updated by DW for the Operations Stage. Enhanced surveillance in 1st month. Regular reviews to be undertaken.	
4.07	Poor visibility	Emergency Requirements	Access / Egress	Access during night, inadequate lighting could lead to personnel injury and ineffective response	No	3	2	M	3	Lighting, radio communication and central monitoring. Torch available to each operator and radio in inspection vehicles and central office. Remote access to control system	1	2	L	WIL		
4.08	Slips / Trips / Falls	Structures	Access / Egress	fall and injury to operator or contractor personnel	No	3	2	M	3	Access to structures within pond area by trained operation staff and vetted contractors only. Fencing, handrailing and signage provided.	1	2	L	WIL		
4.09	Environmental	Emergency Requirements	Earthquake, extreme rainfall and associated	extreme earthquake and/or rainfall/Extreme wind : -> special inspection and required follow up. Potential for wild fire in extreme draught preventing access by operators	yes	1	4	M	5	Special inspection has a programmed response to earthquake/flooding/extreme wind, with programmed response. Wild fire is a hazard requiring routine vegetation control of pond area. EAP in place, to be implemented as necessary.	1	2	L	WIL		
4.10	Mal-Operation	Consent Conditions	Operation	Operating outside of the consent conditions by exceeding the FSL or permitted storage capacity of 8.2 Mm3. Lack of management reducing the water levels during the off-season, as per the RC.	no	1	4	M	4,5	Agreement with NIWA to manage water levels with control system and adhere to RC conditions.	1	1	L	WIL		
4.11	Degradation of Liner	Liner	Liner degradation	liner degradation results in tear in liner and subsequent embankment failure and loss of lives	yes	1	5	H	4	replace liner after life expectancy. Test degradation of liner coupons 5-yearly. Enhanced liner provided at corners. White liner which reflects the UV rays. Piezometers in embankment to detect seepage through embankment.	1	2	L	WIL		
4.12	Working on or near water	Log Boom		Drowning	yes	1	5	H	4	Log boom needs at a minimum an annual inspection. Winch boom out of water for inspection and maintenance. Use of experienced marine contractors to inspect as necessary.	1	2	L	WIL		
5 Decommissioning / Demolition																
5.01	Procedure	Dewatering	Management and release of stored water	Ponds dewatered too quickly leading to flooding and potential loss of lives.	yes	1	5	H		Site management control as for construction. Controlled dewatering of ponds and closure of inflow structures	1	3	M	WIL		
5.02	Access	Site Access	Moving vehicles, earthmoving and other equipment	Movement of vehicles, plant and machinery, materials on site resulting in potential injury to personnel on site.	No	1	5	H		TMP, SSP, CMP. Safety training of site personnel and safety briefing of visitors to site to address moving equipment hazard. Public not permitted on site. Perimeter fencing to be established around boundary and locked gate and sign in point.	1	3	M	WIL		
5.03	Demolition	Movement of plant and machinery	Demolition	Poor visibility and noise resulting in potential loss of lives	No	1	4	M		site management control as for construction. TMP, SSP, CMP.	1	3	M	WIL		
5.04	Wind	Liner Uplift	liner	Uplift of liner during removal, due to high winds results in loss of lives or injury	No	1	4	M		site management control as for construction. Restriction on removing liner during high winds.	1	1	L	WIL		
5.05	Manual Handling	Work methods, training and competency	Load / Force	Manual handling of heavy items causing strain or crushing injury to personnel	No	1	4	M		Safety training of site personnel and safety briefing of visitors to site to address moving equipment hazard				WIL		
5.06	Noise	Mobile Plant and Equipment	Hearing difficulty	Noise on site, may have a negative affect on site personnel's awareness, which could result in injury or loss of life.	No	1	1	L	4	Addressed by Constructors best practice standard. Maintain vigilance and good communications at all times.				WIL		
5.07	Lack of Coordination	Supervisor competence/technical, communication and organisational skills	Communication	Poor communication on site leads to loss of lives or injury	No	1	4	M	4	Addressed by site management and deconstructors methodology.				WIL		
5.08	Environmental	Dust	Impaired visibility & Contamination	impaired visibility, contaminated neighbour environment causing accidents, health problems and pollution.	No	1	1	L	4	Addressed by specification and Contractors best practice standard and dust control plan.				WIL		
5.09	Disposal	Site Management	Environment	pollution and damage to environment	No	1	3	M		Investigate opportunities to recycle demolition materials and liner.				WIL		
5.10	Inadequate Site Reinstatement	Site Management	Environment	Inadequate site reinstatement.	No	2	3	M		Prepare reinstatement plan and ensure it is implemented.				WIL		