Risk Assessment – Dewatering Project:

The following risk assessment was developed to assess the potential risks involved with the Cockatoo Swamp hydrology improvement 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, the operation of the pipeline and the rehabilitation after the pipeline has been removed. 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, the majority of the risks are classified as low, with the exception of the impact of bushfire and potential damage or disturbance to native vegetation and fauna. These are assessed as medium. The increased consequences for these risks are due to the presence of the Helmeted Honeyeater and Leadbeater's Possum. However, with the strict controls in place, the probability of these risks occurring is significantly low.

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 Dewatering Project Risk Assessment

Risk Assessment

Project Name	**Cockatoo Swamp Temporary Pipeline**	**Project Location**	**Cockatoo Creek u/s Yellingbo**
Revision Date	**02/03/2017**	**Project Initiator**	**Edwina Manifold**
Prepared By	**Jacobs**	**Project Manager**	**Toufeek Edross**

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: • Increased noise due to works, including vehicles and machinery. • Increased noise due to the pump.	Certain	Moderate	Significant	• Working Hours limited to: 07:00 to 18:00 Mon-Fri, 07:00 to 15:00 Saturdays • Silenced, bunded pump • Pumping works will occur outside of Helmeted Honeyeater breeding season (January – late April)	Unlikely	Minor	Low
Erosion and sediment control	Possible contamination and pollution into environment: • Erosion due to discharge from outlet • Erosion due to vegetation removal • Silt management	Likely	Moderate	Significant	• The pipeline outlet will be surrounded by sandbags, in order to reduce energy of water discharge to the creek channel and potential for erosion. • Photo monitoring of outlet and downstream locations will take place according to the prepared Monitoring Plan. Discharge to be reduced if significant silt movement or erosion is detected. • Vegetation removal will be by slashing/cutting, reducing the risk of sediment mobilisation. • Placement of silt curtains around the area of disturbance to minimise the potential for mobilised silt to be dispersed into the aquatic environment and compromise habitat quality for aquatic species, including threatened fish and amphibians • Allow 2-3 days after excavation at inlet before placing pumps and fuel cell • Silt will be removed to a licensed waste disposal facility.	Rare	Minor	Low
Waste and resource use	Possible contamination and pollution into environment:	Likely	Moderate	Significant	• An Acid Sulphate Soils (ASS) Management Plan has been prepared for the site • The waste hierarchy AVOID-REDUCE-REUSE-	Unlikely	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
	• Waste due to construction and works • Mobilisation of acid sulphate soils (ASS)				RECYCLE will be used by the site • All waste materials will be assessed and disposed of according to the relevant guidelines and legislation • Spoil to be disposed of off-site • 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 must be managed in accordance with the requirements of the 'Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999'.			
Bushfire	Impacts of bushfire: • On infrastructure such as pumps, fuel tanks and pipelines • Caused as a result of malfunction of pumping equipment or neglect by contractors	Unlikely	Major	Significant	• All activities, including pumping, will cease on days of Total Fire Ban or where fire danger ratings are Severe or above	Unlikely	Moderate	Medium
Chemicals	Contamination of environment, danger to flora and fauna: • Spill of fuel during pump operation & refuelling	Unlikely	Major	Significant	• Fuel cell fully bunded • 10,000 litre fuel tank used to reduce frequency of refuelling (once per month) • Refuelling to take place a minimum of 10m away from permanent water bodies • Spill response kits will be placed at designated locations • Contractors appropriately briefed on environmental issues, work procedures and emergency response/notifications	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	Moderate	Significant	• 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 transfer and reduce the risk of 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].	Unlikely	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 • Clearing through slashing (minimum height of 100mm)	Unlikely	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
					to allow vegetation to regrow when the pipeline is not in place. • In areas dominated by sedge understorey where the potential for slashed vegetation to damage vehicle tyres is negligible, vegetation will be slashed to a minimum of 10cm. In areas dominated by woody shrubs that have a high potential to damage vehicle tyres, vegetation removal will occur at the minimum height practicable. • The flexible pipeline will be placed on top of vegetation on the natural ground surface and will avoid disturbance of established trees. • No top soil will be removed • Removal of the most minimal amount of in-stream vegetation as possible to achieve the required inlet functionality requirements • Ensure in-stream habitat features, such as logs and rocks, are retained and placed nearby to ensure aquatic habitat values are not significantly compromised in this area • The pipeline will be installed by hand to reduce traffic and potential impact on native vegetation and threatened species habitat • Along the roadway where the pipe will sit in the roadside drain, the pipe will be secured by star pickets (or similar) to ensure the pipe doesn't travel into the native vegetation that is not permitted for disturbance • All infrastructure to be removed at the end of the trial period each year to reduce the chance of permanent impact on vegetation (i.e. removal of pipes and pumps prior to winter).			
	• Damage to native fauna and/or fauna habitat	Certain	Major	Significant	• In areas dominated by sedge understorey where the potential for slashed vegetation to damage vehicle tyres is negligible, vegetation will be slashed to a minimum of 10cm. In areas dominated by woody shrubs that have a high potential to damage vehicle tyres, vegetation removal will occur at the minimum height practicable. • Vegetation (habitat) permitted for slashing 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. • 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 prior to removal/slashing. Fauna detected will be encouraged to disperse of	Unlikely	Moderate	Medium

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
					natural accord or transferred to suitable habitat using methods in accordance with approved fauna ethics licensing. • 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 • Ensuring proposed works remain within the proposed construction footprint by ensuring temporary fencing is erected for the duration of the works and that no direct or indirect disturbance occurs beyond the fenced area; • Refer to Threatened Species Management Plan			
Stakeholder/adjacent landholders/community	Disruption to key stakeholders, particularly Parks Victoria staff and Helmeted Honeyeater volunteer feeders who work in the Reserve	Likely	Moderate	Significant	• 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 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 • Project updates to be provided to the Stakeholder Reference Group and other key stakeholders on a regular basis.	Unlikely	Minor	Low
Cultural Heritage	Damage to cultural heritage items	Rare	Moderate	Low	• A Cultural Heritage Management Plan (CHMP) has been prepared for the site • 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 vehicles on site to avoid parking on vegetation • Parking will be limited to the defined construction footprint permitted for clearing or the existing vehicle tracks	Unlikely	Minor	Low
	Potential disturbance to native fauna	Likely	Moderate	Significant	• The potential for disturbance to threatened fauna species (HeHo and LBP) has been discussed with the relevant experts. The noise generated by the silent pumps has been recommended by the experts as being acceptable and unlikely to incur significant disturbance to the threatened species.	Unlikely	Minor	Low

Potential Impact	Key risk	Unmitigated risk rating			Mitigation actions	Mitigated risk rating		
		Likelihood	Potential impact	Consequence		Likelihood	Potential impact	Consequence
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 • Should weather forecast/flood modelling indicate any potential for flooding of the work area, pumps and fuel storage tanks will be made safe or removed from the site	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	• Where possible, native vegetation will be slashed to a minimum height of 100mm from the ground to enable the current species assemblage to persist, minimise the potential for weed establishment, and to encourage native regrowth once the pipeline and associated works areas are closed. In areas dominated by woody shrubs that have a high potential to damage vehicle tyres, vegetation removal will occur at the minimum height practicable. • 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. • All infrastructure is to be removed at the end of the trial period each year to reduce the chance of permanent impact on vegetation (i.e. removal of pipes and pumps prior to winter).	Rare	Moderate	Low