APPENDIX D - ENVIRONMENTAL RISK REGISTER: **MacKays to Peka Peka**

CEMP - Construction Environmental Management Plan
ESCP - Erosion and Sediment Control Plans
EMT - Environmental Management Team
EM - Environmental Manager

CM - Construction Manager
SS - Site Superintendent
PE - Project Ecologist
PLA - Project Landscape Architect

Risk Ranking

Consequence \ Likelihood	Probable (PR)	Possible (PO)	Improbable (IM)	
Minor (MI)	Medium	Low	Low	Minor – Low environmental impac that is short-term and can typically be remedied. Impact contained to operational area. Low risk of reputational effect on NZTA and Alliance.
Moderate(MO)	High	Medium	Low	Moderate – Environmental effects which can be remediated or GWRC issuing of Abatement or Infringement Notices. Discharge off site/downstream occurs. Potential risk of media coveratge and impact on reputation of NZTA and Alliance.
Major (MA)	High	High	Medium	Major – Significant environmental effect resulting in costly restoration or prosecution under the RMA. Likely media coverage and impact on NZTA reputation and Alliance.

Issue	Likelihood	Consequence	Risk	Mitigation	Further Reference
Sediment tracking onto roads	PO	MI	Low	Vehicles to remain on stabilised access ways wherever possible. Maintenance of haul road. All entry and exit points from the site are via stabilised entrance ways and wheel wash can be installed if necessary. Monitoring of entry and exit points from the site and road sweeping if required.	Erosion Sediment Control Plan (ESCP) section 2.0 Principle # 13.
Construction waste, general waste	PO	MI	Low	Waste to be removed from site back to main bins at Otaihanga Yard. Waste to be sorted according to type as detailed in the Resource Efficiency & Waste Management Plan (REWMP).	REWMP
Damaging image due to public complaint received	PO	MI	Low	Keep stakeholders informed of activities and maintain access wherever possible. Record complaint, appropriate person to investigate as per CEMP. Advise Stakeholder Manager, who will follow up complaint, respond with results of investigation and actions for site operations.	CEMP Sections 3.7 and 3.8. Stakeholder and Communications Management Plan
Changes to direction and flow of groundwater and drawdown of water table potentially affecting existing wells	PO	MI	Low	Baseline groundwater and surface water monitoring. On-going monitoring as specified in the GWMP. Search of GWRC bore records identifies few bores that might be affected; should effects arise these can be addressed on a case by case basis.	Groundwater (Level) Management Plan (GWLMP)
Water way contamination due to washing vehicles and equipment	IM	MI	Low	Undertake vehicle washing at commercial washing facilities. Wash on pervious surfaces away from storm water cesspits and natural waterways.	CEMP Section 3.6
Contamination during tremi pile dewatering	IM	MO	Low	Water contaminated by concrete/bentonite during tremi pour to be contained and either treated or removed from site by sucker truck. Contact EM to agree treatment before pour.	CEMP Section 3.6
Damaging protected vegetation	IM	MO	Low	Refer to Tree Protection Plan. Trees to be protected are identified in Tree Protection Plan. Site specific plans for works affecting the identified trees. Identified trees to be fenced with temporary fencing or safety mesh. Site smoko, temporary buildings, storage and equipment parking areas shall be outside of the tree dripline. Works within driplines to be supervised by EMT.	Ecological and Landscape Management Plans (EMP, LMP)
pH altered water discharge as a result of flocculation	IM	MO	Low	Implement as per Flocculation Plan. Bench testing indicates no impact on pH from polyacrylamide. ES responsible for system installation, operation and maintenance. ES responsible where batch dosing is required. On-site care should be taken around any storage shed and dosage plumbing.	ESCP Section 7.12 and Appendix L
Disturbing sensitive areas due to storage of construction materials	IM	MI	Low	No storage of equipment or materials in wetlands. Locate stockpiles away from streams and overland flow paths. Install and maintain erosion and sediment controls in accordance with ESCPs. Inspect controls regularly.	Site Specific ESCPs
Disturbing sensitive areas due to establishment of access and yards	IM	MO	Low	No works without Work Plan/ESCP approval. Minimise disturbance, especially for temporary works. Avoid machinery movements in this area where possible.	Site Specific ESCPs
Wastewater from site	IM	MO	Low	Capture wastes using portable tank and vacuum sucker truck. Use portaloos. Connect to sewer with council approval.	CEMP Section 2.6
Odour from construction activities	IM	MO	Low	Monitor areas of peat excavation for excessive or unusual odour	CEMP Section 3.5
Ineffective planting works and pest plant control	PR	MI	Medium	Hold an on-site inception meeting with PE and PLA. Agree on holding points. Hydroseed newly exposed earth. Implement mulching, pest control and security, maintenance and reporting. Pest plants and weeds in wetlands are more invasive and require rigorous management.	EMP, LMP
Lack of environmental awareness	PO	MO	Medium	Environmental site induction, toolbox meetings, specific training (external and internal), work plan procedures	CEMP Section 3.3
Untreated sediment discharge from work site	PO	MO	Medium	Refer to the specific Construction Erosion and Sediment Control Plan (CESCP) for the works area and ensure controls listed are in place and built prior to commencing with works. Methodologies for the various activities as specified within the CESCP need to be carefully followed and managed. The EMT will be responsible for the regular checking of all controls and audits. Extra controls and checks may be required before forecasted heavy rain or before leaving the site for a number of days. All exposed areas of earth resulting from works to be stabilised as soon as practicable. All pumping from the earthworks activity is to be managed in accordance with pumping methodology provided and the "Permit to Pump" system. Prior to any earthworks within each sector occurring a new updated CESCP is to be developed for endorsement by Council. This CESCP will be consistent with the ESCP and will include the principles and practices and also introduce innovative and new opportunities to ensure sediment discharge is minimised.	CEMP Section 3.5, CESCP's for specific sections. Section 6.0 and section 7.0 of ESCP
Contaminated land and groundwater	PO	MO	Medium	Ensure agreed protocols are adhered to in areas identified as contaminated. Dispose of contaminated material off site to approved disposal facility. Remove contaminated groundwater with sucker truck for off site disposal or pump to sewer with prior authorisation.	Contaminated Soils and Groundwater Management Plan (CSGMP) Section 3
Oil escape from hydraulic hose bursts	PO	MO	Medium	Stop machine. Contain spill. Prevent discharge to waterways or storm water cesspits. Notify Environmental Manager. Initiate clean-up using spill equipment.	Hazardous Substances Management Plan (HSMP)
Spillage during refuelling of plant equipment	PO	MO	Medium	Where possible refuel >10m from waterways using mobile refuelling plant. Operator must be present at all times. Avoid spills to water or ground. Report all spills to EM. Know where your closest spill kit Is located.	HSMP
Spill of other Hazardous substance to the land or waterways	PO	MO	Medium	Spill Procedure to be developed and implemented. Spill kits available across the site. Appropriate training given to all staff. Identify contaminant, stop source, protect receiving environment, contact EM, clean-up. Store hazardous substances in bunded area or appropriate storage container. All storage containers to be labelled.	HSMP

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Risk Ranking

Consequence \ Likelihood	Probable (PR)	Possible (PO)	Improbable (IM)	
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Issue	Likelihood	Consequence	Risk	Mitigation	Further Reference
Sediment discharge during dewatering (e.g. piles, trenches, peat replacement)	PO	MO	Medium	Permit to Pump' required with methodologies outlined and the way these are managed is through the permit system. All water treated prior to discharge. Sediment laden water discharged through grass buffer zone using flocculant filter socks, turkey nests, decanting earth bund or other sediment control as appropriate. Controls inspected before use and ongoing monitoring throughout. Water checked for hydrocarbons and other contaminants before discharge.	ESCP Section 7.11
Adversely affecting the natural flow in surface water ways or wetlands due to implementation of stormwater devices.	PO	MO	Medium	Baseline groundwater and surface water monitoring. On-going monitoring as specified in the GWMP. Alternative techniques or mitigation if exceeds limits.	GWLMP
Changes to direction and flow of groundwater, potentially altering contaminant migration paths [near Otaihanga Landfill]	PO	MO	Medium	Baseline groundwater level and quality monitoring as specified in the GWLMP and CSGMP. Alternative techniques or mitigation if limits are exceeded	CSGMP
Unnecessary riparian vegetation clearance during site establishment activities, culverting, bridge works.	PO	MO	Medium	There is an expectation of best endeavours to avoid existing riparian vegetation and aquatic systems wherever possible outside the construction footprint. In locations where these areas can be avoided or effects minimised, fencing or other markers will be established to demarcate the Projects/Construction Footprint boundary. Contractors working in these areas should be advised that the signage fence demarcates work boundaries that should not be breached.	EMP, LMP
Cement/lime contamination of waterways during soil conditioning	IM	MA	Medium	Correct dose used, occurs only during dry conditions, low-wind. Skirt on truck is to be used at all times. Ponds and receiving waters monitored for pH. Lime ploughed into surface as soon as practicable. If spill occurs EM to be notified to investigate and prevention system in place to prevent discharge into waterways. Notification of nearby stakeholders maybe required.	
Contamination of surrounding area during insitu concreting and grouting	IM	MA	Medium	Isolation of work area from waterways. Collect and dispose of excess concrete to concrete washout (polythene lined skip or pit). All large volumes and concrete remaining in the bowl to be taken back to contractor's yard. Spill kit available for use.	CEMP Section 3.6
Unnecessary vegetation clearance of valued native and exotic vegetation during site establishment and land disturbance activities	IM	MA	Medium	Identification of vegetation to be retained, including and individual specimen trees, prior to site establishment works. Clearance boundaries to be identified and vegetation fenced. No land disturbance (including use of machinery) within dripline of trees or groups of vegetation. Where a deviation from an approved route or area cleared, the new area/route is to be checked by the PE and PLA.	ELMP Vegetation Map Series (Appendix 1) and Planting Plans (Appendix 2).
Unnecessary vegetation clearance of valued wetlands during site establishment activities	IM	MA	Medium	Prior to works the PE and PLA shall approve the physical extent of the wetland vegetation to be marked out for removal/protected. Clearance boundaries to be identified and taped or fenced. Where a deviation from an approved route or area cleared, the new area/route is to be checked by the PE and PLA.	ELMP Vegetation Map Series (Appendix 1) and Planting Plans (Appendix 2).
Culverts and temporary stream diversions preventing fish passage	IM	MA	Medium	Ensure the design of the culverts do not impair fish passage. Maintaining fish passage within all the drains and streams traversed by the Expressway Alignment is important to retain existing aquatic habitat and connectivity. To achieve this result will require detailed design and considerable care during construction, and in some cases, ongoing monitoring and maintenance.	EMP, LMP. Appendix L.
Hazardous air pollutants from work on contaminated land	IM	MO	Medium	Ensure agreed protocols are adhered to in areas identified as contaminated. Monitor suspended particulate, using appropriate alert thresholds.	Construction Dust Management Plan (CAQMP) Section 3
Asbestos from work on contaminated land	IM	MO	Medium	Cease work in immediate area. Specialist contractors required to identify extent of contamination and to remove contaminated material	
Unnecessary damage to dune landforms and poor reshaping of modified dunes.	PR	MO	High	Once engineering earthwork drawings are finalised, the Alliance (particularly the machine operators) and the Landscape Architect shall meet on-site to go through the drawings and discuss how to approach the earthworks within dune landscapes and in particular the reshaping. hold points' should be identified and agreed to, in order for timely site visits by the Project Landscape Architect to monitor works before the next phase of activity commences. Communication between the Contractors and the Project Landscape Architect is necessary to ensure progress updates reflect coordinated site visits.	EMP, LMP
Non compliant construction noise	PR	MO	High	Plan and carry out site operations in accordance with Construction Noise Management Plan. Ensure high risk noise areas are identified and communicated to work teams. Perform noise monitoring. Use noise barriers where appropriate if limits are likely to be exceeded. Advice from (external) noise mitigation specialists as required. Stakeholder Manager should be advised of all noisy and night works, and residents notified.	Construction Noise and Vibration Management Plan (CNVMP)
Non compliant construction vibration	PR	MO	High	Existing Condition Surveys of buildings condition close to works. Baseline monitoring. Monitoring as required during high risk construction activities. Alternative techniques or cease work if vibration exceeds limits. Selection of appropriate equipment and frequency/machinery speeds. Inform Stakeholders 3 days prior to construction with potential vibration effects. Education of residents regarding perceived vibration issues.	CNVMP
Dust from construction activities	PR	MO	High	Wetting of any areas of concern, rapid stabilisation, limiting speed of traffic, keeping surfaces and structures clean, and regular road sweeping. SS and EM to plan site specific mitigation measures. Monitoring of works. EM to investigate complaints. Particular care taken at identified areas sensitive to dust. Stabilisation of haul roads and batter slopes using a combination of revegetation and hard fill - water supply also secured to ensure adequate supply for dust suppression. Undertaking works at times of the year when dust generation will be minimised - wetter periods.	ESCP section 5.4 and throughout

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Issue	Likelihood	Consequence	Risk	Mitigation	Further Reference
Disturbance, sedimentation and turbidity in Waikanae River	PR	MO	High	No works without specific Work Plan approval. Minimise disturbance, especially for temporary works. Works in accordance with approved ESCPs Site specific work plans to be approved by EM. Triggered sedimentation and turbidity monitoring. Waikanae River works outlined in section 7.10 of ESCP and Appendix R Drawings.	Site Specific ESCP's ESCP Appendix R, and EMP and LMP
Archaeological site disturbance	PO	MA	High	Areas of archaeological concern identified before construction, and archaeologist to remain onsite in these areas. Accidental discovery procedures included in site induction. CM to notify EM and Archaeologist; who will inform NZ Historic Places and Tangata Whenua. Works to cease in the area and the site secured.	CEMP Section 3.5
Contamination due to works in and around watercourses	PO	MA	High	Capture slurry and dispose to pit, skip bin or off-site. Use a wet-vac to capture slurry. Do not allow to enter natural waterways or storm water drains. Stone column / rip rap and bridge establishment methodology to be followed at all times. Culvert placement and any works within watercourses to follow methodologies which includes both structural and non structural control measures. Ensure timing of works is such that risk profile is reduced as much as possible by avoidance of high stream flows and where practicable avoidance of periods of fish spawning and migration.	ESCP in particular Section 7.6, 7.7, 7.8, 7.9, 7.10, 7.12 and 7.14
Settlement of buildings due to peat removal methodology	PO	MA	High	Confirm methodology to be undertaken through onsite trials. Pre condition building surveys undertaken at high risk locations. Settlement monitoring undertaking if deemed appropriate	Settlement Monitoring Management Plan (SMMP)
Settlement of the ground due to construction dewatering resulting in damage to buildings or services	PO	MA	High	Baseline ground survey and groundwater monitoring. On-going monitoring as specified in the GWMP. Alternative techniques or mitigation if exceeds limits.	GWLMP
Adversely affecting the natural flow in surface water ways or wetlands due to dewatering activity.	PO	MA	High	Baseline groundwater and surface water monitoring. On-going monitoring as specified in the GWMP. Alternative techniques or mitigation if exceeds limits.	GWLMP
Hydrological changes to wetlands from the preloading and peat compaction.	PO	MA	High	Monitoring of surface water levels and groundwater levels as outlined in the ELMP and GWMP and reporting to the PE and EMT.	EMP, LMP