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Monkey Mia Dolphin Resort

Construction Management Plan

Prepared for
RAC Tourism Assets Pty Ltd
by Strategen

April 2017

strategen
ENVIRONMENTAL

Monkey Mia Dolphin Resort

Construction Management Plan

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

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Client: RAC Tourism Assets Pty Ltd

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
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Final Report	**2**	**Submit to OEPA**	**T. George / M. Brook**	**Electronic**	**11 April 2017**

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1. Summary

This Construction Management Plan (CMP) is submitted in accordance with Ministerial Statement (MS) 709 condition 2-1 and commitment 2 & 3 of Schedule 2 for the Monkey Mia Dolphin Resort expansion (the Project) by RAC Tourism Assets Pty Ltd (RAC).

Table 1 below presents the environmental management targets to measure achievement of the conditioned environmental objective that must be met through implementation of this CMP.

Table 1: Environmental management targets

Required information	Response	
Title of proposal	Expansion of the Monkey Mia Dolphin Resort, Monkey Mia, Shark Bay.	
Proponent	RAC Tourism Assets Pty Ltd.	
Ministerial Statement number	709.	
Purpose of this Condition EMP	The Construction Management Plan is submitted to fulfil the requirements of condition 2-1 and commitment 2 and 3 of Schedule 2 of the above Statement.	
EPA's environmental objective for the key environmental factor	Environmental factor	EPA Environmental objective
	Factor 1 Terrestrial Environmental Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.
	Factor 2 Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.
	Factor 3 Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.
	Factor 4 Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.
Management targets	**Environmental Factor**	**Management Target**
	Factor 1 Terrestrial Environmental Quality	• No unauthorised loss or degradation of vegetation outside the project areas. (T1.2).
		• No uncontained refuse within the project area or in the surrounding environment. (T1.3).
	Factor 2 Amenity	• Maintain the amenity of the area and the health of the surrounding environment by minimising indirect impacts such as dust and noise from Project construction activities. (T2.1).
		• Protect the amenity and surrounding environment by limiting disturbance where possible and by progressive revegetating disturbed areas. (T2.2).
	Factor 3 Terrestrial Fauna	• Protect fauna and its habitat by ensuring no unauthorised clearing or earthworks. (T3.1).
		• No fauna mortality resulting from the Project construction activities. (T3.2).
	Factor 4 Inland Waters Environmental Quality	• Prevent sediment from the Project area entering the ground and surface water environment (T4.1).

Corporate endorsement

I hereby certify that to the best of my knowledge, the Condition EMP provisions in within this Construction Management Plan are true and correct and address the legal requirements of condition 2-1 and commitment 2 & 3 Schedule 2 of Ministerial Statement No. 709.

[Signature of duly authorised proponent representative]

Name: Signed:

Designation: Date:

2. Context, scope and rationale

RAC owns and manages the current Monkey Mia Dolphin Resort located within a World Heritage area on a Shire of Shark Bay reserve. Approval under the *Environmental Protection Act 1986* (EP Act) to expand the resort was granted through issue of MS 709 on 28 December 2005.

As per MS 709, the expansion of the resort comprises the expansion of the existing resort area, the provision of staff accommodation facilities and an upgrade to the wastewater treatment plant (the Project, Figure 1). The Project commenced in 2013 with the upgrade to the wastewater treatment plant, which was subsequently completed in 2014.

This CMP forms a component of the Project Environmental Management System (EMS).

2.1 Scope

Condition 2-1 and commitment 2 & 3 in Schedule 2 of MS 709, requires the proponent to prepare a CMP to ensure construction activities are managed to minimise the potential impacts upon the surrounding environment and visual amenity.

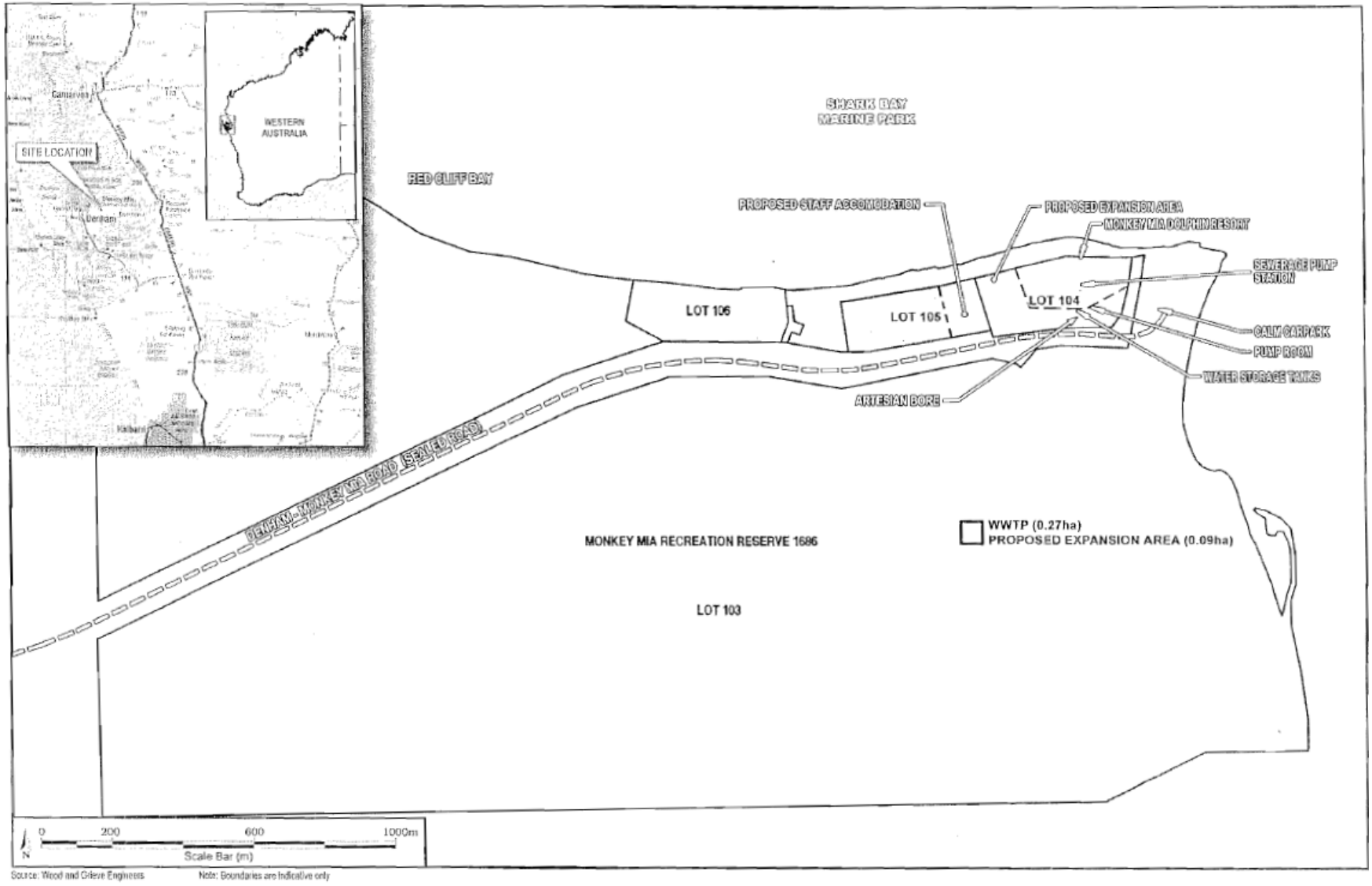
Given that the upgrade to the waste water treatment plant was completed in 2014, this CMP specifically refers to the management of construction activities associated with the resort expansion area and staff facilities (Figure 2). This CMP also addresses the requirements of the existing approved Monkey Mia Dolphin Resort Vegetation and Traffic Plan, Shire of Shark Bay (Appendix 2).

2.1.1 Key environmental factors

The environmental factors, EPA objectives and environmental aspects of the Project are provided in Table 2.

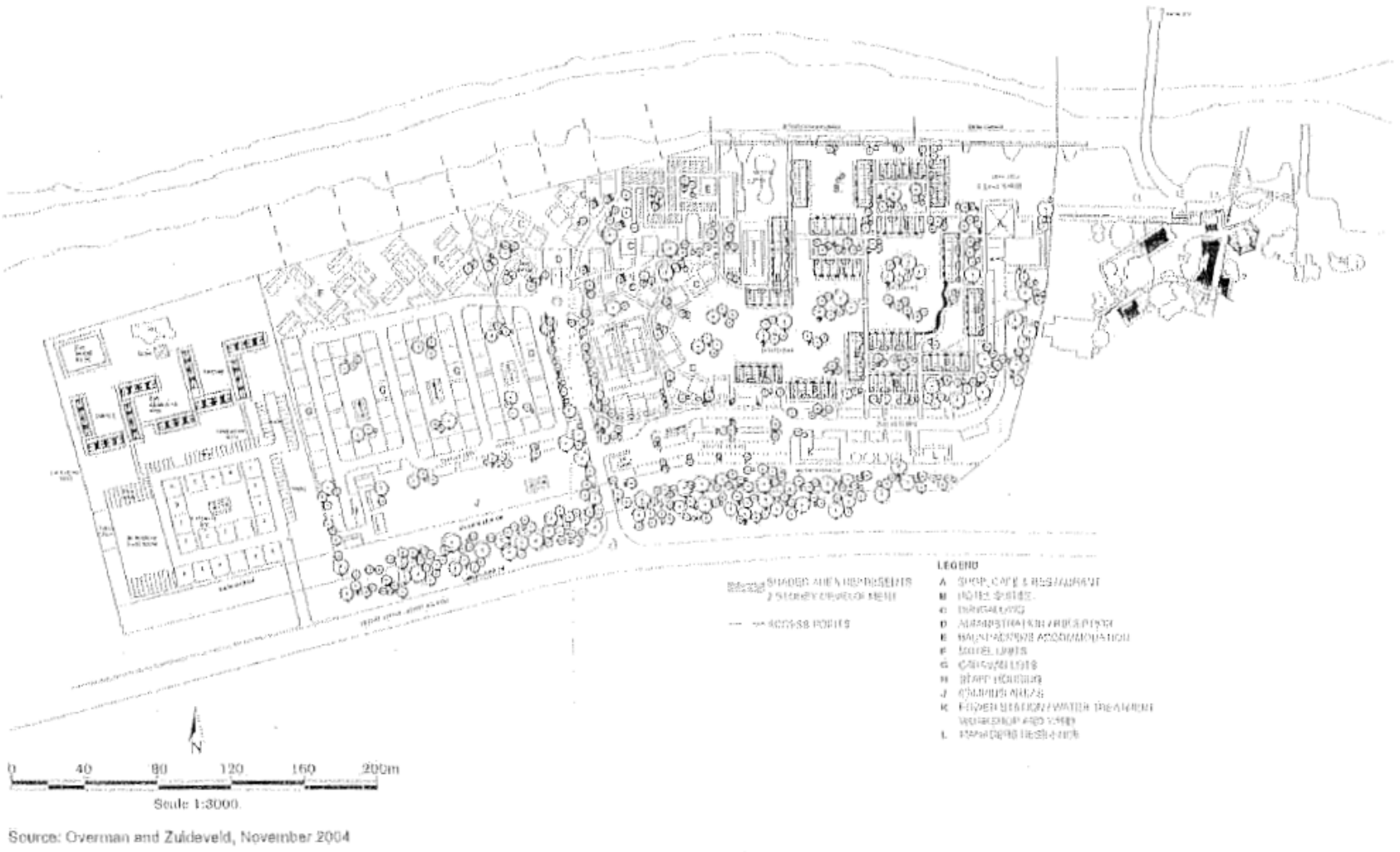
Table 2: Key environmental factors, objectives and Project environmental aspects

Factor	EPA objective	Environmental aspects of the Project
Factor 1 Terrestrial Environmental Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	• Clearing and earthwork activities have the potential to generate dust and noise which may adversely impact visual amenity and the surrounding environment • Placement of storage facilities may adversely impact visual amenity and the surrounding environment • Earthwork activities may adversely impact the beach through waste generation and erosion.
Factor 2 Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.	
Factor 3 Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	• Clearing and earthwork activities have the potential to fragment fauna habitat and cause fauna mortality.
Factor 4 Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	• Uncontrolled stormwater drainage has the potential to impact flora through smothering from sediment transport • Uncontrolled stormwater drainage has the potential to release potential contaminants from construction activities into the terrestrial environment.



Source: MS 709

Figure 1: Monkey Mia Dolphin Resort, noting expansion areas for the resort



Source: MS 709

Figure 2: Monkey Mia Dolphin Resort expansion area and staff facilities

2.2 Requirements of MS 709

This CMP is submitted in accordance with MS 709, in particular condition 2-1 and commitment 2 & 3 in Schedule 2. Table 3 details the requirements of these conditions and commitments, and also indicates which sections of this CMP they are addressed.

Table 3: Requirements of condition 2-1 and commitment 2 & 3 of Schedule 2 of MS 709

Condition	Requirement	Section in CMP
Condition 2-1	The proponent shall implement the environmental management commitments documented in schedule 2 of this statement.	CMP
Commitment 2 of Schedule 2	Prepare a Construction Management Plan, which will include:	
	(a) management of noise and dust impacts;	Section 3 and 3.3
	(b) minimising visual impacts;	Section 3 and 3.3
	(c) provision of fencing, appropriate storage facilities and locations; and	Section 3.1 and 3.3
	(d) containment of all earthworks to avoid affecting the beach.	Section 3 and 3.3
Commitment 3 of Schedule 2	Implement the Construction Management Plan.	Section 2 and 4

2.3 Rationale and approach

The general approach for managing any potential construction impacts is to develop a comprehensive management based program that identifies:

- management risks
- key management based targets
- management actions
- monitoring measures
- review and revision requirements.

An adaptive risk based management approach has been developed in order to create a robust management system, that prioritises and manages significant risks using the mitigation hierarchy (i.e. avoid, minimise, manage, rehabilitate and offset).

This management approach allows for flexibility, to enable the management program to adapt to any changes in the Project conditions, as well as to respond to the dynamic nature of the surrounding environment. The methodology for the risk-based approach is provided in Appendix 1.

2.3.1 Rationale for choice of management targets

The management targets in Table 5 were selected in order to prioritise the risks indentified for the Project, and are based on a review of:

- available data for the region
- the relationship between the project aspects and the environmental factors
- industry standards and legislative requirements
- the requirements of MS 709.

3. Construction management

The objective of the CMP is to identify the management provisions that RAC proposes to implement to manage and minimise potential construction impacts to:

- meet the EPA's objectives for amenity and terrestrial environmental quality as described in Table 2
- meet the objective of the MS 709, which is to minimise the potential impacts of construction activities upon the surrounding environment and visual amenity.

3.1 Management actions

Risk-based management actions have been identified and prioritised in Table 4 based on the methodology provided in Appendix 1.

These management actions focus on Project construction activities that have the highest likelihood of causing environmental impact, and were specifically developed to reduce potential impacts of construction activities on the surrounding environment and visual amenity.

Table 4: Risk-based management actions

Risk and key impacts	CEMP Management action reference	Management actions	Relevant Management Target	Risk-based priority	Timing
Earthwork, operations and vehicle movements may generate dust that can affect visual amenity and the surrounding environment	CEMP 1.	Undertake dust training as part of the Project site induction, which should include: • information on the potential for construction activities to cause dust • information on the effects of dust on the environment and visual amenity • details of designated roads and access tracks • procedures for dust suppression.	T2.1	Medium	Prior to personnel commencing work on site
	CEMP 2.	Avoid dust generating activities during unfavourable weather conditions (e.g. high wind speed) and unfavourable wind directions, where practicable.	T2.1	Medium	During construction
	CEMP 3.	Implement dust suppression (e.g. water spray/wet down of unsealed tracks\stockpiles) if high levels of dust is observed or considered likely.	T2.1	Medium	During construction
	CEMP 4.	Minimise cleared surfaces to only that which is required for construction activities.	T2.2	Medium	During construction
	CEMP 5.	Schedule vegetation clearing to occur immediately before planned earthworks to minimise potential for dust, where practicable.	T2.1	Medium	During construction
	CEMP 6.	Stabilise cleared areas and any dry, dust-prone areas or stockpiles to prevent dust lift off.	T2.1	Medium	During construction
	CEMP 7.	Ensure disturbed areas not required for operation are revegetated as soon as possible using weed free materials. Bulk fill will be sourced from close proximity to site.	T2.2	Medium	During construction
	CEMP 8.	Restrict site access to designated roads, access tracks and construction areas.	T2.1	Medium	During construction
	CEMP 9.	Monitor weeds in vegetation adjacent to the construction site and revegetated areas.	T1.2	Medium	During construction
	CEMP 10.	Establish and enforce vehicle speed limits for unsealed areas with an objective to minimise dust generation.	T2.1	Medium	During construction
	CEMP 11.	Inform the public of the construction activities including timing and hours of work.	T2.2	Medium	During construction
	CEMP 12.	Maintain a public complaint register and develop appropriate responses to any dust complaints received.	T2.1	Medium	During construction
Earthwork, operations and vehicle movements generate noise that affects visual amenity and the surrounding environment	CEMP 13.	Undertake noise training as part of the Project site induction, which should include: • information on the potential for construction activities to cause noise • information on the effects of noise on the environment and visual amenity • details of designated roads and access tracks • procedures for noise management.	T2.1	Medium	Prior to personnel commencing work on site

Risk and key impacts	CEMP Management action reference	Management actions	Relevant Management Target	Risk-based priority	Timing
	CEMP 14.	Undertake construction activities between the hours of 7 am and 7 pm Monday to Saturday, excluding public holidays. However, if Sunday or extended hours are required for construction, they will be agreed with the Resort Manager prior to extended hours commencing.	T2.1	Medium	During construction
	CEMP 15.	Avoid construction activities adjacent to occupied residences, where possible.	T2.1	Medium	During construction
	CEMP 16.	If construction activities are proposed to occur adjacent to occupied residences discuss noise minimisation options with the Resort Manager prior to commencement of construction, if high noise levels are considered likely.	T2.1	Medium	During construction
	CEMP 17.	Maintain a public complaint register and develop appropriate responses to any complaints received.	T2.1	Medium	During construction
Unauthorised earthworks and incorrect placement of infrastructure leading to disturbance of the foreshore	CEMP 18.	Demarcate the Project boundary prior to the commencement of construction.	T1.2	High	Prior to construction
	CEMP 19.	Ensure the total area cleared associated with the resort expansion area, does not exceed 3.1 ha of white coastal sandplain vegetation.	T1.2	High	Prior to clearing
	CEMP 20.	Ensure the total area cleared associated with the staff accommodation facilities, does not exceed 2.3 ha of white coastal sandplain vegetation.	T1.2	High	Prior to clearing
	CEMP 21.	Install signage and boundary markers around the construction area is to restrict access into the Project area, minimise impact on surrounding area and to formalise the approved construction area.	T1.2	High	During construction
	CEMP 22.	Ensure all earthworks are contained within the boundary marker.	T1.2	High	During construction
	CEMP 23.	Ensure fuel and chemical storage facilities are appropriately bunded.	T4.1	Medium	During construction
Site operations and activities are likely to generate waste which may affect the beach and foreshore if not appropriately disposed of	CEMP 24.	Undertake waste training as part of site inductions, including information on: • waste management procedures and practices • appropriate disposal of waste • location and types of waste disposal facilities.	T1.3	Low	Prior to commencing work on site
	CEMP 25.	Ensure clearly labelled waste disposal facilities are located around the Project area for waste disposal.	T1.3	Low	Prior to commencing work on site
	CEMP 26.	Ensure waste collected within the Project area is disposed of appropriately.	T1.3	Low	Prior to commencing work on site
Clearing and earthwork activities has the potential to fragment fauna habitat and cause fauna mortality	CEMP 27.	Clearly demarcate areas of habitat proposed to be cleared.	T3.1	High	Prior to clearing
	CEMP 28.	Retain additional areas of white coastal sandplain vegetation, where practicable.	T3.1	High	Prior to clearing
	CEMP 29.	Enforce a maximum speed limit within the Project area of 40 km/hr to minimise collisions with native fauna.	T3.2	Medium	During construction

Risk and key impacts	CEMP Management action reference	Management actions	Relevant Management Target	Risk-based priority	Timing
	CEMP 30.	Install fauna warning signage on roads close to significant fauna habitats.	T3.1	Medium	During construction
Uncontrolled stormwater drainage has the potential to impact marine flora through smothering from sediment transport.	CEMP 31.	Direct water flows away from cleared areas and stockpiles.	T4.1	High	During construction
	CEMP 32.	Incorporate sediment traps designed to remove silt and withstand at least a 2 year ARI event.	T4.1	High	During construction
Uncontrolled stormwater drainage has the potential to release potential contaminants from construction activities into the marine environment	CEMP 33.	Allow for the treatment of hardstand runoff water in interceptors to remove oil and contaminants, where necessary.	T4.1	High	During construction
	CEMP 34.	Reduce stormwater discharge by containing runoff from bulk earthworks in storage ponds and dams, where possible.	T4.1	High	During construction
	CEMP 35.	Re-use stormwater runoff, where applicable, as dust suppression and road watering.	T4.1	Low	During construction
	CEMP 36.	Revise the 'Cyclone Management Plan' to include protocols to reduce the stormwater impacts from cyclonic rainfall. Protocols will include inspections of the stormwater containment system and the Project area to prevent discharge to the foreshore/marine environment.	T4.1	Medium	During construction

3.2 Management target

Management targets have been developed to measure and report against the relevant EPA environmental objective (Table 5).

Table 5: Management targets

Environmental factor	EPA Environmental objective	Management targets (Unique identifier)
Factor 1 Terrestrial Environmental Quality	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	• No unauthorised loss or degradation of vegetation outside the project areas. (T1.2) • No uncontained refuse within the project area or in the surrounding environment. (T1.3).
Factor 2 Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.	• Maintain the amenity of the area and the health of the surrounding environment by minimising indirect impacts such as dust and noise from Project construction activities. (T2.1) • Protect the amenity and surrounding environment by limiting disturbance where possible and by progressive revegetating disturbed areas. (T2.2).
Factor 3 Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	• Protect fauna and its habitat by ensuring no unauthorised clearing or earthworks. (T3.1) • No fauna mortality resulting from the Project construction activities. (T3.2).
Factor 4 Inland Waters Environmental Quality	To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	• Prevent sediment from the Project area entering the ground and surface water environment. (T4.1).

3.3 Monitoring program

The purpose of monitoring program is to inform, through the management targets, if the environmental objective is being achieved, as well as to determine if management actions need to be reviewed and revised.

Table 6 outlines the monitoring program proposed to be undertaken by RAC.

Table 6: Monitoring program to achieve management targets

CEMP Monitoring action	Monitoring Indicator	Parameter	Monitoring method	Frequency	Location	CEMP action cross reference	Relevant Management Target
CEMP M1.	No public complaints relating to dust or noise	Complaints register	Review of the complaints register	Daily	Project area	CEMP2 CEMP10 CEMP11 CEMP13 CEMP14 CEMP15 CEMP16	T2.1
CEMP M2.	No observations of excessive dust observed during site inspections	Dust	Site inspection	Weekly during clearing and earthwork activities	Within the Project area and surrounding environment	CEMP3	T2.1
CEMP M3.	Completed induction register and induction material which includes dust and noise management procedures	Induction register and induction material	Review of the induction register and material	Monthly	Project area	CEMP1 CEMP12	T2.1
CEMP M4.	Rehabilitation of disturbed areas occurs as soon as is practicable	Cleared areas	Site inspection	Weekly	Project area	CEMP7	T2.2
CEMP M5.	Clearing and earthwork boundaries are adequately demarcated and weed inspection in adjacent vegetation	Clearing and earthwork boundaries	Site inspection	Weekly	Project area	CEMP17 CEMP9	T1.2
CEMP M6.	Fencing is in adequate condition	Integrity of fencing	Site inspection	Weekly	Project area	CEMP20	T1.2
CEMP M7.	No earthworks or clearing activities are undertaken outside of the Project area	Earthworks and operations	Site inspection	Weekly	Project area	CEMP17 CEMP21	T1.2 T2.1
CEMP M8.	No incorrect disposal of waste	Waste	Site inspection	Weekly	Project area	CEMP23 CEMP25	T1.3
CEMP M9.	No reports of fauna encounters/ collisions	Fauna	Review of native fauna death records	As required	Project area	CEMP32	T3.2

CEMP Monitoring action	Monitoring Indicator	Parameter	Monitoring method	Frequency	Location	CEMP action cross reference	Relevant Management Target
CEMP M10.	Inspections of the stormwater system demonstrates that sediment and debris is not present	Sediment	Visual assessment	Monthly during construction	Stormwater system manholes/pits	CEMP34 CEMP35	T4.1
CEMP M11.	Inspections of chemical and fuel storage areas demonstrate that no spills/leaks have occurred	Contaminants	Visual assessment	Weekly during construction	Chemical and fuel storage areas	CEMP36	T4.1

4. Review and revision of management actions

In the event that management targets are not met, RAC will investigate the potential cause and any potential impacts that may have resulted. If the management targets are not met, and it is deemed to be the result of the project, the corrective actions detailed in Table 7 will be implemented.

Table 7: Corrective actions for management targets

CEMP corrective action	Performance indicator	Action	Responsibility	CEMP monitoring action reference	Relevant Management Target
CEMP CA1.	Public complaints received regarding the level of dust and/or noise from the project area	1. Investigate cause. 2. Ensure dust and noise control measures are being implemented and are appropriate. 3. Implement appropriate control to reduce or rectify impact. 4. Where required, re-educate personnel on the importance of dust and noise management. 5. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM1	T2.1
CEMP CA2.	Excessive dust observed during site inspections	1. Investigate cause. 2. Ensure dust control measures are being implemented and are appropriate. 3. Implement appropriate control to reduce or rectify impact. 4. Where required, re-educate personnel on the importance of dust management. 5. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM2	T2.1
CEMP CA3.	Inductions are not being undertaken and/or do not include appropriate induction material.	1. Investigate cause. 2. Undertake induction of relevant personnel. 3. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM3	T2.1 T1.3
CEMP CA4.	Cleared areas have not been rehabilitated as soon as is practicable	1. Investigate cause. 2. Undertake rehabilitation as soon as possible. 3. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM4	T2.2

CEMP corrective action	Performance indicator	Action	Responsibility	CEMP monitoring action reference	Relevant Management Target
CEMP CA5.	Clearing and earthwork boundaries are not demarcated. Unacceptable weed infestations (based on 10% increase in annual weed density in adjacent vegetation).	1. Investigate cause. 2. Immediately stop ground disturbance activities. 3. Demarcate and /or fence appropriate boundaries as soon as possible. 4. Re-educate personnel on the importance of demarcation, fencing and/or weed management. 5. Implement measures to prevent further weed infestations (e.g. screening fencing, weed control in adjacent land), as practicable. Undertake annual weed control activities as required. 6. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM5 CEMPM6	T1.2
CEMP CA6.	Unauthorised clearing or earthworks have been undertaken	1. Immediately stop ground disturbance activities. 2. Investigate cause. 3. Implement appropriate control to reduce or rectify impact including conducting rehabilitation as soon as possible. 4. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM7	T1.2
CEMP CA7.	Excessive vehicle collisions with native fauna (more than one collision per month)	1. Investigate cause. 2. Undertake intervention or remediation works (e.g. further reduce speed limit, educate workforce). 3. Monitor success. 4. Revise and update risk assessment and management actions where applicable.	Construction contractor	CEMPM9	T3.2
CEMP CA8.	Sediment and/or debris present in the stormwater system	1. Investigate cause and determine source. 2. Remove sediment/debris. 3. Continue monitoring.	Construction contractor	CEMPM12	T4.1
CEMP CA9.	Spills and/or loss of containment has occurred at the chemical/fuel storage area	1. Investigate cause. 2. Report spill to DPaW, DER and Shire of Shark Bay. 3. Immediately cleanup and undertake remediation. 4. Review procedures and undertake further training of staff. 5. Continue monitoring.	Construction contractor	CEMPM13	T4.1

4.1 Reporting provisions

The performance of the CMP will be assessed annually against the management targets in Table 5, and will be reported on as part of the Compliance Assessment Report (CAR). The CMP reporting template is presented in Table 8.

4.1.1 Reporting on exceedance of the management target

In the event that management targets are not met during the reporting period, a written report will be included in the CAR detailing the corrective actions that were undertaken, and the effectiveness of the corrective actions to rectify any potential impacts.

Table 8: Environmental management plan reporting table

Condition environmental objective and management target set in the Condition EMP		Reporting on the management objective and management target	Status[1]
Key EPA environmental factors: Terrestrial environmental quality, Amenity, Terrestrial fauna, Inland waters environmental quality and Marine environmental quality			
EPA objective	Management target		
Factor 1 Terrestrial Environmental Quality To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.	• No unauthorised loss or degradation of vegetation outside the project areas. (T1.2).	• No unauthorised loss or degradation of vegetation is outside the project area.	■ YES or ● No
	• No uncontained refuse within the project area or in the surrounding environment. (T1.3).	• No uncontained refuse was within the project area or in the surrounding environment.	■ YES or ● NO
Factor 2 Amenity To ensure that impacts to amenity are reduced as low as reasonably practicable.	• Maintain the amenity of the area and the health of the surrounding environment by minimising indirect impacts such as dust and noise from Project construction activities. (T2.1).	• The amenity of the area and health of the surrounding environment was minimised and maintained.	■ YES or ● NO
	• Protect the amenity and surrounding environment by limiting disturbance where possible and by progressive revegetating disturbed areas. (T2.2).	• The amenity and surrounding environment was protected.	■ YES or ● No
Factor 3 Terrestrial Fauna To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	• Protect fauna and its habitat by ensuring no unauthorised clearing or earthworks. (T3.1).	• Fauna and its habitat was protected.	■ YES or ● NO
	• No fauna mortality resulting from the Project construction activities. (T3.2).	• No fauna mortality resulted from the Project construction activities.	■ YES or ● NO
Factor 4 Inland Waters Environmental Quality To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.	• Prevent sediment from the Project area entering the ground and surface water environment (T4.1).	• Sediment from the Project area was prevented from entering the ground and surface water environment.	■ YES or ● No

[1]Notes: The status of achievement of the condition environmental objectives is indicated by the following symbols:

■ Condition environmental objective achieved

● Condition environmental objective not achieved

5. Adaptive management

RAC will implement an adaptive management system to provide a robust management plan, which effectively meets the environmental objectives. To achieve this, the CMP will be reviewed on an annual basis to ensure that the plan takes into consideration amendments to operations, monitoring results, audits, continuous improvement and changes in regulatory and corporate requirements. If revised, a copy of the revised CMP will be provided to the OEPA as part of the CAR.

6. Stakeholder consultation

Consistent with the EPA's expectations for this CMP, RAC consulted with a number of stakeholders during the development of the plan.

This section provides a summary of consultation that occurred and key comments received from each stakeholder (Table 9).

Table 9: Stakeholders consulted, comments and responses

Organisation(s)	Comments	RAC response to comments/concerns
Department of Parks and Wildlife (previously known as Department of Conservation and Land Management CALM)	• There is no indication on actions to be undertaken to reduce the potential introduction of weeds from fill brought into the site. Also consideration should be given to management actions to be undertaken if weeds are located during or post construction on the resort property or in adjacent native vegetation areas.	Potential introduction of weeds will be minimised by demarcating the construction area, restricting personnel access to adjacent vegetation and only driving on identified roads and tracks. The following actions (detailed in Table 4) have also been included: • revegetation will occur as soon as possible, using weed free materials • bulk fill will be sourced from close proximity to site • weeds in adjacent areas will be monitored during construction • if required, weed control corrective measures will be implemented as outlined in Table 7.
Shire of Shark Bay (SoSB)	Dust suppression and soil stabilisation: • What methods are proposed to be utilised? • What type of equipment/machinery is proposed to be used to carry out these works? • What type of stabilising material will be used on cleared or eroded areas, i.e mulch, hydro-mulching?	Dust suppression methods are listed in Table 4 of this plan and include: • wetting down of unsealed tracks and stockpiles • minimising areas to be cleared • scheduling of clearing activities that have the potential to cause dust • ensuring revegetation of disturbed areas occurs as soon as possible • vehicle speed limits on unsealed roads (Appendix 2). Equipment/machinery proposed to be used to carry out dust suppression includes: • water sprays as stated in Table 4 of this plan • weather forecast website • vehicle speed signs. Water has been identified as the stabilising material to be used on cleared or eroded areas. Revegetation of disturbed areas will occur as soon as possible (Table 4) to reduce erosion.
	All construction activities, vehicles and equipment used, to comply with Environmental Protection (Noise) Regulations 1997.	The 'Monkey Mia Dolphin Resort Vegetation and Traffic Management Plan' version 3 is in Appendix 2 of this Plan and was prepared prior to the upgrade of the WWTP (dated March 2013). The plan states in Section 6.3 that noise disturbance caused by construction traffic will adhere to all applicable noise regulations and legislation. This plan was a condition set by the Shire of Shark Bay (Ordinary Council Meeting Minutes, 27 February 2013).

Organisation(s)	Comments	RAC response to comments/concerns
	Storage areas for materials: • Provide details of types of materials that are proposed to be stored and more specific information on storage and handling techniques, of any dangerous goods, including type and details of bunding and how these specific areas will be sealed, specifically with regard to the types of chemicals and/or fuels and any other dangerous goods that are proposed to be stored. • Provide information on methods of separation of "dangerous" goods, in particular chemicals that may present a fire hazard or can become combustible if mixed with or come in contact with other stored chemicals or dangerous goods. • Provide comment from Department of Mines and Petroleum (DMP) on proposed bulk storage areas for chemicals and fuels, with regards to fire barriers, separation and storage equipment, including shelving, and fire fighting equipment, that is proposed to be used. • Details of an "Emergency Plan" in the advent of a major chemical spill and or fire event.	• Fuel will be in stored in a 36 000L sea container as required by Australian Standard 1940 and outlined in the 'Monkey Mia Dolphin Resort Vegetation and Traffic Management Plan' (Appendix 2). No other dangerous goods will be stored. • Fuel will be stored in a sea container with lockable valves and bunded floor. • RAC will apply for a Dangerous Goods licence from DMP for the storage of fuel under the *Dangerous Goods Safety Act 2004* and Storage and Handling Regulations. • The Emergency Procedure Manual (updated 2015) identifies where an environmental incident will require an emergency response and is appended to the EMS. It details the actions for a hazardous material spill and a fire event.
	Waste collection and management (Waste Management Plan): • What types of waste are anticipated, inert, putrescibles, chemical toilet effluent disposal, grey water disposal from caravans, used cooking oils, used oils from motor vehicles, and any proposed recycling? • What are the proposed "appropriate" methods of waste storage and disposal, including solid and liquid wastes i.e used cooking oils, used chemical containers, etc. • What facilities will be utilised for the disposal of the various waste types i.e bin storage and wash down areas, pest and rodent control? • What windblown litter measures will be undertaken/implemented during the construction phase, i.e temporary fencing?	• Wastes expected from the expansion of the resort and staff accommodation will be similar to those that already occur at the current Monkey Mia Dolphin Resort and include inert landfill and putrescibles waste. • Wastes expected from the construction phase of the proposal will be inert Type 1 waste such as building and demolition waste and management actions are described in Table 4. • Clearly labelled waste disposal facilities [receptacles] will be located around the Project area for waste disposal (Table 4). • All wastes, including construction wastes, will be taken off site for disposal. • Wash down areas for weed hygiene will be established as stated in the 'Monkey Mia Dolphin Resort Vegetation and Traffic Management Plan' (Appendix 2). Contaminated water will report to interceptors to remove contaminants (Table 4). • Demarcation to restrict access into the Project area and to formalise the approved construction area (Table 4). All earthworks will be contained within the boundary. • A weekly site inspection will be conducted to determine the integrity of fencing (Table 6).

7. References

RPS Bowman Bishaw Gorham (RPS) 2004, *Expansion of Monkey Mia Dolphin Resort Public Environmental Review (EPA Assessment Number 1455),* report prepared for Monkey Mia Dolphin Resort Pty Ltd, Perth, June 2004.

Appendix 1
Risk-matrix

Risk-based priority

A risk assessment determines whether a hazard could harm the environment. The following stages are undertaken once an environmental hazard has been identified

- Stage 1: Risk identification to identify and document environmental risks and impacts associated with the organisation activities, goods and services
- Stage 2: Qualitatively ranking potential environmental impacts to establish relative significance
- Stage 3: Establishing and documenting control measures to mitigate potentially significant environmental impacts.

RAC shall control all environmental risks identified within the organisation to an extent that is practically possible (Table A 1), once they have been identified through the risk management and identification process.

Risk ranking is generally undertaken by assigning likelihood and consequence levels to each identified activity or issue and determining risk levels through the use of a risk matrix. After completing this process management measures are implemented and a residual risk is determined.

Table A 1: Qualitative risk rating matrix

	Consequences			
Likelihood	Critical (4)	Major (3)	Moderate (2)	Minor (1)
Almost Certain (A)	VH	VH	H	M
Likely (B)	VH	VH	H	M
Unlikely (C)	VH	H	M	L
Rare (D)	H	M	L	L

VH	Very High	Immediate action required. Task stopped.
H	High	Senior Management attention needed.
M	Medium	Management responsibility must be specified.
L	Low	Manage by routine procedures.

Table A 2: Likelihood Classification

Likelihood	Description
Almost Certain (A)	Event is a common or frequent occurrence and is expected to occur daily (e.g. noise and dust).
Likely (B)	Event is expected to occur annually.
Unlikely (C)	Event may occur. If the event has occurrence in the project area it is very infrequent. It is likely to have occurred within the industry.
Rare (D)	The event is unlikely to not occur in the project area but has been known to occur infrequently within the industry. The event may occur at a frequency of more than 10 years.

Table A 3: Consequence Classification

Consequence	Definition
Critical (4)	**Environment:** Long term large scale damage to habitat or environment. **Legal:** Non-compliance having a critical financial or community profile impact. **Community:** Widespread community disruption with significant adverse economic impact.
Major (3)	**Environment:** Severe impact requiring remedial damage to environment. **Legal:** Non-compliance and having high financial or community profile impact. **Community:** Extensive community complaints extending beyond the region or adverse state level media coverage. Wider community disruption up to 7 days with adverse economic impact.
Moderate (2)	**Safety:** Moderate impact on environment. No long term or irreversible damage. **Legal:** Non-compliance having moderate financial or community profile impact. **Community:** Widespread local complaints or adverse regional media coverage. Isolated community disruption up to 3 days with limited adverse economic impact.
Minor (1)	**Environment:** Minor breach of environmental policy. Negligible impact on environment. **Legal:** Technical breach with no sanction. **Community:** Few complaints or minor adverse media coverage. Negligible impact on reputation. Isolated community disruption up to 1 day with minimal economic.

When determining risk controls, the hierarchy of risk controls, summarised in Table A 4 must be considered.

Table A 4: Hierarchy of risk controls

Option	Examples
Elimination	Stop using equipment or substance, or stop undertaking the procedure causing the risk.
Substitution	Use an alternative substance, equipment or process which poses less risk.
Isolation	Separate receivers from the source of the risk.
Engineering Controls	Reduce exposure to the risk by making physical changes to equipment, procedures or the work environment (e.g. using dust control measures on equipment).
Change work practices	Adopt work procedures which minimise exposure to the risk (e.g. wet sweeping a dusty environment rather than dry sweeping, to minimise the amount of airborne dust.

Appendix 2
Monkey Mia Dolphin Resort Vegetation and Traffic Plan, Shire of Shark Bay

Biota Environmental Sciences

Monkey Mia Dolphin Resort Vegetation and Traffic Management Plan

Aspen Park Property Management Pty Ltd

March 2013

ABN 49 092 687 119
Level 1, 228 Carr Place
Leederville Western Australia 6007
Ph: (08) 9328 1900 Fax: (08) 9328 6138

Project No.: 884

Prepared by: Ciaran Gibson

Document Quality Checking History

Version: 1_1	Peer review:	Rachel Warner
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	Approved for issue:	Garth Humphreys

Monkey Mia Vegetation and Traffic Management Plan

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1.0 Introduction

1.1 Background

Aspen Parks Property Management Pty Ltd (Aspen) manages the Monkey Mia Dolphin Resort, which is located on Monkey Mia Road in Denham, in the Shire of Shark Bay (Figure 1.1)

Aspen intends to upgrade the water treatment and power facilities at the resort. The existing facility includes two ponds, on the northern half of Reserve 49108, located 800 m to the south-southwest of the resort and serviced by an unsealed track that encroaches on Reserve 1686 (Figure 1.2). The Shire of Shark Bay (the Shire) manages Reserve 49108, while the Shire and the Department of Environment and Conservation (DEC) jointly manage Reserve 1686.

The main components of the facility upgrade will be positioned on the southern half of Reserve 49108, and include:

- one 100 kilolitre water tank and two 250 kilolitre water tanks;
- an open shed, approximately 148 m^2 in size, to accommodate four generators, a switch room and a workshop; and
- a sea container for fuel storage.

Upgrades to the existing access track will also occur to accommodate construction traffic. These include:

- widening of sections of the access track;
- a vehicle bypass track for construction traffic; and
- a turnaround area at the southern end of the existing track.

The general project layout is shown on Figure 1.2, and this area will hereafter be refered to as the project area.

Aspen submitted plans for the expansion and upgrading of the facilities to the Shire of Shark Bay in December 2012. The proposal was given condition approval by the Shire on February 27th 2013 (Shire of Shark Bay 2013).

Native vegetation will be cleared as part of the facilities upgrade. Specifically, clearing will be associated with the upgrade of the access track. The total area to be cleared is 0.86 ha (Figure 1.2). The *Environmental Protection Act 1986* (*EP Act 1986*) requires that clearing of native vegetation is conducted under a permit (Native Vegetation Clearing Permit) unless it is for a defined exempt purpose. Clearing involved with the facilities upgrade is considered to be exempt under Schedule 6 of the *EP Act 1986;* clause 9- Clearing under the *Town Planning and Development Act 1928*. This exemption allows for clearing in accordance with an approved subdivision including construction of access tracks to or within the subdivision. In addition clearing of up to one hectare with one financial year for the construction of vehicle tracks is also exempt under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

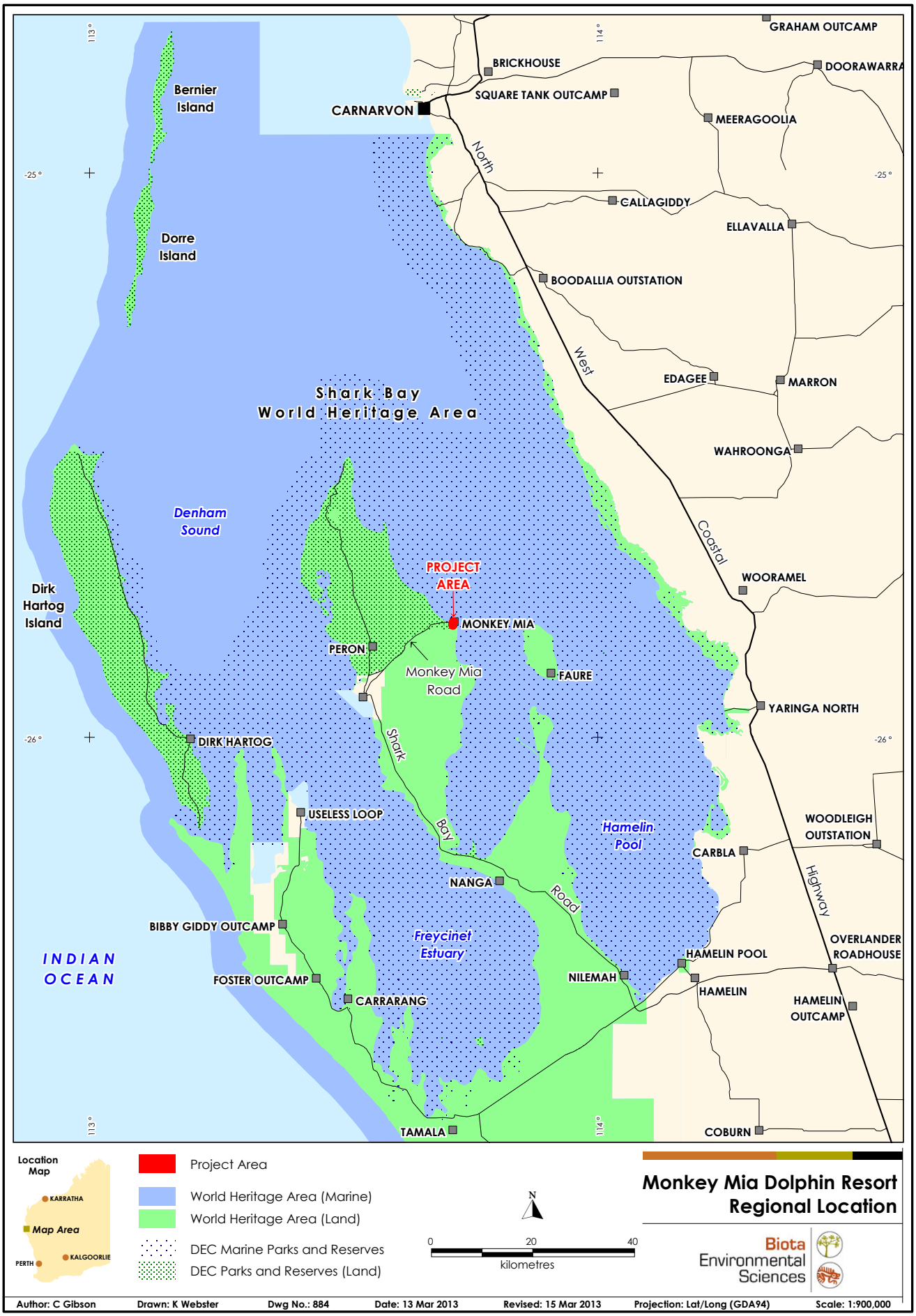

Figure 1.1: Location of the Monkey Mia Dolphin Resort, Denham.

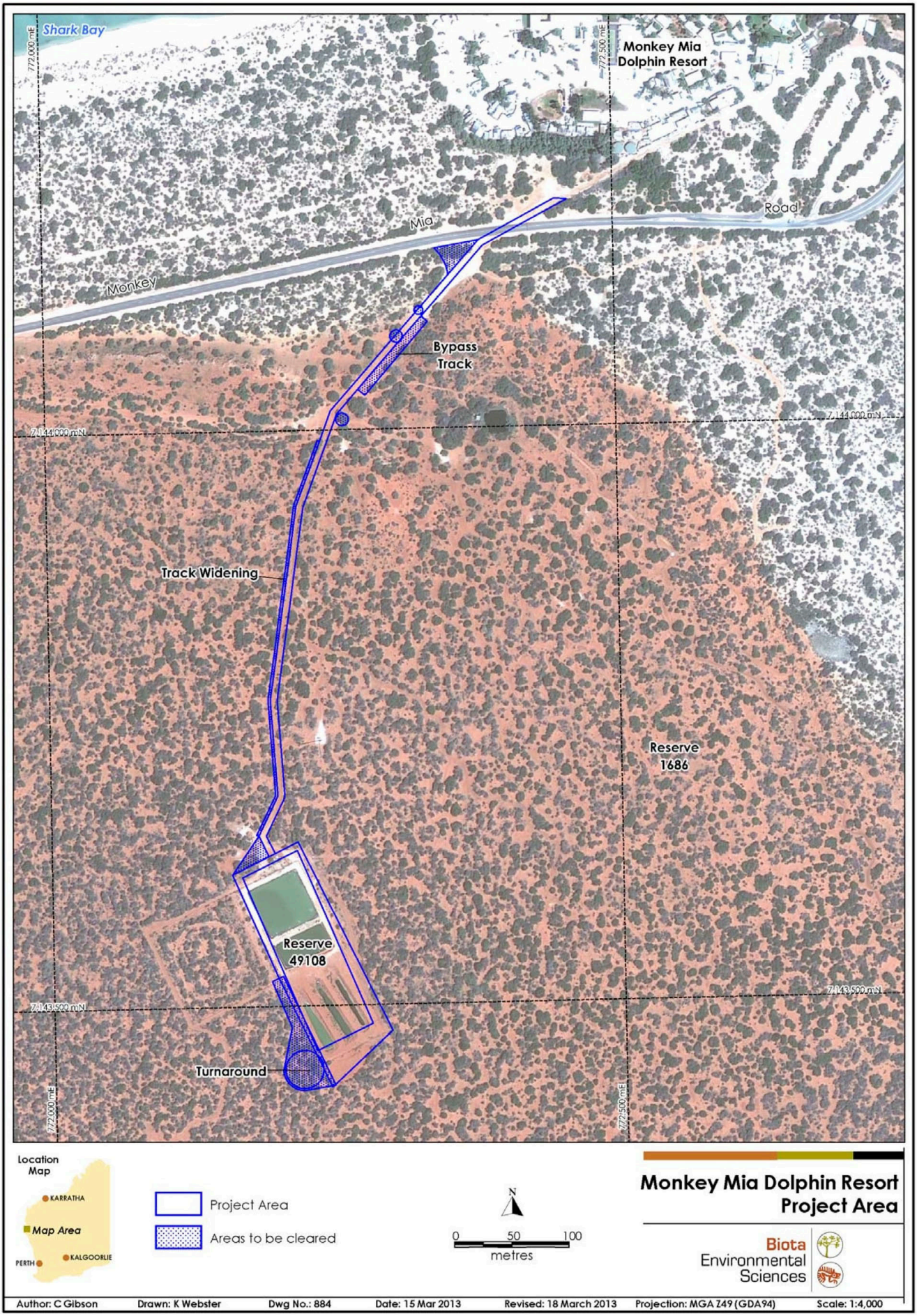

Figure 1.2: Project area.

1.2 Scope and Structure of this Document

This document has been prepared in accordance with, and with the intention of meeting, the requirement of the following condition set by the Shire of Shark Bay:

- *Condition 1(iv): "Lodgement of a Traffic and Vegetation Management Plan for the separate written approval by the Shire Chief Executive Officer prior to the commencement of any construction"* (Ordinary Council Meeting Minutes, 27 February 2013).

The project area shown on Figure 1.2 sets the spatial scope for this management plan. This management plan is intended for use during construction associated with the upgrade of the facilities for the Monkey Mia Dolphin Resort.

Management of vegetation is addressed in Sections 3.0 and 4.0 while traffic management is discussed in Section 6.0. In addition, Aspen has requested that rehabilitation measures, for historically disturbed areas within Reserve 1686, be considered in this document. This is provided in Section 5.0.

1.3 Other Related Documents

Several other management plans are relevant to this document and include:

- Shark Bay Terrestrial Reserves and Proposal Reserve Additions Management Plan No. 75 2012 (DEC and Conservation Council 2012); and
- Shark Bay World Heritage Property Strategic Plan 2008-2020 (DEC and DEWSPAC 2008).

This management plan draws on flora and vegetation data collected during two previous flora and vegetation surveys in the project area:

- Monkey Mia Resort Expansion (Strategen 2012); and
- Vegetation and Rare Flora Surveys - Concept Development Plan Areas Monkey Mia Dolphin Resort (Weston 2002).

2.0 Environmental Setting

2.1 Overview

The project area is located on the Peron Peninsula and is situated within the Shark Bay World Heritage Area, in the Midwest Region of Western Australia (WA).

Botanically, it occurs close to the boundary of two provinces, the Southwest Botanical Province and the Eremaean Botanical Province. Vegetation on the Peron Peninsula comprises arid zone flora species and is considered to be representative of the Eremaean Botanical Province (DEC and Conservation Council 2012).

2.2 Vegetation

Vegetation mapping completed by Weston (2002) covers most of the project area, including the areas surrounding the existing water treatment facility. This mapping does not include the majority of the vegetation adjacent to the existing access track.

Weston (2002) describes two vegetation communities within the project area:

- ***Acacia ramulosa* thicket.** This community is characterised by dense (>50% canopy cover) *Acacia ramulosa* shrubs to 3 m in height over scattered lower shrubs including *Persoonia bowgada, A. tetragonophylla, Eremophila maitlandii, Rhagodia latifolia* and *Stylobasium spathulatum*. The thicket surrounds the southern boundary of Reserve 49108, within which the existing facilities are located.
- ***Acacia ramulosa, A. tetragonophylla* scrub.** This community is characterised by *Acacia ramulosa, A. tetragonophylla* shrubs greater then 2 m in height over *Rhagodia latifolia* shrubs over *Ptilotus divaricatus, P. obovatus* low shrubs. This community covers the area surrounding the north Reserve 49108 and is dominant in the boarder area surveyed by Weston (2002).

These *Acacia* shrubland communities are well represented on the Perron Peninsula (DEC and Conservation Council 2012).

The vegetation condition[1] within the majority of the project area is considered to be Excellent to Very Good (Weston 2002, Strategen 2012). Previous surveys observed that herbs and grasses were either absent or unidentifiable. This was considered to be a result of grazing by feral animals (predominantly goats and rabbits) and unfavourable conditions for flora sampling at the time of survey (insufficient rainfall preceding the survey) (Weston 2002, Strategen 2012).

The condition of vegetation 10 m either side of the access track was described by Strategen (2012) as ranging from Very Good to Completely Degraded[1]. Observed disturbances along the track included construction of fencing, walking trails, minor excavations and rubbish dumping.

2.3 Conservation Significant Vegetation and Flora

2.3.1 Threatened Flora

To date, no Threatened Flora species listed under the Federal *Environment Protection and Biodiversity Conservation 1999* or under the WA *Wildlife Conservation Act 1950* have been recorded during flora surveys associated with the Monkey Mia Dolphin Resort (Weston 2002, Strategen 2012).

The nearest Threatened Flora record is *Eucalyptus beardiana,* located approximately 75 km south-southwest of Monkey Mia (DEC and WAM 2013). To date, no *Eucalyptus* species have been

[1] Vegetation Condition scale based on Bush Forever (Government of Western Australia 2000).

recorded during flora surveys associated with the Monkey Mia Dolphin Resort,(Weston 2002, Strategen 2012). Thus, is it considered highly unlikely that this species occurs in the project area.

The framework for ranking flora species of conservation significance is presented in Appendix 1.

2.3.2 Priority Flora

A total of five Priority Flora species are known to occur within a 5 km radius of the Monkey Mia Dolphin Resort (DEC and WAM 2013). These species are listed in Table 2.1, along with a brief description and the likelihood of their occurrence in the project area.

The framework for ranking flora species of conservation significance is presented in Appendix 1.

Table 2.1: Priority Flora species known from within a 5 km radius of the Monkey Mia Dolphin Resort.

Species	**Conservation Status**	**Description** (DEC 2013)	**Likelihood of Occurrence in Project Area**
Chthonocephalus tomentellus	Priority 2	Daisy. Annual herb with yellow flowers between August and November. Known to occur on red sand plains and dunes near saline depressions.	Unlikely; absence of preferred habitat (Weston 2002).
Lepidium biplicatum	Priority 2	Low shrub with white flowers in September. Known to occur in coastal regions between Geraldton and Carnarvon.	Unlikely; absence of preferred habitat (Weston 2002).
Olearia occidentissima	Priority 2	Daisy. Shrub to 20 cm in height with white/pink flowers between July and September. Known to occur in shallow soils and on coastal limestone cliffs.	Possible; recorded ~3 km west of Monkey Mia jetty (DEC and WAM 2013). Conditions during surveys in project area have been unfavourable for the identification of this species (Weston 2002, Strategen 2012).
Sondottia glabrata	Priority 2	Daisy. Annual herb to 10 cm in height with white/yellow flowers between September and October. Known to occur on saline flats.	Unlikely; due to absence of preferred habitat (Weston 2002).
Acacia drepanophylla	Priority 3	Wattle. Tree to 5 m in height with yellow flowers between May and July. Known to occur on red clay or loam over limestone on flat to undulating plains.	Possible; recorded <10 m to the southeast of the existing facilities (Weston 2002), ~3 km west of Monkey Mia jetty and within 250 m of the project area (DEC and WAM 2013).

No Priority Flora species, listed by the DEC, have been recorded during flora surveys associated with the Monkey Mia Dolphin Resort (Weston 2002, Strategen 2012).

2.4 Weeds (Introduced Species)

A total of five weed species have been recorded within a 5 km radius of the Monkey Mia Dolphin Resort. Of these, two have previously been recorded in the project area (Weston 2002, Strategen 2012). These species are listed in the Table 2.2, along with a brief description and their weed rating (CALM 1999).

One of these species, *Echium plantagineum,* is listed as a Declared Plant in the Shire of Shark Bay under the *Agriculture and Related Resources Protection Act 1976 (ARRP Act)*. This species is commonly referred to as Paterson's Curse and is listed as a category P1 for the whole State, which prohibits the introduction or movement of the plant or its seeds. The WA Department of Agriculture and Food have produced a factsheet on this species, which is provided in Appendix

2. Doublegee (**Emex australis*) is also listed as a Declared Plant in the southwest of WA. However, it is not listed in the Shire of Shark Bay.

Table 2.2: Weed species recorded within a 5 km radius of the Monkey Mia Dolphin Resort (*denotes introduced/weed species).

Species	**Source**	**Description** (DEC 2013)	**Weed Rating** (CALM 1999)
Buffel Grass (**Cenchrus ciliaris*)	Weston (2002) and Naturemap (DEC and WAM 2013)	Tufted grass to 1.5 m in height with purple flowers between February and October. Aggressive weed.	High
Doublegee (**Emex australis*)	Recorded in the project area by Strategen (2012)	Annual herb with green flowers between January and December. Weed of disturbed areas.	Low
Mediterranean Turnip (**Brassica tournefortii*)	Recorded in the project area by Weston (2002)	Annual herb to 60 cm in height with yellow/cream flowers between June and November. Aggressive weed of disturbed areas.	High
Paterson's Curse (**Echium plantagineum*)	Naturemap (DEC and WAM 2013)	Annual herb to 1 m in height, with purple/pink flowers in between September and January. Aggressive weed of disturbed areas.	To Be Advised
Ruby Dock (**Acetosa vesicaria)*	Naturemap (DEC and WAM 2013)	Fleshy annual herb to 1 m in height with pink-red flowers between July and September. Aggressive weed of disturbed areas.	Not Listed

A brief discussion for each of five weed species recorded within a 5 km radius of the Monkey Mia Resort follows:

- Buffel Grass (**Cenchrus ciliaris*) was introduced by pastoralists as a fodder species. Buffel Grass has demonstrated allelopathic capacities whereby it releases chemicals that inhibit the growth of other plants, and aggressively competes with native flora (Cheam 1984a, 1984b). This perennial grass can form dense tussock grasslands, particularly along creeklines, floodplains and in sandy coastal areas. Buffel Grass is known to be widespread on the Peron Peninsula (DEC and Conservation Council 2012). Buffel Grass has not been recorded in the project area, however both of the surveys noted that some grasses were in poor health and were difficult to identify at the time of survey (Weston 2002, Strategen 2012). It is therefore unknown whether some of these were Buffel Grass, or other weed grasses. This species may occur in the project area.

  A key management strategy set by the DEC is to prevent new infestations of this species and control small infestations where appropriate (DEC and Conservation Council 2012). Given its prevalence in the locality, this species is a threat to the native vegetation.

- Doublegee (**Emex australis*) was originally introduced as a salad vegetable (Hussey et al. 1997). It is now a widespread weed of agricultural and disturbed land throughout the southwest of WA (Hussey et al. 1997). The woody fruits of this species were commonly observed in the project area by Strategen (2012).

- Mediterranean Turnip (**Brassica tournefortii*) is a common weed of disturbed roadsides and grazed woodlands (Hussey et al. 1997). Mediterranean Turnip was recorded several times in the project area by Weston (2002). The subsequent survey by Strategen (2012) did not locate this species, however they did note that the timing of the survey was not favourable for flora sampling, and weed species may have been present but not identifiable at the time of the survey.

  The DEC and Conservation Council (2012) consider that the *Acacia* shrublands on the Peron Peninsula have become infested with Mediterranean Turnip and that this species has been replacing native herbs.

- Paterson's Curse (**Echium plantagineum*) is a Declared Plant listed under the *ARRP Act*. This species is known to complete aggressively with native daisies and form dense herblands

throughout the southwest of WA. One record of Paterson's Curse is known from the Monkey Mia locality (DEC and WAM 2013). It was recorded in 1992 approximately 1.5 km west of the Monkey Mia Dolphin Resort, along Monkey Mia Road (DEC 2013). This species was not recorded by Weston (2002) or Strategen (2012). However, is it known from the broader Shark Bay area (DEC and Conservation Council 2012). Given it has not been recently recorded in the locality, It is considered unlikely that Paterson's Curse occurs in the project area.

- Ruby Dock (**Acetosa vesicaria*) is a common weed of roadsides and is often mistaken for a native species (Hussey et al. 1997). One historical record of Ruby Dock is known from the Monkey Mia locality (DEC and WAM 2013). It was recorded in 1993 approximately 1.5 km west of the Monkey Mia Dolphin Resort along Monkey Mia Road (DEC 2013). This species has not been recorded by subsequent surveys at Monkey Mia (Weston 2002, Strategen 2012). However, is it known from the broader Shark Bay area (DEC and Conservation Council 2012). Given it has not been recently recorded in the locality, It is considered unlikely that Ruby Dock occurs in the project area.

3.0 Potential Impacts on Vegetation

The construction involved with upgrading the water treatment and power facilities at the Monkey Mia Dolphin Resort has the potential to impact on the flora and vegetation in the area. These impact mechanisms are described below.

3.1 Introduction or Spread of Weeds

Construction in the project area has the potential to introduce new weed species and/or spread existing populations, through earthworks, clearing and the movement of vehicles. Low density populations of two weed species have been observed in the project area (Weston 2002, Strategen 2012). An additional three weed species are known to occur with a 5 km radius of the Monkey Mia Dolphin Resort (Section 0), and other weed species may also occur in the project area or in the vicinity. Section 4.1 provides management measures to address the risk associated with the introduction or spread of weeds in the project area during construction.

3.2 Unplanned Clearing or Disturbance

There is a risk of ground disturbance or inadvertent clearing outside of the defined works area while construction is occurring in the project area. The movement of vehicles is considered to be the most likely way in which unplanned vegetation clearing or disturbance could occur. Section 4.2 provides management measures to address the risk of unplanned clearing or disturbance during construction.

3.3 Fire

While fire is an essential and natural process in the vegetation communities of the locality, altered fire regimes have the potential to impact vegetation condition. The construction associated with the facility upgrade may result in inadvertent fires and burning of native vegetation. Section 4.3 provides management measures to address the risk of bushfires during construction.

3.4 Dust

Although the Midwest region is a naturally dusty environment, additional dust is likely to be generated in the project area via clearing, construction and earth moving and traffic movement along unsealed tracks. This may affect the physiological processes of the vegetation and subsequently its overall condition. Section 4.4 provides management measures to address the risk of dust generation to vegetation.

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4.0 Vegetation Management Procedures

4.1 Introduction or Spread of Weeds

Management actions to prevent/reduce the introduction and/or spread of weed species in the project area and surrounding vegetation that will be implemented for the project comprise:

1. Introduce and maintain vehicle, plant and equipment weed hygiene, including the establishment of a vehicle wash/brush down station. All contractors will be required to ensure that vehicles and equipment are free of dirt, mud or plant material prior to entry into the project area.
2. Restrict access into the project area to approved staff and contractors only. Signage should be erected at the entrance to the access track to advise the public accordingly.
3. Educate staff and contractors to raise awareness of the weed species in the vicinity of Monkey Mia and how they can impact environmental values, particularly the Declared Plant, Paterson's Curse (**Echium plantagineum*).
4. Implement eradication procedures in the event of a weed outbreak or infestation, appropriate to the species in question. This should be developed in consultation with the DEC or Department of Agriculture and Food.

Table 4.1 below provides a summary of weed management measures to be implemented for the project, including identification of management responsibilities.

Table 4.1: Summary of weed management actions, responsibilities and timing.

Management Action	Responsibility	Timing
1.1 - Establish a wash-down facility for vehicles, plant and equipment in a suitable location outside of the project area. This should comprise a concrete hard stand with high-pressure hose, brooms and drainage controls to ensure wash-down water is captured.	Site Supervisor	Pre-construction
1.2 – Ensure all vehicles, plant and equipment entering the project area are free of dirt and plant material.	All staff and contractors	Construction
1.3 – Carry out periodic inspections of contractor vehicles, plant and equipment to ensure compliance with weed hygiene measures.	Site Supervisor	Construction
2.1 – Erect signage advising no public access to the project area.	Site Supervisor	Pre-construction
3.1 – Provide copies of relevant weed factsheets to staff and contractors working on-site.	Site Supervisor	Construction
4.1 – Consult with DEC or Department of Agriculture and Food to develop and implement control procedures if any new weed outbreaks occur in the project areas.	Site Supervisor	Construction

4.2 Unplanned Clearing or Disturbance

Management actions that will be implemented to prevent inadvertent clearing or disturbance in the project area and surrounding vegetation will include:

1. Clearly demarcate all areas that have been approved for clearing. Clearing limit boundaries must be shown on all drawings and specifications issued to contractors. These limits will also be surveyed in on-site and clearly marked with posts and flagging or other suitable method. Commencement of vegetation clearing will be made a hold-point for all contractors, requiring checking and sign off by the site supervisor prior to proceeding.

2. Ensure that all staff and contractors understand the boundaries of the project area and only work within this area.
3. Restrict vehicle movement and parking to designated tracks and areas.
4. Rehabilitate areas that have been historically disturbed in the vicinity of the project area with native vegetation (as described in Section 5.0). Where appropriate, disturbed areas in the project area should also be rehabilitated when they are longer required.

No clearing or disturbance should occur outside the defined project area. Contractors should be required to rehabilitate any area that they clear outside of the defined clearing areas associated with the facilities upgrade.

Table 4.2 below provides a summary of vegetation clearing management measures to be implemented for the project, including identification of management responsibilities.

Table 4.2: Summary of vegetation clearing management actions, responsibilities and timing.

Management Action	Responsibility	Timing
1.1 – Show all areas of vegetation approved for clearing on all design and specification drawings issued to contractors.	Aspen Project Manager	Pre-construction
1.2 – Survey in and mark vegetation clearing limits on-site.	Site Supervisor	Construction
1.3 – Ensure no clearing works are commenced without written sign off by the Aspen Site Supervisor.	All staff and contractors	Construction
2.1 – Ensure all staff and contractors are made aware of the boundaries of the project area and that clearing is prohibited.	Site Supervisor	Pre-construction
3.1 – Provide copies of relevant weed factsheets to staff and contractors working on-site.	Site Supervisor	Construction
4.1 – Consult with DEC or Department of Agriculture and Food to develop and implement control procedures if any new weed outbreaks occur in the project areas.	Site Supervisor	Construction

4.3 Fire

Management actions that will be implemented to minimise the potential for fires in the project area include:

1. Ensure that no fires are deliberately started within the project area and that all on-site personnel understand that fires are strictly prohibited.
2. Ensure that vehicles and machinery are parked on clear ground to avoid hot engines igniting .
3. Ensure that all vehicles operating in the project area are equipped with fire extinguishers.
4. Develop an emergency response plan for bushfires.
5. Designate the project area as a no smoking zone.

Table 4.1 below provides a summary of bushfire management measures to be implemented for the project, including identification of management responsibilities.

Table 4.3: Summary of bushfire management actions, responsibilities and timing.

Management Action	Responsibility	Timing
1.1 – Ensure no fires are deliberately lit in the project areas.	All staff and contractors	Construction
1.2 – Ensure all on-site personnel understand that fires are prohibited.	Site Supervisor	Construction
2.1 – All vehicles, plant and equipment are to be parked on existing cleared areas only.	All staff and contractors	Construction
3.1 – Ensure all vehicles are equipped with fire extinguishers.	Contractor	Construction
4.1 – Develop a bushfire emergency response plan.	Site Supervisor	Pre-construction
4.1 – Designate the project area as a no smoking zone.	Site Supervisor	Construction

4.4 Dust

Management actions that may be implemented to minimise dust levels in the project area include:

1. Consider weather conditions (such as wind direction and speed) when planning construction or disturbance activities.
2. Implement dust suppression if high levels of dust are being generated, such as waterspray/wetdown of unsealed tracks.

The Site Supervisor will monitor conditions on-site and liaise with the staff and contractors to implement control measures if significant dust is being generated during construction.

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5.0 Rehabilitation of Degraded Vegetation

5.1 Objective and Scope

Aspen has identified areas outside of the project area, within Reserve 1686, which have been degraded by vehicle tracks, walking tracks and other historical disturbance. Aspen intends to rehabilitate these areas to a condition resembling the surrounding natural environment. This will be approached primarily through the recovery and management of topsoil from areas to be cleared for the project.

The steps involved in the rehabilitation process are described in the following sections and include:

- selection of sites for rehabilitation;
- preparation of sites for rehabilitation;
- placement of topsoil;
- placement of vegetation debris;
- control measures for weeds and feral animals; and
- monitoring and maintenance.

Reserve 1686 is jointly managed by the Shire and the DEC, and therefore approval from these bodies should be sought prior to the commencement of rehabilitation works within this Reserve.

5.2 Selection of Sites

Degraded sites chosen for rehabilitation should be:

- Representative of the vegetation type from which the topsoil will be taken. This will maximise the likelihood that an equivalent suite of flora species will be represented in the topsoil seed bank compared to those in the adjacent intact vegetation. .
- Accessible to vehicles and equipment. No additional clearing of native vegetation should occur as a result of accessing rehabilitation sites.

5.3 Site Preparation

The following site preparation should be conducted on all sites for rehabilitation:

- Chemical control and/or hand removal of any weeds present.
- Construct a perimeter fence to restrict the movement of the public and feral animals (particularly grazers) into the site.
- Provide clear signage to notify the public of the rehabilitation works.

Established native trees or shrubs should not be removed from any rehabilitation areas.

5.4 Topsoil Management

It is intended that topsoil from cleared areas will be moved to disturbed sites to allow for germination of locally-occurring native species from the soil seed bank.

Topsoil should be stripped at a depth of 50 mm. It is preferable that the topsoil is relocated to the rehabilitation sites when it is removed and not stockpiled (termed 'direct return' topsoil management). Where this is not possible, topsoil should be stockpiled as close as possible to the

rehabilitation sites, for the shortest possible time. Topsoil stockpiles should be placed in previously disturbed areas and should not exceed 2 m in height. No native vegetation should be cleared to accommodate stockpiles.

If possible, the placement of topsoil on the rehabilitation sites should occur before rain. This will promote seed growth and aid in the establishment of native species. This will, however, also aid the establishment of weed species. Weed monitoring and manual removal should be conducted regularly. The Shark Bay area experiences its highest rainfall between the months of May and July (Bureau of Meteorology 2013).

5.5 Vegetation Debris

Native vegetation removed as a result of approved clearing should be spread onto rehabilitation sites after the placement of topsoil. The vegetation debris should be spread to a depth of between 10-50 mm, which will aid in suppressing weed germination and establishment. It is preferable that the debris is spread my hand to reduce soil compaction, which will inhibit plant growth.

5.6 Weed Control

Weed control should be undertaken prior to rehabilitation works (see Section 5.3). Regular inspections should occur after topsoil placement and in particular after winter rain (see Section 5.4). Eradication procedures should be implemented in the event of a weed outbreak or infestation, such as chemical control or manual removal. This should be developed in consultation with the DEC or Department of Agriculture and Food as appropriate to the species in question.

5.7 Control of Feral Animals

A perimeter fence should be constructed around rehabilitation sites to restrict the movement of feral animals. Feral animals can significantly impact the revegetation of sites, through grazing pressure and introducing weed species.

5.8 Monitoring and Maintenance

Monitoring should occur to ensure the success of the rehabilitation. Rehabilitation success can be measured by the establishment of native species, in a similar composition to surrounding vegetation, and the absence of weeds.

The monitoring and maintenance of rehabilitated sites should focus on:

- Identifying weed outbreaks and implementing control measures (Section 5.6).
- Checking the perimeter fence for failures or breakage and effecting repairs if required.
- Observing if native flora species are recruiting to the rehabilitation areas. This can be determined through a comparison of the rehabilitation area with nearby areas of intact vegetation with a similar structure and species composition. If native species are not growing within the rehabilitation site, additional measures may be necessary such as seeding or planting with locally occurring native species.

6.0 Traffic Management

Construction and works associated with upgrading and expanding the facilities at the Monkey Mia Dolphin Resort will require an increased traffic volume within the project area. Specifically, construction traffic will be utilising the track that runs south from the resort to the facilities, including a turning circle at the southern end (see Figure 1.2). The access track also crosses Monkey Mia Road, which is the only public access the resort.

Issues associated construction traffic on Monkey Mia Road have been addresses in a separate "Temporary Road Closure Plan" which Aspen has developed in consultation with Main Roads.

Risks associated with the construction traffic along the access track include:

- Interaction of construction traffic along on a single lane unsealed access track.
- Interaction of construction vehicles with private vehicles and pedestrians.
- Noise disturbance.

The following management actions are intended to reduce and control the risks associated with the construction traffic.

6.1 Interaction of Construction Traffic on a Single Lane Unsealed Access Track

Management actions that will be implemented to reduce to risks associated with interacting construction traffic on a single lane unsealed access track include:

1. Setting safe speed limits for all construction traffic. A speed limit of 40 km is usually adequate for construction works.
2. Implementing dust suppression, such as spray/wetdown of unsealed tracks, should dust levels being to impact visibility or if there are complaints from the public.
3. Construction of vehicle bypass tracks as described in the works approved by the Shire of Shark Bay.
4. Widening of the access track as outlined on the project layout
5. Establishment of vehicle and plant and equipment priority rankings such that light vehicle traffic must give way to plant and equipment, and inclusion in site inductions.

Table 6.1 below provides a summary of management measures to be implemented for the project to address the risks associated with the interaction of construction on the access track.

Table 6.1: Summary of management actions, responsibilities and timing for the interaction of construction traffic on the access track.

Management Action	Responsibility	Timing
1.1 – Set a safe speed limit for construction traffic using the access track.	Site Supervisor	Pre-construction
2.1 – Implementing dust suppression.	Site Supervisor	Construction
3.1 – Construction of vehicle bypass tracks.	Site Supervisor	Construction
4.1 – Widening of the access track.	Site Supervisor	Construction
5.1 – Establishment of vehicle and plant and equipment priority rankings	Site Supervisor	Pre-construction

6.2 Interaction of Construction Vehicles with Private Vehicles and Pedestrians

Management actions that will be implemented to reduce the risks associated with construction traffic interacting with private vehicles and pedestrians include:

1. Restricting access into the project area to approved staff, contractors and vehicles only, with the use of signage, fences and barriers.
2. Informing the public utilising the facilities in the area, including the Monkey Mia Resort and the DEC Monkey Mia visitors centre, of the construction activities including timing and hours of work.
3. Diverting, with the use of signage, barriers and fencing, any existing walking tracks that cross the project area or other areas where construction vehicles will be present.

Table 6.2 below provides a summary of management measures to be implemented for the project to address the risks associated with the interaction of construction vehicles with private vehicles and pedestrians.

Table 6.2: Summary of management actions, responsibilities and timing for the interaction of construction traffic with private vehicles and pedestrains.

Management Action	Responsibility	Timing
1.1 – Erect signage advising no public access to the project area.	Site Supervisor	Pre-construction
2.1 – Inform the public of the construction works.	Site Supervisor	Pre-construction
3.1 – Erect signage, barriers and fencing, to divert any existing walking tracks.	Site Supervisor	Pre-construction

6.3 Noise Disturbance Caused by Construction Traffic

Management actions to reduce to impact of noise disturbance caused by the movement of construction vehicles include:

1. Adherence to all applicable noise regulations and legislation.
2. Adherence to the relevant work hour regulations for the Shire of Shark Bay.
3. Maintain a public complaints register and develop appropriate responses to any complaints received.

The Site Supervisor will monitor conditions on-site and liaise with the contractors and staff to implement control measures if significant noise is being generated during construction. The Site Supervisor will also maintain the public complaints register.

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Appendix 1

Framework for Conservation Significance Flora Species in WA

Threatened Flora Statutory Framework

In Western Australia, all native flora species are protected under the *Wildlife Conservation Act 1950-1979,* making it an offence to remove or harm native flora species without approval. In addition to this basic level of statutory protection, a number of plant species are assigned an additional level of conservation significance based on the fact that there are a limited number of known populations, some of which may be under threat.

Species of the highest conservation significance are designated Threatened, either extant or presumed extinct: taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee;

- **T: Threatened Flora (Threatened Flora - Extant)**: taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee (Atkins 2008). *(= Threatened Flora = Endangered + Vulnerable)*

Species that appear to be rare or threatened, but for which there is insufficient information to properly evaluate their conservation significance, are assigned to one of four Priority flora categories:

- **P1: Priority One - Poorly Known**: taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- **P2: Priority Two - Poorly Known**: taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.
- **P3: Priority Three - Poorly Known**: taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.
- **P4: Priority Four - Rare**: taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.
- **P5: Priority Five – Conservation Dependent**: taxa that are subject to a specific conservation program, the cessation of which would result in the taxon becoming Threatened within five years.

Note that of the above classifications, only 'Threatened' has statutory standing. The Priority Flora classifications are employed by the Department of Environment and Conservation to manage and classify their database of species considered potentially rare or at risk, but these categories have no legislative status. Note also that proposals that appear likely to affect Threatened flora require formal written approval from the Minister for the Environment under Section 23(f) of the *Wildlife Conservation Act 1950-1979* in addition to the requirements of the *Environmental Protection (Native Vegetation Clearing) Regulations 2004*.

Appendix 2

Paterson's Curse (**Echium plantagineum*) Factsheet Department of Agriculture and Food

Paterson's curse

(*Echium plantagineum*)

Family : **Boraginaceae**
Form : **Herbaceous – Annual or biennial**
Status : **Present in WA**

An erect annual (occasionally biennial) herb to 1.5 m high, commonly 30-60 cm, reproducing by seed. Native to southern Europe. Widespread throughout the south-west of Western Australia, and the eastern Goldfields.

Stems : One to several stems arise from base, much branched and covered with stiff white hairs.

Leaves : Alternate, bristly. Rosette leaves to 25 cm long, oval to oblong, stalked and with distinct lateral veins. Stem leaves are smaller and narrower, not stalked and almost clasping the stem.

Flowers : Purple, rarely pink or white, crowded along one side of a curved spike. Five petals joined in a curved trumpet shape, 2-3 cm long. Five stamens, two of which are longer than the others and extend beyond the petals.

Fruit : A group of four nutlets surrounded by a stiffly bristled calyx.

Seeds : Brown to grey, 2-3 mm long, three sided strongly wrinkled and pitted.

Declaration

Category : P1
Location : For the whole of the State

Category : P3
Location : For the municipal districts of Augusta-Margaret River, Broomehill, the City of Bunbury, Busselton, Capel, Chittering, Collie, Cranbrook, Dandaragan, Dalwallinu, Dardanup, Denmark, Donnybrook-Balingup, Harvey, Esperance, Gingin, Kent, Kojonup, Mandurah, Moora, Murray, Ravensthorpe, Serpentine-Jarrahdale, Tambellup, Victoria Plains, Waroona, Wongan – Ballidu, Wagin, West Arthur and Woodanilling.

Category : P4
Location : For the municipal districts of the City of Albany, Boddington, Boyup Brook, Bridgetown-Greenbushes, Gnowangerup, Brookton, Bruce Rock, Corrigin, Cuballing, Dumbleyung, Jerramungup, Katanning, Kondinin, Kulin, Lake Grace, Manjimup, Merredin, Mukinbudin, Nannup, Narembeen, Narrogin, Nungarin, Pingelly, Plantagenet, Wandering, Westonia, Wickepin, Williams, Yilgarn and those portions of the municipal districts of Carnamah and Coorow west of the Midland Road.

Standard Control Codes (these may vary for individual plants)	
P1 REQUIREMENTS Prohibits movement	Introduction of the plant or their seeds into, or movement within the declared area is prohibited.
P3 REQUIREMENTS Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that reduces the extent/distribution and/or density of the declared plant within the infested property. The infested area must be managed to prevent the spread of seeds or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery Treatment must be done prior to seed set each year.
P4 REQUIREMENTS Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that contains the declared plant by preventing the spread of seeds or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery to prevent spread beyond existing boundaries on the infested property. Treatment must be done prior to seed set each year.

Control Method

Recommended herbicides	**:**	In cereals • **Chlorsulfuron** • **Metsulfuron methyl** • **Triasulfuron** • **Tigrex** • **Broadstrike** • **Jaguar** • **Bromoxynil + MCPA** In Pasture • Up to 4 leaf stage **Jaguar®** **Tigrex®** **Broadstrike®** **Bromoxynil + MCPA** • At early flowering - seed set control **Chlorsulfuron** **Metsulfuron methyl** **Triasulfuron** **Glyphosate + 2,4-D LV ester**

Herbicide	**:**	**2,4-D amine** (various trade names - APVMA site)
Active ingredient	**:**	a) 500 g/litre 2,4-D amine **(Group I)** b) 625 g/L
Rates of dilution for spot spraying	**:**	Not Recommended
Amount of product per 10 litres water	**:**	Not Recommended
Rate of product per hectare	**:**	• a) 0.75 L for 'Spray Grazing • b) 0.6 L. • a) 1.6 L for rosettes less than 10 leaves. • b) 1.3 L
Time of application	**:**	'Spray Grazing' - Winter - from three weeks after germination.
Remarks	**:**	'Spray-graze' technique for selective control in pastures.
More information and other control methods	**:**	'Spray Grazing' apply low rate (0.75 L) of 2,4-D amine (500 g/L) or MCPA (1L/ha) and heavy graze at 4 - 6 times normal stocking rate from 7 - 10 days after treatment. Best results in small paddocks 10 - 20 ha. Other formulations of 2,4-D amine are available and if using these adjust rates accordingly

Herbicide	**:**	**Chlorsulfuron** (various trade names - APVMA site)
Active ingredient	**:**	750 g/kg chlorsulfuron **(Group B)**
Rates of dilution for spot spraying	**:**	1 g in 50 litres
Amount of product per 10 litres water	**:**	0.2 g
Rate of product per hectare	**:**	15 – 20 g
Wetting agent dilution	**:**	1:400
Time of application	**:**	• In cereals: Wheat pre-sowing. Wheat, barley and oats post-emergence. • In pasture: apply at early flowering to prevent seed formation. The addition of 750 mL - 1 L of 2,4-D amine (500 g/L) will improve the control.
Remarks	**:**	• Ensure chlorsulfuron is thoroughly dissolved when using small quantities prior to adding to tank mix. • May also be used for spot spraying, roadsides etc. Can be used in non-legume pastures. Spot spraying recommendations are based on 20 g/ha. • An application of 1g/L through a blanket wiper can also be effective in pasture where reduced damage to subterranean clover is desired.
More information and other control methods	**:**	Application of 10 – 15 g/ha at flowering prevents seed formation. Addition of 2.4 –D amine at 10 mL/10 L or 1 L/ha will improve control of seed formation.

Herbicide	:	**Metsulfuron methyl** (various trade names - APVMA site)
Active ingredient	:	600 g/kg metsulfuron-methyl **(Group B)**
Rate of product per hectare	:	5 g
Rates of dilution for spot spraying	:	0.5 g in 100 L water
Wetting agent dilution	:	1:400
Time of application	:	In cereals - Pre-sowing in wheat only. Post-emergence in wheat and barley. In pastures - At flowering of Patersons curse for seed control.
Remarks	:	More effective on older plants, i.e. August – September.
More information and other control methods	:	Addition of 2,4 –D amine @ 1 L/ha of 500 g/L or 0.8 L of 625 g/L will improve control of seed formation.

Herbicide		**Triasulfuron** (various trade names - APVMA site)
Active ingredient		714 g/kg triasulfuron **(Group B)**
Rate of product per hectare		a) 30 g b)15 g
Package size		
Time of application		a) Apply pre-emergence to wheat only. b) At early flowering of Paterson's curse for control of seed formation on plants growing along road sides.
Remarks		For seed set control. Addition of 0.75-1.0 litre 2,4-D amine (500 g/L) or 0.6 – 0.8 L/ha of the 625 g/L 2,4-D amine concentration will give a quicker kill of seeds.
More information and other control methods		• Triasulfuron, metsulfuron or chlorsulfuron @ 1 g/L of water are effective for controlling seed set when used through a 'Blanket wiper' on plants that have run up in pasture. • Resistance has developed to these chemicals so it is important to rotate use. • Results are poorer once green/black seeds of Paterson's curse are present.

Herbicide	:	**Glyphosate + 2,4-D LV ester** (various trade names - APVMA site)
Active ingredient	:	1) 360 g/litre or 2) 450 g/L glyphosate **(Group M)** + 600 g/litre or 680 g/L 2,4-D LV ester **(Group I)** Other concentrations of glyphosate are available. Adjust rates if using them.
Amount of product per 10 litres water	:	1) 5 mL or 2) 4 mL + 5 mL LV ester
Rate of product per hectare	:	1) 500 mL 2) or 400 mL + 500 mL of 2,4-D LV ester
Time of application	:	At early flowering
Remarks	:	Where Paterson's curse is growing in drains or near water courses the herbicide Roundup Biactive® should be used. An APVMA permit is required to apply 2,4-D ester (80%) from 1 September until 1 May. Alternative formulations of 2,4-D are available to substitute the 80% formulation. Rates should be adjusted for the different formulations.
More information and other control methods	:	Glyphosate is suitable for spot spraying in non-selective situations. Care should be taken to check for restricted spraying permits when applying 2,4-D ester. This treatment is only suitable in cereal growing areas where there are no commercial vineyards or tomato gardens

Herbicide	:	**Jaguar®**
Active ingredient	:	250 g/L bromoxynil **(Group C)** + 25 g/L diflufenican **(Group F)**
Rate of product per hectare	:	500 - 750 mL/ha
Time of application	:	Lower rate for plants with less than 2 leaves, higher rates for plants with up to 4 leaves.
Remarks	:	Registered in cereals and pastures, including cover crops in vineyards.
More information and other control methods	:	Similar product Barracuda registered @ 600 mL for small Paterson's curse.

Herbicide	:	**Tigrex®**
Active ingredient	:	250 g/L MCPA **(Group I)** + 25g/L diflufenican **(Group F)**
Rate of product per hectare	:	1 L/ha
Time of application	:	Up to 4 leaf stage
Remarks	:	Clovers should have 3 trifoliate leaves.
More information and other control methods	:	Some yellowing of clovers may occur. Check label for tolerance of various clovers.

Herbicide	:	**Broadstrike®**
Active ingredient	:	800 g/kg flumetsulam **(Group B)**
Rate of product per hectare	:	25 g/ha
Wetting agent dilution	:	1:400 BS 1000 or Uptake® at 500 mL/100L
Remarks	:	Safe on clovers. Appears more effective in the south west. Clovers should have 3 trifoliate leaves. Paterson's curse around metro areas has developed resistance to this herbicide as well as the sulfonyl areas.
More information and other control methods	:	Restrictions on grazing or cutting for stockfeed as follows: • medic/clover 3 days, • wheat 8 weeks after treatment • Improved control has been obtained when this product is mixed with terbutryn (Igran) @ 300-500 mL/ha. If using this mixture with Broadstrike, do not use the spraying oil Uptake®. Only use a non ionic wetting agent.

Other relevant information related to this topic:

- Quarantine WA
- Permitted and quarantine species list
- CSIRO biological control
- Paterson's curse (Farmnote 33/2005)
- How to control Paterson's curse (Note 169)
- Off-label permit of a registered agvet chemical product
  (Declared plants: Permit number – per13236)
- Off-label permit (olp) for use of a registered agvet chemical product
  (Environmental weeds: Permit number – per13333)
- For description and distribution http://florabase.dec.wa.gov.au/browse/profile/6681