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DRAFT Weed Management Plan

Beef Processing Facility

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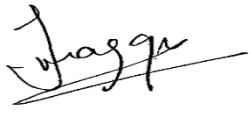
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1 Introduction

This Weed Management Plan has been developed as part of The Public Environmental Report (PER) that has been prepared at the request of the Northern Territory Minister for Natural Resources, Environment and Heritage (the Minister), in accordance with the NRETAS *Guidelines for the Preparation of a Public Environmental Report, Meat Processing Facility Project, Livingstone Locality, NT* (NRETAS January 2012).

1.1 Project Area Location

The project site with a total area of 601 ha is comprised in Lot 4 Hundred of Cavanagh (116.4 ha) and Section 5410 Hundred of Strangways (484.7ha). The land has a boundary to Stuart Highway of approximately 370 m in the east and a boundary to Blyth Road of about 210 m in the west. The North-South rail corridor forms the north-eastern boundary of the land. The location of the site is shown in **Figure 1**.

Access to the site is only possible from the eastern side of the property via formalised entry points off the Stuart Highway.



Figure 1: Project Site Location

1.2 Existing Land use and Site Characteristics

The current land use is cattle-grazing and hay production. Hay production is in operation on approximately 50% of the site area. Cattle are grazed on areas of the site not suitable for hay production, constituting an area of approximately 25%. The remaining 25% of the total site area are wetlands and seasonally available for grazing. Grazing is not currently restricted in the riparian zone.

The climate of the region is characterised by two distinct seasons- Dry Season (May-October) and Wet Season (November-April). The wet season is typified by high temperatures and humidity, and significant rainfall events. Rainfall records for stations near the site, at Elizabeth Valley and Noonamah, show that the annual average rainfall is 1,660 mm at Elizabeth Valley and 1,900 mm at Noonamah (the period of records at Noonamah is much shorter than for Elizabeth Valley).

Three second order (Strahler's Order) streams associated with the Berry Creek system are present on the land. The east branch runs on an east-west alignment through the centre of the site, while the southern branch runs from a point near the intersection of Scrutton and Cornock Roads outside the site, through Lot 4 and to the south-western corner of Section 5410. The west branch runs roughly parallel to the western boundary (Refer to **Figure 2**). The stream margins are well vegetated.

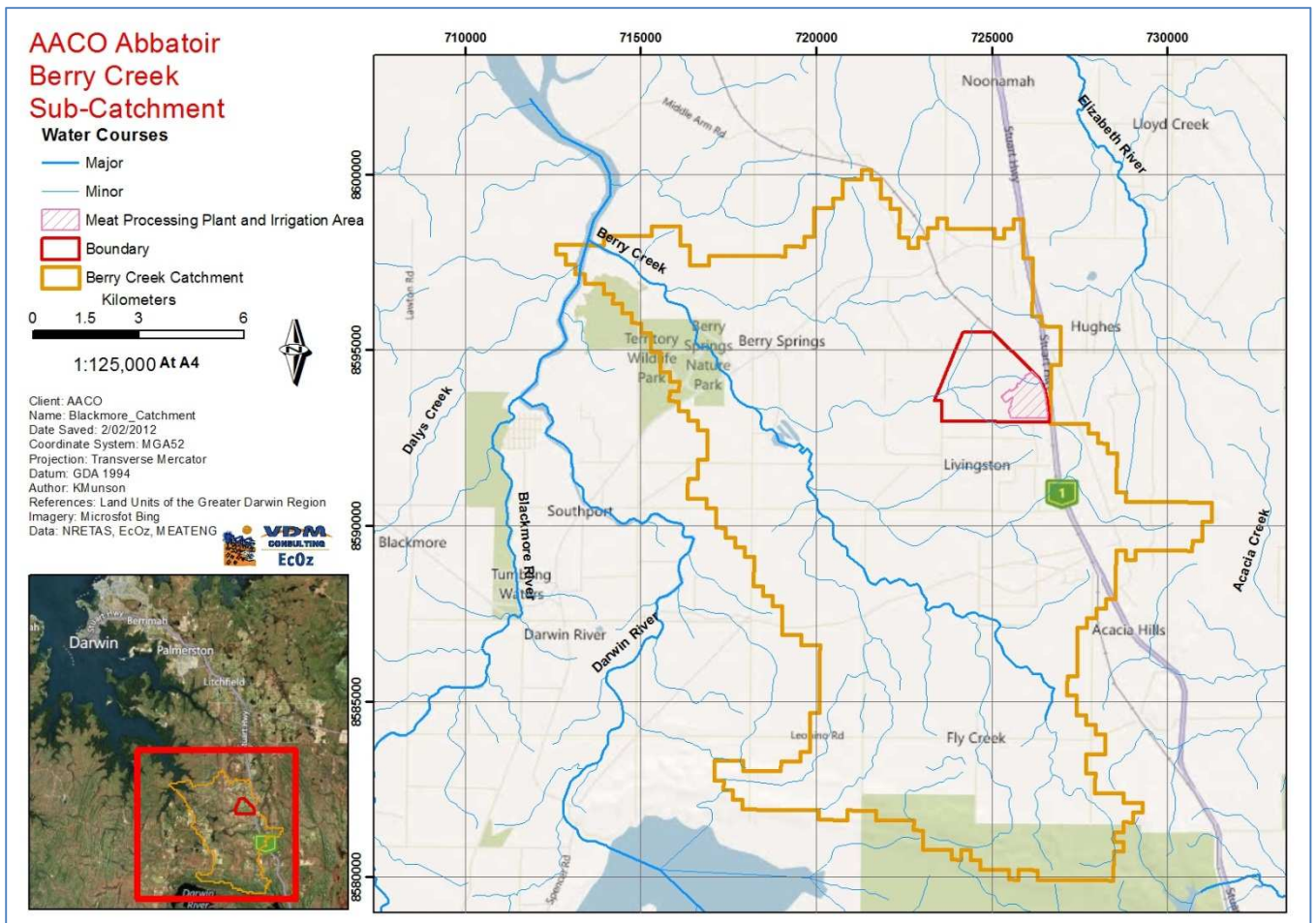


Figure 2: Catchment map

Land units represented on the site include Land Units 2b1, 3b, 3c, 3e, 4a, 5a, and 5b2. Their distribution is shown in the **Figure 3**. The typical soil type is a relatively deep mottled yellow duplex soil often with a lateritic &/or ironstone layer at about 80 – 100 cm and deep yellow/grey clayey soils lower in the terrain and associated with seasonally waterlogged areas.

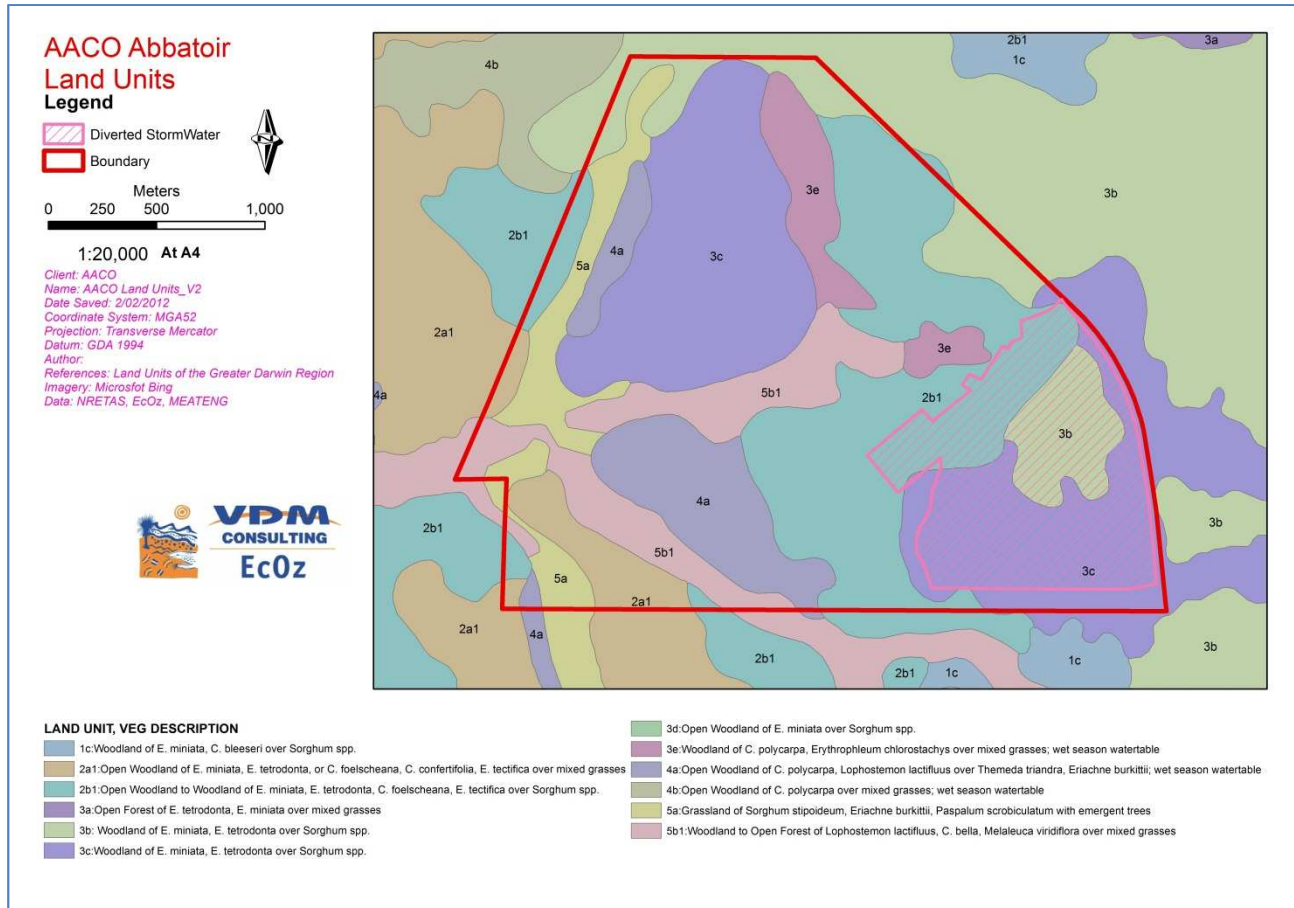


Figure 3: Land Units within Project Area

1.3 Project Overview

AACo are committed to developing this facility in accordance with environmental and industry best practice, facilitating robust management and mitigation of potential environmental impacts (**Refer to Appendix C of PER** for more detail). The design of facility is given in **Figure 4**.

Following is a brief description of key features of the proposed facility that impact the weed management of the site;

- The intention is to establish a beef processing facility with a capacity to process approximately 1000 cattle per day. The intention is that capacity will begin at 240 cattle per day and increase in stages to the maximum intended capacity of 1000 head per day using two shifts.
- Facilities to include are a fully contained large area with about 2 days holding capacity, a banded manure/paunch content composting area, water treatment ponds, and treated water irrigation system.
- The entire facility will occupy about 4 ha in the eastern portion of Section 5410. A further 14 ha will be required for waste treatment and disposal. These area requirements amount to approximately 3% of the parcel area.

- Upland areas will be used as irrigated pasture paddocks, using treated water from the facility operations, to optimise nutrient uptake and hay production. Although only one area can be utilised with the available water resources, three areas have been identified as a contingency if nutrient levels exceed acceptable limits, or other unforeseen circumstances arise.
- Cattle grazing will be allowed on the areas not suitable for hay production, constituting an area of approximately 25%.
- Operation of the storage dam, water balance and irrigation system is to be carefully scrutinized to determine the need for additional water by collection and storage of stormwater runoff to ensure sustainability of the irrigation system and the maximization of fodder production.
- Treated water ponds will be carefully monitored to help ensure optimal treatment of the water being generated.
- Under the proposed development, the riparian buffer will be installed and maintained 50m from the channel bank. This buffer will permit the sensitive environment to naturally revegetate, offering improved outcomes for the entire catchment.
- An environmental monitoring program is to be undertaken including regular monitoring of treatment ponds, groundwater, land conditions and the soils of the irrigation area. An annual Environmental Monitoring Report outlining the overall environmental performance of the facility will be routinely completed

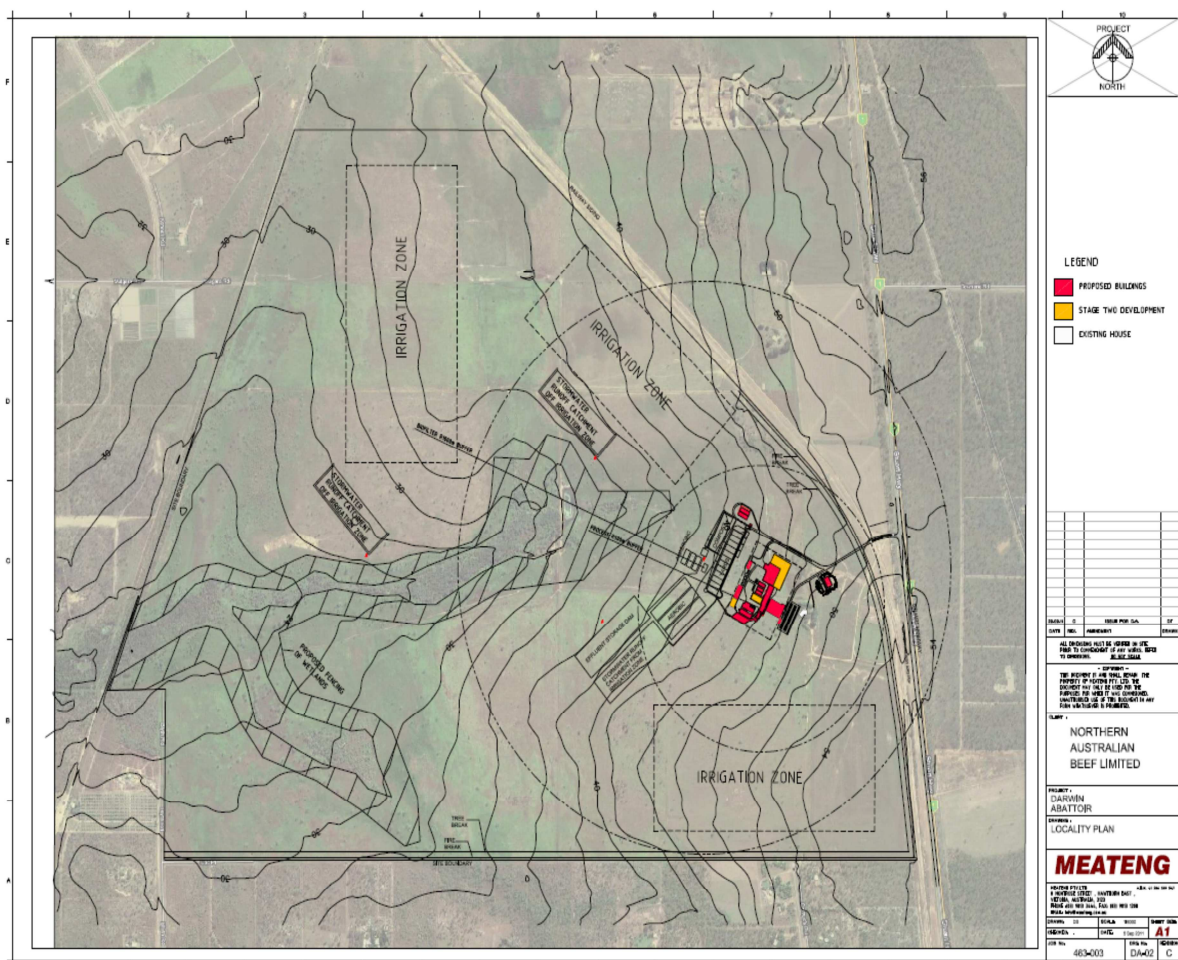


Figure 4: Project Facility design

1.4 Environmental Risk-Weed Invasion

Weed invasion threat has been identified a considerable risk to the land management of the site and surrounding properties. The potential for weeds to invade and establish on the site is high over the life of project. Potential Sources included are:

- Initial Construction Phase:
 1. Soil disturbance from earthworks and the frequent movement of construction vehicles to and from the site
 2. Weeds could potentially be imported to the site on construction and landscaping materials, and on the clothing of construction workers
- Operational Phase:
 1. Trucks movements to bring the cattle on-site
 2. Cattle movement on and around the grazing land
 3. Composting and Storage Dam areas
 4. Riparian and revegetation zones, existing weeds proliferating
 5. Spread of existing weed infestations due to disturbance and vehicle traffic;

The proliferation of environmental weeds on and adjacent to the site may have significant environmental impacts, including:

- reduction of biodiversity
- impacts on recreational activities
- impacts on landscape and lifestyles
- degradation of water quality
- increased risk of fire.

1.5 Potential Weed Species

A weed is an introduced plant growing in competition with the plants that belong in an area. This competition can lead to the disappearance of native species and have consequences such as loss of food and habitat for native wildlife, and altered landscapes.

A desktop search of the Infonet database has found that there could be potentially 31 invasive species within the proposed site. These species, listed in Table 1 over the page, have been passed through Weed Risk Assessment to determine their risks and are scored on the severity of its impact and likelihood of control using a number of parameters including:

- **Invasiveness:** mode of reproduction, and potential to disperse.
- **Impacts:** capacity to modify the environment, social or economical values.
- **Distribution:** current distribution and potential distribution based on favoured habitat.

As well as

- **Costs and ease of control:** ease of detection, accessibility of the site, cost of control methods and effectiveness, time to reproduction from a new plant, reproductive capacity (e.g. duration the weed may reproduce and the amount of reproductive parts) and factors contributing to spread or establishment of the weed.

- **Persistence:** how long propagules may remain viable in the environment and the probability of re-invasion.

Eradication of weed species scored through the Weed Risk Assessment under *Weed Management Act 2001* should interrogate a cross examination of the ecology of weed and confidence in the existing knowledge as well as a cross examination of the qualities which influence the effort required to eliminate the weed for the particular infestation.

1.6 Legislative Obligations

The relevant legislation to this Plan is the *NT Weeds Management Act 2001*, which states that the owner and occupier of land must:

- a) Take all reasonable measures to prevent the land being infested with a declared weed;
- b) Take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land; and
- c) Within 14 days after first becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify an officer of the presence of the declared weed.

Table 1: Infonet Weed List within Project Area

Class A weed – To be eradicated

Gamba Grass	<i>Andropogon gayanus</i>
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Class B weed – Growth and spread to be controlled

Olive Hymenachne	<i>Hymenachne amplexicaulis</i>
Hyptis	<i>Hyptis suaveolens</i>
Bellyache Bush	<i>Jatropha gossypifolia</i>
Mission Grass (perennial)	<i>Pennisetum polystachion</i>
Mission Grass (perennial)	<i>Pennisetum polystachion subsp. polystachion</i>
Salvinia	<i>Salvinia molesta</i>
Sicklepod	<i>Senna obtusifolia</i>
Spiny-head Sida	<i>Sida acuta</i>
Flannel Weed	<i>Sida cordifolia</i>
Paddy`s Lucerne	<i>Sida rhombifolia</i>
Branched Porterweed	<i>Stachytarpheta australis</i>
Grader Grass	<i>Themeda quadrivalvis</i>

Class C: Not to be introduced to the Territory (All sp. Listed under Class A and B)

Species with no status

Neem	<i>Azadirachta indica</i>
Calopo	<i>Calopogonium mucunoides</i>
Clustering Fishtail Palm	<i>Caryota mitis</i>
Golden Shower	<i>Cassia fistula</i>
Gambia Pea	<i>Crotalaria gorensis</i>
Purple Crabgrass	<i>Digitaria violascens</i>
Indian Heliotrope	<i>Heliotropium indicum</i>
Red Natal Grass	<i>Melinis repens</i>
Mission Grass (annual)	<i>Pennisetum pedicellatum</i>
Lippia	<i>Phyla nodiflora var. nodiflora</i>
Spearpod	<i>Ruellia tuberosa</i>
Bitter Broom	<i>Scoparia dulcis</i>
Singapore Daisy	<i>Sphagneticola trilobata</i>
American Rat`s Tail Grass	<i>Sporobolus jacquemontii</i>
Caribbean Stylo	<i>Stylosanthes hamata</i>
Townsville Lucerne	<i>Stylosanthes humilis</i>
Shrubby Stylo	<i>Stylosanthes scabra</i>
Cinderella Weed	<i>Synedrella nodiflora</i>

2 Weed Management Plan

2.1 Objectives

This Weed Management Plan outlines the precautions and procedures that will be implemented for preventing the entry of weeds onto the site and the spread of existing weeds during the life of project.

A robust monitoring plan has been developed in order to facilitate ongoing identification of environmental impacts that may arise. The early detection of change is critical in minimising any adverse environmental impacts. The integrated environmental management approach uses this monitoring plan as a precautionary measure given that within an integrated approach the aim is to eliminate environmental impacts through design and management practices.

This Plan has been written with the view to achieving the following specific objectives:

- Ensure weeds are not introduced to the site through vehicles, livestock, machinery and equipment brought onto the site by AACO personnel or associated contracting companies. All vehicles will be required to undergo a thorough wash-down on site.
- Avoid spread of weeds within site through cattle grazing, machinery and equipment hygiene, vigilance of viable weed seed(s) and treatment within treatment area (specifically in composting and holding dam area), temporary fencing of identified weed infestation area and implementing a specific weed control measures during suggested timing as given in **Appendix A**. Identified weeds are to be actively managed as per controls detailed within this Weed Management Plan.
- Minimise areas of soil disturbance to prevent the risk of colonisation from nearby weed infestations (via dispersal methods such as wind and animals) - This will be achieved by only clearing the area required to establish associated infrastructure, active management of grazing zone and by proper management of grazing activities.
- Ensure weeds are not introduced to the lease parcel via imported materials such as processing equipment, machinery and stores - All materials such as steel, plastics and plant equipment will be inspected for soil and seed presence. All construction or ground disturbing equipment will be thoroughly cleaned prior to entry to the site.
- Monitor the success of the weed management strategies outlined within this Plan, and review strategies where necessary - The key to successful weed management is awareness, rapid detection, and response. Weed Identification Kits will be utilised to aid in identification of weeds and list preferred management options for all weeds that have the potential to occur within the project area.
- Ensure ongoing rapid weed detection and respond to any emerging infestations.

Weed colonisation within the site will be controlled through prevention, monitoring and early eradication. The site location and its vast area with significant diversity sets up a challenge to maintain all the land in a good condition and weed-free. The site has been divided into the different zones based on the proposed land use. Site characteristics such as soil and hydrology are identified to develop specific weed management measures for individual zones so as to maintain the land in a healthy condition. These zones in order of their conservation priority are listed below:

1. Streams and Riparian zone
2. Wetland zone
3. Grazing land zone
4. Pasture/Irrigation zone

5. Infrastructure zone

The commencement of weed monitoring will coincide with the commencement of site development. The aim of the monitoring is to confirm the success of all objectives specified within this Management Plan and as per agreements with land owners and current managers. Weed monitoring will be on-going through the life of this project and will be reported annually via the EMP.

Manual and/or chemical control programs will be implemented wherever new weed species or infestations are identified within the site. Detail concerning listed weed species can be found in **Appendix A**.

Photographs of weed species known to be problematic in the area will be posted on noticeboards to assist employee identification of potential outbreaks around their work areas.

2.2 Weed Management - Avoid the importation of weeds onto the project site

The construction phase is not seen as a time of major risk of introduction of new weeds. The major risk is associated with transporting large numbers of cattle to the site regularly. This activity will expose the site to weeds from all over the NT that could be transported on road transport vehicles and on the livestock being transported. Weeds seeds may drop from the vehicle or animals onto the road trafficking areas or may be deposited in the stock holding yards. Once in the holding yards, the potential for seeds to spread further is dramatically reduced by the high level of management of that area. If the stocks are released to graze the property, then the risk is increased. There is the potential for weeds to be introduced to the site within cattle feed. This risk is relatively low because the area that such feeds will be stored and used is highly managed and prevention and management are common practice.

2.3 Weed Management - Avoid the spread of weeds within the project site

As the site is currently completely cleared and utilised for cattle grazing, the risks of spreading weeds within the project site will become more of an issue once the site has been managed for weeds for several years. The movement of cattle and agricultural machinery around the site create the greatest opportunity for the spread of internal weeds.

The construction phase is not seen as a time of major risk of introduction of new weeds, but ground disturbing activities will help proliferate existing infestations. AACO has prepared an Erosion and Sediment Control Plan (see **Appendix F of the PER**) which includes measures that aim to minimise soil disturbance. As construction activities will be occurring in areas of future high use and visibility, the risk is considered low. Ground disturbance will be minimised during operations via appropriate stocking rates and active management of grazing areas.

During the operation phase, any known infestation will be actively managed and potentially fenced so as to avoid their spread with the cattle involvement.

2.4 Ongoing Monitoring and Response

The key to successful weed management is awareness, rapid detection, and response. Land managers and on-site personnel must be able to identify weeds and respond to weed emergencies in a timely manner. To assist in this, Weed Identikits will be produced for, and used by, on-site staff and managers, and formal training will be provided on the use of these kits. The Weed Identikits provide a brief description to aid in identification of weeds and list preferred management options for all weeds that have the potential to occur within the lease. With this tool, on-site staff can identify emerging weeds and eradicate them before infestations become established. Weed Identikits can easily be compiled using the Weed Management Branch website.

It may be several years before weed seed accidentally transported to the lease parcel emerges as a visible weed infestation, thus the Weed Identikit and training for on-site staff is important to ensure that the lease parcel remains weed free into the future.

The following information in **Table 2** is extracted from the NT Government's (2009) *Weed Management Handbook*, and outlines the potential treatments for those weed species identified through the infonet search tool.

Table 2: Summary of control methods

Management options	Applicable situations
Hand-pulling, manual removal	Small infestations Early stage infestations Sites with predominantly native vegetation Species not effectively controlled with available chemicals
Physical control (machinery)	Predominantly exotic vegetation Multiple weed species No limitations to access
Chemical control: – foliar spraying – cut and paint – drill and fill – frill and fill	Large infestations Multiple weed species or monocultures Sites with either predominantly exotic vegetation or a mixture of native and exotic vegetation Sites which may have access limitations
Biological control	Only available for limited number of weed species May be particularly important for sites not readily accessible for other control options
Revegetation with native species	Sites where additional native plants are desired May be through planting tube stock or direct seeding

2.5 Weed Management Specific Measures

2.5.1 Streams and Riparian Zone

The project area supports three second order (Strahler's Order) streams associated with the Berry Creek System (as shown in **Figure 2**). These creek margins are well vegetated and feature a 50m wide riparian zone on either side of the creek line. Presently, this area is exposed to the cattle grazing, and it can substantially facilitate weed invasion and potential heavy infestation on disturbed soil.

The management of this riparian zone is essential to maintain its ecosystem values such as habitats to a diverse range of flora and fauna. Management involves sediment and nutrient run-off control within Berry Creek System and the stabilisation of stream banks and appropriate environment to aquatic life. Weed management has been identified as a key control measures to prevent the deterioration of this sensitive habitat. Weed management in riparian areas is one of the most difficult challenges, because these areas are inherently invasible and control options are limited. However, healthy maintained or established riparian zones will discourage the growth of weed.

Following strategies will be taken to maintain the health of riparian zone and prevent the growth of weed species –

- Fence-off the riparian zone to prevent the cattle movement within the riparian zone. At least a 100m wide riparian zone/conservation zone will be maintained through fencing the 50m corridor on either side of creek line (as shown in **Figure 4**). This will allow the land to recover from the grazing pressure.
- Replanting on disturbed patches .Where weeds have already invaded the riparian vegetation and where topsoil is exposed, rehabilitation of those areas will be conducted immediately. A combination of chemical and mechanical methods will be employed to eradicate the particular infestations. Specific control options for key weeds are included in **Appendix A**. It is important that the only the herbicides registered for use in riparian lands and near water courses will be used. Following the treatment, the areas will be sowed with native species and mulched to prevent re-invasion, as well as to stabilise any exposed soil.
- Active on-going monitoring and management of riparian zone. Regular monitoring of riparian vegetation (protected buffer) will be continued for long term weed management as these areas are highly invasive in nature to the re-invasion of existing or new weed species. This on-going monitoring will target on measuring the changes in species diversity and structural composition, extent of new seedling establishment, regeneration of native species and changes in the composition and extent of weed species.

To ensure long term management of the riparian zone, a follow-up maintenance will include watering plants in early stages to aid establishment, plant replacement after flooding or drought, on-going weed management, management of fuel load in and the riparian area to reduce the risk of fire and construction of firebreaks where necessary.

- Restricted human disturbance. These areas will be visited only during the scheduled inspection and for the disturbed area management.

2.5.2 Wetland Zone

The wetland areas (approximate 25% of the site) associated with the Berry Creek system are currently unmanaged and open to cattle grazing. These areas are vulnerable to the weed invasion therefore the appropriate management strategies will be placed to maintain the natural values of wetland and control the weed attack.

- Stormwater management. The facility design incorporates the construction of stormwater dams to collect the stormwater run-off from the upland areas (irrigation zone). This design will prevent the stormwater discharge to the wetlands and subsequently, a control over the potential increased nutrients levels which support the introduction of weed species.
- Waste Management. All the wastes associated with the proposed facility will be disposed appropriately to the nearby landfill sites. No waste including the organic material or plant waste will be dumped in a wetland area to disallow the weed introduction.
- Grazing and disturbance control. Management strategies will target onto prevent and/or reduce the grazing and human disturbance. The cattle will be excluded from the existing wetland zone to improve their natural quality and habitat. Cattle are attracted to the burned areas, therefore to encourage the cattle exclusion from this area, a grazing pasture will be controlled burned, a long way from this habitat.
- Revegetation of disturbed area. All disturbed areas will be immediately rehabilitated following the early detection. Encountered weed species within the area will be managed in accordance to the plan outlined in **Appendix A**. Following the treatment, the area will be revegetated with the plant species native to the area. This area will be temporarily fenced until the native seedlings are established.
- Ongoing monitoring and management of area. This area will be regularly inspected for any project associated disturbance and will be managed immediately to off-set the significant environmental or economic damage.

2.5.3 Grazing zone

The project supports cattle grazing on the grasses growing naturally on the upland areas (not included in the infrastructure zones and not suitable for hay production). The cattle can easily facilitate weed introduction via the native vegetation trampling and disturbance to the soil and the weed spread via its fur and faeces. The weed growth within the grazing areas can result in the decreased animal production, altered fire regimes, altered run-off and stream flow processes and potential injury and/or toxicity to animals. Therefore, the management of the grazing areas is important to maintain its quality and the nearby areas including conservation/riparian zone, wetland areas and irrigation/pasture zone.

The following measures will be implemented to maintain the quality of grazing land and prevent the weed spread-

- Weed treatment. The efforts will be made not to introduce any new outbreaks within the grazing zone and prevent the spread of existing infestations. All existed infestation within the grazing zone will be managed in accordance with the **Appendix A**. If any existed weed has the good forage value, then it will be carefully managed by physical means (such as slashing) or biological means (grazing) before it triggers the impact or proliferates.
- Controlled Grazing. Controlled grazing on the grazing land will avoid the weed introduction and weed proliferation. This will be achieved by the various means given below-
 - √ The stock number released on the grazing land will be adjusted as suitable to its carrying capacity.

- Ongoing monitoring and management of area. This area will be regularly inspected for any new outbreaks and will be managed immediately as per the controls outlined in **Appendix A**.

2.5.4 Irrigation/Pasture Zone

Irrigation/pasture zone will be cropped with Lucerne or a similar legume crop for hay production. Therefore, it is important for AACo to manage the weeds within this area and produce weed-free good quality fodder. To reduce the weed spread, these irrigation areas will be established on the up-land areas and away from the existing watercourse lines within the property. A regular inspection and management of these areas will be included in the weed management strategy to control the weeds before they become well established and pose a serious economic and/or environmental harm.

2.5.5 Infrastructure Zone

AACO will incorporate the weed control measures in their environmental strategy to prevent the weed spread from and within the meat processing plant and associated infrastructure, over the life of project. Following measures will be implemented to minimise the threat of weed spread-

- Vegetation Clearance: Prior to clearing, all the area designed for clearing will be closely monitored for any scored weed infestation. Where weed species will be recorded, control mechanisms will be implemented to reduce the risk of contamination of topsoil stockpiles with weed seed and vegetative material. All identified infestations will be immediately treated in accordance to the plan outlined in **Appendix A** and the clearing of area will not be permitted until its declared weed free from the experienced personnel. This problem can also be resolved in other way involving a separate stockpiling of contaminated soil within the bunded area, herbicide spraying of stripped soils and appropriate disposal as fill of soil materials is infested with weeds.
- Vehicle washdown. During the construction phase, all the vehicles and machinery will be washed down and inspected off-site prior to the entry of site. Once the storm-water dams are constructed and hold the sufficient water, this pooled water will be pumped to use for the wash-down of light vehicles on-site.
- Inspection of imported materials. All materials such as steel, plastics and plant equipment will be inspected for soil and weed(s) seed presence prior to entry to the site.
- Access Routes. All known infestations along the access routes will be maintained in a weed free or reduced state to lessen the spread of weed by vehicle movement. Active chemical or physical control measures specific to the known infestations will be implemented immediately after the detection. Refer to **Appendix A** for the control measures.
- Livestock inspection. Livestock act as seed carriers both via their fur and their faeces. Therefore, every single livestock will be inspected carefully prior to their entry in the holding yards to eAACoe the early detection of weed introductions.
- Waste treatment facility management. Each component of waste treatment facility including compost area, holding dam, anaerobic ponds, and effluent storage dam should be regularly inspected to diseAACoe the weed establishment and prevent their spread. Compost area will be more regularly inspected for the weed(s) seeds and vegetation fragments. Other units of treatment facility like holding dam, aerobic ponds and effluent storage dams can also contain the weed reproductive parts transmitted from wind or animals such as birds (including treated compost effluent).

Where any weed reproductive part is detected, it will be managed appropriately. The seeds or vegetation fragments collected will be placed within the closed container or air-tight bag, and an advice will be taken from the NRETAS for their proper disposal.

3 Responsibility

Table 3-Weed Management Roles and Responsibilities

POSITION	RESPONSIBILITY
<p>General Manager - Production</p>	<ul style="list-style-type: none"> • Ensure that all declared noxious weeds are identified and eradicated as required by regulations • Ensure that this weed management plan is implemented • Provide access to training for Site Manager • Maintain wash-down log
<p>Field Manager</p>	<ul style="list-style-type: none"> • Ensure that all personnel are aware of and adhere to these procedures • Inspect vehicles for seed and soil when entering site • Implement wash-down procedures • Inspect individual component of waste treatment facility before directing treated material to other component • Undertake continued training in weed identification • Maintain and act upon Weed Control Register • Perform regular surveys to identify noxious weeds and undertake any control programs as necessary
<p>Employees and Contractors</p>	<ul style="list-style-type: none"> • Report any occurrence of noxious weeds • Wash all vehicles and equipment before entering or leaving site

4 References

Northern Territory Government 2009. Weed Management Handbook. Accessible at <http://www.nt.gov.au/weeds>

Northern Territory Government 2012. NT NRM Infonet. Accessible at <http://www.ntinfonet.org.au/reports/>

NRETAS 2011, *Weeds*, Northern Territory Government. Accessible on <http://www.nretas.nt.gov.au/national-resource-management/weeds>

Appendix A – Potential Weeds Treatment

Weed Species	Dispersal Mode	All management zones excluding grazing zone			Grazing Zone	
		Management Goal	Non-Chemical Applications	Chemical Control	Forage Value	Control
Gamba Grass <i>Andropogon gyanus</i>	Wind, Water, Vehicles, Machinery, Cattle, Movement of hay, soil and machinery	Class A/C or B/C depending on location	Hand pulling, Slashing, Early wet season burning when plants are not seedling (Prior to physical or chemical control Method)	Foliar Spraying with Glyphosate 360 g/L @ rate of 10ml/1L in the growing season (Nov-April), effective when plants are actively growing and are young	Vigorous, highly productive and palatable to livestock when young	Heavy Grazing and Slashing for the Gamba Grass.
Olive Hymenachne <i>Hymenachne amplexicaulis</i>	Spread by seed, in stockfeed, by waterbirds or by flood waters. Also planted as a ponded pasture species.	Class B / Class C	Heavy grazing in the dry season can decrease seed production. Mechanical or physical removal is ineffective due to highly effective vegetative reproduction from small fragments. The use of heavy earth moving machinery to remove hymenachne from drains has met with some success in north Queensland. Aim to reduce plant bulk prior to wet season flooding and drown it.	Foliar Spraying with Glyphosate 360 g/L @ rate of 10ml/1L in the growing seasons (April-June and Nov-Dec), effective when plants are actively growing.	Provides high quality feed all year round,	Heavy Grazing
Hyptis <i>Hyptis suaveolens</i>	Fruit is spread by water, in mud and attached to animals.	Class B / Class C	Manually remove all plant material; slash to encourage competition from desirable species.	Foliar Spraying with Glyphosate 360 g/L @ rate of 15ml/1L or 2, 4-D amine 625g/L @ rate of 320ml/100L in the growing season (Nov-April), effective when plants are actively growing.	Unpalatable to most types of livestock	Same non-chemical and chemical measures

Bellyache Bush <i>Jatropha gossypifolia</i>	Spread mostly by explosive release of seed. Also spreads by water-dispersed seed and by suckers.	Class B / Class C	Chain, slash or rake. Fire can be used as part of an integrated control program to kill young Bellyache bush seedlings and improve access for other control methods. Follow up control may require hand removal.	Using Fluroxypyr 200g/L: Seedlings: Foliar spray when actively growing (Nov - May) @ 500ml/100L or 3L / ha (boom) Adult (individuals): Cut stump of basal bark @ 3L / 100l (diesel) Adult (infestation): Foliar spray @ 10g/100L Using Metsulfuron-methyl 500 g/L: Seedlings: Foliar spray applied when actively growing (Nov-May) - requires wetting agent Adult (infestation): Foliar spray at 10g/L	-	Same non-chemical and chemical measures
Mission Grass (perennial) <i>Pennisetum polystachion</i>	Spread by water, as hay or grain contaminants or attached to animals	Class B / Class C	Small infestations should be controlled manually, preferably before seeding. Manually remove all plant material; slash to encourage competition from desirable species.	Foliar Spraying with Glyphosate 360 g/L @ rate of 10ml/1L in the growing season (Nov-April), effective when plants are actively growing (Nov - April).	Only edible when young, avoided by stock when mature	Slashing and Heavy Grazing
Mission Grass (perennial) <i>Pennisetum polystachion subsp. polystachion</i>	Spread by water, as hay or grain contaminants or attached to animals	Class B / Class C	Small infestations should be controlled manually, preferably before seeding. Manually remove all plant material; slash to encourage competition from desirable species.	Foliar Spraying with Glyphosate 360 g/L @ rate of 10ml/1L in the growing season (Nov-April), effective when plants are actively growing (Nov - April).	Only edible when young, avoided by stock when mature	Slashing and Heavy Grazing
Salvinia <i>Salvinia molesta</i>	Reproduces by fragmentation	Class C	Remove small infestations by hand, ensuring all of the plant is removed and destroyed.	Must be reported to Weed Management Branch immediately if found	-	Same non-chemical and chemical measures

<p>Sicklepod <i>Senna obtusifolia</i></p>	<p>Seeds explosively released from ripe pods. Long distance dispersal mainly by water, in mud, with harvested sugar cane or by vehicles and machinery. Seeds also germinate in livestock dung</p>	<p>Class B / Class C</p>	<p>Slashing can reduce old plants to a manageable size. Slashing should always be done prior to seed set, preferably when plants are flowering. Rotary hoeing or discing infested areas and immediately sowing with improved pastures can be effective, if the grasses are well managed. Avoid grazing paddocks containing sicklepod or senna, especially when mature seed is present. A constant, dense sward of grass will exclude sunlight and help to maintain soil moisture.</p>	<p>Using Triclopyr 200 g/L and Picloram 100 g/L Tordon® DS: Foliar spray @ 375ml/100L – apply when actively growing (Nov-Apr), need non-ionic wetting agent. Using Dicamba 500 g/L: Foliar spray @ 500ml / 100L - a surfactant may be required Using Triclopyr 300 g/L and Picloram 100g/L: Foliar spray @ 200ml/L or 3L/ha (diesel). Needs non-ionic wetting agent and should not be applied to podding plants.</p>	<p>Toxic to livestock</p>	<p>Same non-chemical and chemical measures</p>
<p>Spiny-head Sida <i>Sida acuta</i></p>	<p>Spread by seed in awned mericarps that catch on wool, fur and cloth, or seed spread in hay, or mud attached to animals and vehicles.</p>	<p>Class B / Class C</p>	<p>Repeated slashing and cultivation; vigorous pasture competition.</p>	<p>Using 2, 4-d amine 625 g/L: Foliar spray when actively growing (Nov-Apr) @ 320ml/100L Using Metsulfuron-methyl 600g/L: Foliar spray @ 10g/L - requires wetting agent.</p>	<p>Unpalatable to stock</p>	<p>Same non-chemical and chemical measures</p>
<p>Flannel Weed <i>Sida cordifolia</i></p>	<p>Finely barbed seed is spread on animals or clothing, in hay, in water or in mud on machinery or vehicles. Also dispersed by water, or excreted undigested by animals</p>	<p>Class B / Class C</p>	<p>Repeated slashing and cultivation; vigorous pasture competition.</p>	<p>Using 2, 4-D amine 625 g/L:Foliar spray when actively growing (Nov-Apr) @ 320ml/100L Using Metsulfuron-methyl 600g/L:Foliar spray @ 10g/L - requires wetting agent. Using Glyphosate 360 g/L:foliar spray @ 15ml/L when actively growing</p>	<p>Unpalatable to stock</p>	<p>Same non-chemical and chemical measures</p>

Paddy's Lucerne <i>Sida rhombifolia</i>	Finely barbed seed is spread on animals or clothing, in hay, in water or in mud on machinery or vehicles	Class B / Class C	Grub plants out. Slashing before flowering will prevent seed production temporarily and produce new growth for spraying.	Using 2, 4-D amine 625 g/L: Foliar spray when actively growing (Nov-Apr) @ 320ml/100L Using Metsulfuron-methyl 600g/L: Foliar spray @ 10g/L - requires wetting agent. Using Glyphosate 360 g/L: foliar spray @15ml/L when actively growing	Unpalatable to stock	Same non-chemical and chemical measures
Branched Porterweed <i>Stachytarpheta australis</i>	Invasive roadsides, creek lines and also monsoon vine forests where soil has been disturbed by pigs and buffalo. They are a contaminant in hay and pasture seeds and will invade newly sown or bared pastures. They are also spread from garden to garden by humans.	Class B / Class C	Slash before seed set and re-establish pasture grass for competition.	Foliar spray with 2, 40D amine 625g/L @ 320ml/100L when actively growing (Nov-Apr)	Unpalatable to stock	Same non-chemical and chemical measures
Grader Grass <i>Themeda quadrivalvis</i>	Spread by movement of seed by animals, in mud, by graders and in contaminated seed.	Class B / Class C	Small infestations should be controlled manually, preferably before seeding, and burnt on site. If seed is present, burn it inside a drum to generate enough heat to kill the seeds.	Foliar spray with Glyphosate 360 g/L @ rate 10ml / 1L when actively growing (Nov-Apr)	Unpalatable to stock	Same non-chemical and chemical measures

Note

Class A – To be eradicated

Class B – Growth and Spread to be controlled

Class C – Not to be introduced to the Northern Territory