Risk Assessment – Cockatoo Swamp Levee Removal:

The following risk assessment was developed to assess the potential risks involved with the Cockatoo Swamp Levee Removal project. The assessment demonstrates the potential impact of the risks, and the mitigation actions that will be implemented to reduce the likelihood of such impacts occurring. This risk assessment supplements the Environmental Management Plan (EMP). The assessment was conducted through discussion with input from those involved in each aspect of the project. The risks identified cover all facets of the works and the rehabilitation after the levee removal works have been completed. These include possible impacts on the swamp, flora and fauna, stakeholders and community, cultural heritage and amenity of the works area.

Once identified, the risks were analysed and assigned with a potential impact and a likelihood of occurring. The potential impact was determined from table 1 which gives an indication of the severity of the impact using the categories of Catastrophic, Major, Moderate and Minor. A likelihood rating was given (Certain, Likely, Unlikely, Rare) and the overall risk was defined from table 2, using both the likelihood of occurring and potential of the impact to determine the risk; Significant, Medium or Low. This process was first completed assuming an 'unmitigated' scenario to identify the 'true risk.' It was then repeated using the mitigation actions that will be implemented to minimise the potential for the risks to occur (Table 3). The 'residual risk' rating is shown as the mitigated risk rating and demonstrates the final risk rating associated with the project.

After the mitigation actions are applied, each of the risks are classified as low, given the strict controls in place.

Table 1 The potential impact and corresponding severity

Potential Impact	
Catastrophic	Significant damage or impact on environment or community e.g. ▪ severe and/or persistent waterway/ stormwater quality pollution ▪ deaths of fauna/ flora ▪ widespread and/or significant changes to ecosystems ▪ soil contamination over an area > 10 m^2 , contamination of offsite soil or contamination of soil with prescribed or hazardous materials ▪ widespread community impact resulting in illness, injury or inconvenience ▪ loss or destruction of archaeological/heritage places, sites or objects receiving a fine/s is a certainty or works will be halted
Major	Major adverse environmental or social impacts e.g. ▪ medium-term, noticeable/measurable change in waterway/ stormwater quality ▪ isolated deaths of non-vulnerable fauna/ flora species ▪ noticeable, localised changes to ecosystems ▪ soil contamination over an area 1m^2 – 10 m^2 (excluding contamination of offsite soil or contamination of soil with prescribed or hazardous materials) ▪ annoyance or nuisance to community ▪ frequent, partial damage or off site movement of archaeological/heritage places, sites or objects ▪ fining likely or works may be halted
Moderate	Moderate undesirable environmental or social impacts e.g. ▪ localised, short term noticeable/measurable change in waterway/ stormwater quality ▪ short term, minor changes to ecosystems ▪ soil contamination over an area <1m^2 (excluding contamination of offsite soil or contamination of soil with prescribed or hazardous materials) ▪ some annoyance or nuisance to community ▪ isolated, partial disturbance or movement of archaeological/heritage places, sites or objects ▪ fines unlikely
Minor	No or minimal adverse environmental or social impacts e.g. ▪ no measurable/ unlikely effect on waterway/ stormwater quality and ecosystems ▪ no or isolated community complaints ▪ no or isolated events where areas of soil <1m2 is contaminated (excluding contamination of offsite soil or contamination of soil with prescribed or hazardous materials) ▪ no or unlikely impact on archaeological/heritage places, sites or objects ▪ no likelihood of being fined

Table 2 Likelihood and consequence risk rating

	Consequence			
Likelihood	**Rare**	**Unlikely**	**Likely**	**Certain**
	Unlikely to occur during a project even if controls are missing.	May occur once or twice during the project if preventative measures are not applied.	Will occur more than once or twice but less than weekly if preventative measures are not applied.	Will occur at a frequency greater than every week if preventative measures are not applied.
Catastrophic	Medium	Significant	Significant	Significant
Major	Medium	Significant	Significant	Significant
Moderate	Low	Medium	Significant	Significant
Minor	Low	Low	Medium	Medium

Table 3 Cockatoo Swamp Levee Removal Project Risk Assessment

Risk Assessment

Project Name	**Cockatoo Swamp Levee Removal**	**Project Location**	**Cockatoo Creek u/s Yellingbo**
Revision Date	**02/03/2017**	**Project Manager**	**Edwina Manifold**
Prepared By	**Jacobs**	**Reviewed By**	**Roger Winders**

Potential Impact	**Key risk**	**Unmitigated risk rating**			**Mitigation actions**	**Mitigated risk rating**		
		Likelihood	**Potential impact**	**Consequence**		**Likelihood**	**Potential impact**	**Consequence**
Noise	Disruption to amenity and/or fauna (during construction only): • Increased noise due to construction works. • Increased noise due to traffic and people on-site.	Certain	Minor	Medium	• Working Hours limited to: 07:00 to 18:00 Mon-Fri, 07:00 to 15:00 Saturdays • Limit number of vehicles and machinery on-site	Unlikely	Minor	Low
Erosion and sediment control	Possible contamination and pollution into environment: • Erosion due to levee removal • Erosion due to vegetation removal • Potential mobilisation of acid sulphate soils (ASS)	Likely	Moderate	Significant	• Cleared areas will be reinstated • Spoil will be hydromulched once placed, using a mixture of native grasses, typical to the region • The levee cuts will be hydromulched to reduce the possibility of scour • If the ground conditions are too wet to allow access then hand mulching with sterile straw should take place • Revegetation of spoil areas shall take place as directed by Parks Victoria. The Melbourne Water Planting Guidelines and Standards for Plant installation will also be considered. • An Acid Sulphate Soils (ASS) Management Plan has been prepared for the site • If a potential acid sulphate soil hazard is identified, waste acid sulphate soils and rock will be managed in accordance with the requirements of the ‘Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999’.	Rare	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
Bushfire	Impact of bushfire: • On machinery • Caused as a result of malfunction or neglect by contractors	Unlikely	Major	Significant	• All activities will cease on days of Total Fire Ban where fire danger ratings are Severe or above	Unlikely	Minor	Low
Waste and resource use	Possible contamination and pollution into environment: • Waste due to construction and works • Mobilisation of acid sulphate soils (ASS)	Likely	Moderate	Significant	• An Acid Sulphate Soils (ASS) Management Plan has been prepared for the site • The waste hierarchy AVOID-REDUCE-REUSE-RECYCLE will be used by the site. • All waste materials will be assessed and disposed of according to the relevant guidelines and legislation • Any suspected contaminated material to be tested and assessed in accordance with EPA's IWRG621 Soil hazard categorisation and management. • If a potential ASS hazard is identified, waste ASS and rock will be managed in accordance with the requirements of the 'Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999'.	Rare	Minor	Low
Weeds and Pathogens	Introduction and spread of weeds and/or pathogens: • Transfer of weeds and/or pathogens to and from site by vehicles/equipment	Likely	Minor	Medium	• Operators to inspect vehicles and plant, and remove any vegetation or mud which could contain seed or infected soils – before entering and leaving the site • Vehicles to be cleaned using phytoclean • Implement best practice hygiene protocol(s) for control of pathogens and weeds, to prevent the transfer and reduce the risk of the introduction and spread of weeds and pathogens [Refer to Parks Victoria hygiene protocols for Phytopthera and other potential soil pathogens (2002) and *Arrive Clean, Leave Clean* guidelines from DoE].	Rare	Minor	Low
Flora and Fauna	Clearance of native vegetation: • Damage to native flora	Likely	Moderate	Significant	• Before works commence, temporary protection fencing must be erected around the permitted area of native vegetation clearing under the supervision of a suitably qualified ecologist. All fencing must remain in place until all works are completed. • Ensure the communication of ecologically sensitive areas to contractors to minimise likelihood of inadvertent disturbance. This will be done during induction and toolbox meetings • Access tracks and construction works shall be planned to avoid native vegetation impact as far as practicable. The final access track alignment should be reviewed and confirmed prior to construction, with consideration of the ground conditions at the time and to minimise disturbance to vegetation. • Vegetation (habitat) permitted for removal will be clearly marked with temporary fencing (bunting) by a suitably qualified ecologist. The fencing is to remain in place for the duration of the works to ensure that no direct or indirect disturbance occurs beyond the fenced area. • All on-site personnel are to be inducted by a suitably qualified ecologist to communicate the sensitivities of	Unlikely	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
					threatened species and their habitats and potential impacts of their works. • In areas dominated by woody shrubs that have a high potential to damage vehicle tyres, the most minimal vegetation removal will occur, as practicable. • Slashed vegetation material will be dispersed around areas surrounding the project area or elsewhere in the reserve, as agreed by Parks Victoria, to provide habitat. • Refer to Threatened Species Management Plan.			
	• Damage to native fauna and/or fauna habitat	Unlikely	Moderate	Medium	• Ensure all on-site personnel are inducted by a suitably qualified ecologist to communicate the sensitivities of threatened species and their habitats as relevant to the project, to minimise the likelihood of inadvertent disturbance and to communicate stop-work procedures if any fauna species are present and at risk of direct impact (injury/death) on the construction site. • A qualified and licensed fauna spotter/catcher will be present at the time of permitted habitat clearing to assess for fauna presence. Fauna detected will be encouraged to disperse of natural accord or transferred to suitable habitat using methods in accordance with approved fauna ethics licensing • Vegetation (habitat) permitted for removal will be clearly marked with temporary fencing (bunting) by a suitably qualified ecologist. The fencing is to remain in place for the duration of the works to ensure that no direct or indirect disturbance occurs beyond the fenced area; • Where native animals are present during construction works, works should cease and the animal be relocated/given the opportunity to naturally disperse outside the works area • Slashed vegetation material will be dispersed around areas surrounding the project area or elsewhere in the reserve, as agreed by Parks Victoria, to provide habitat. • Refer to Threatened Species Management Plan	Rare	Minor	Low
Stakeholder/adjacent landholders/community	Disruption to key stakeholders, particularly Parks Victoria staff	Unlikely	Moderate	Medium	• Levee works to only occur during the day for a maximum of two days. Working Hours limited to: 07:00 to 18:00 Mon-Fri, 07:00 to 15:00 Saturdays. • Key stakeholders (Stakeholder Reference Group) have been involved in the project design throughout the whole project • Landowner consent to be signed by DELWP • Public land manager consent received from Parks Victoria (land manager) • Yarra Ranges Council has been engaged throughout the project • Key stakeholders will be informed of the project schedule and any other relevant communications prior to the commencement of work. • Adjacent landholders are unlikely to be affected as the project works have been designed to not have any detrimental effect (eg. Flooding) on upstream	Unlikely	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
					landholders. Works and access to the site will only take place within the Reserve; no works or access is to take place on private freehold properties/ The Reserve is not publically accessible.			
Cultural Heritage	Damage to cultural heritage items	Rare	Moderate	Low	• A Cultural Heritage Management Plan (CHMP) has been prepared for the site and will be implemented • Site personnel will be trained in identifying cultural artefacts and relevant protocols should cultural artefacts be discovered as a result of any works or disturbance	Rare	Minor	Low
Access/Parking	Potential disturbance of native vegetation	Likely	Moderate	Significant	• Limit the number of cars on site to avoid parking or traversing on vegetation • Parking will be limited to the defined construction footprint, access routes as determined through onsite survey or the existing vehicle tracks	Rare	Moderate	Low
	Potential disturbance to native fauna	Unlikely	Moderate	Medium	• The potential for disturbance to threatened fauna species (HeHo and LBP) has been discussed with the relevant experts and is minimal for this area of the reserve. • Timing of works outside Helmeted Honeyeater breeding season (January – April).	Rare	Moderate	Low
Flooding	Floods potentially encroaching on equipment then being washed into creek	Unlikely	Moderate	Medium	• Store equipment within cleared area away from watercourse during construction • Monitor weather conditions prior to each day	Rare	Moderate	Low
	Danger to workers and environment	Unlikely	Major	Significant	• No work when severe weather is forecast • Melbourne Water flood team advised of works, and will provide warnings if flows predicted to be dangerous	Rare	Minor	Low
Post works/Site rehabilitation	Habitat quality may be further reduced if vegetation is not encouraged to regenerate as quickly as possible following works	Likely	Moderate	Significant	• The disturbance footprint will be closed off with temporary fencing (bunting) to limit unauthorised access that may hinder natural regeneration of the native vegetation. • A reinstatement plan of affected areas will be developed by Parks Victoria and Melbourne Water. At the conclusion of the project, discussion is to be had with Parks Victoria to establish whether the natural regeneration occurring is adequate and weed establishment is being avoided or whether supplementary planting is required in the disturbed area.	Rare	Moderate	Low