ALIEN INVASIVE PLANT MANAGEMENT PLAN:

REDSTONE CSP FACILITY

PRODUCED FOR

ACWA POWER/SOLARRESERVE

BY

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REDSTONE CSP:

ALIEN PLANT MANAGEMENT PLAN

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MANAGEMENT PLAN OBJECTIVES

The purpose of the Redstone Alien Plant Management Plan is to provide a framework for the management of alien and invasive plant species during the operation of the ACWA Power SolarReserve Redstone Solar Thermal Power Plant. The broad objectives of the plan includes the following:

- Ensure alien plants do not become dominant in parts or the whole site through the control and management of alien and invasive species presence, dispersal & encroachment.
- Initiate and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural recovery and re-establishment of indigenous species where possible in order to retard erosion and alien plant invasion.
- Provide an identification guide that can be used by management to identify and target alien species with appropriate control measures.

As there are already two existing solar PV projects in operation on the same property as the Redstone Solar Thermal Plant, this plan draws directly on observations of alien species identity and abundance within the existing PV plants. The footprint of the CSP is currently natural vegetation with few alien species present and so few inferences as to which alien species are likely to become problematic can be drawn directly from this. As the environment and construction-phase disturbance within the PV facilities is similar to that within the CSP footprint, similar alien species are likely to become a problem within the CSP plant and this is considered the most reliable indicator of likely alien species composition at the site.

It is assumed that the entire footprint of the CSP itself will be cleared of all vegetation during construction but that some level of low vegetation cover would be allowed to return and tolerated thereafter. In addition, there are likely to be some remaining intact fragments of natural vegetation within the facility which would require management. It is also important to note that alien species should also be managed around the periphery of the development and not just within the fenced-off facility.

PROBLEM & LEGISLATIVE BACKGROUND

Alien plants require management because they may impact biodiversity as well as the provision of ecosystem services which contribute to human livelihoods and well-being. In recognition of these impacts, South Africa has legislation in place which requires landowners to clear or prevent the spread of certain declared weeds from their properties. Within the context of the CSP Plant, alien plant invasion can be problematic as they may increase the risk of fire within the plant, spread into the surrounding natural vegetation or be more costly or difficult to control than the indigenous grassland.

In terms of the legislation, the Conservation of Agricultural Resources Act (CARA, Act 43 of 1983), as amended in 2001, requires that landusers clear *Declared Weeds* from their properties and prevent the spread of *Declared Invader Plants* on their properties. Table 3 of CARA lists all declared weeds and invader

plants that must be controlled. Alien plants are divided into 3 categories based on their risk and potential impact as an invader.

- Category 1 - These plants must be removed and controlled by all land users. They may no longer be planted or propagated and all trade in these species is prohibited.
- Category 2 – These plants pose a threat to the environment but nevertheless have commercial value. These species are only allowed to occur in demarcated areas and a landuser must obtain a water use licence as these plants consume large quantities of water.
- Category 3 – These plants have the potential of becoming invasive but are considered to have ornamental value. Existing plants do not have to be removed but no new plantings may occur and the plants may not be sold.

The following guide is a useful starting point for the identification of alien species:

Bromilow, C. 2010. *Problem Plants and Alien Weeds of South Africa*. Briza, Pretoria.

RECOMMENDED MANAGEMENT PRACTICE & CLEARING METHODS

Alien species are adept at taking advantage of disturbance and many of their traits are linked to this ability. This usually includes the ability to produce large amounts of seed or being flexible in terms of their size, growth form or reproductive strategy. Alien plant control strategies therefore need to focus on these key attributes while management practices need to ensure that they do not create circumstances under which alien species are encouraged or can thrive. Perhaps the most important aspects in this regard are minimising disturbance and ensuring the retention of indigenous vegetation as far as possible.

It is important to note that it is not possible or practical to prevent alien species from entering the site as seed. There are many alien species present in the immediate area along roadsides and other disturbed areas. The relatively large amount of disturbance created during construction will render the site vulnerable to invasion for some time to come and it is likely that many alien species from the local species pool will invade the site over time.

The following general principles and observations which underlie or impact the alien management plan can be made regarding the likely trajectories of vegetation change at the CSP facility:

- There is likely to be a progression of alien species presence and abundance at the site over time. Initially, alien species are likely to be a significant and persistent problem due to the high levels of disturbance present at the site following construction. Most alien species are poor competitors and the lack of indigenous vegetation cover will encourage the growth of alien species. Provided that alien species are controlled in a sensitive manner, a cover of perennial grasses is likely to

become well established with a couple of years. This should discourage alien species which, with additional control, should become considerably less conspicuous within 5 years. Some more competitive alien species may become established at this time and alien control strategies may need to be adapted over time to address the new problem species.

- Alien species presence will vary from year to year in terms of abundance, density and the identity of species present. This can be ascribed largely to variation in rainfall timing and amount, which will favour a different suite of species each year. Therefore, occasional outbreaks of certain species is not likely to be cause for concern, whereas a persistent high or increasing abundance of a species is indicative of a species where control may be required.
- Management practices will impact indigenous as well as alien species. The dominant management practice at the site is likely to be mowing to control vegetation height and fire risk within the facility. Regular mowing encourages the growth of low and creeping forms and discourages tall growth forms. This principle is well demonstrated by garden lawns or sports fields where most alien species or weeds in the lawn can be eradicated simply through regular mowing. Within the context of the facility, the grass *Cynodon dactylon* is likely to be key as this species is able to tolerate mowing or heavy grazing and is likely to increase under a regular mowing regime.

Without being too prescriptive as the exact methods and approaches to be used, the following general management practices should be encouraged or strived for:

- Mowing excess vegetation by hand, for example with a weedeater, generates the lowest level of associated disturbance and is usually the preferred method for vegetation control. However, the footprint of the facility is very large and this is not likely to be practical. As a result, mechanical means such as using a tractor with mower is also considered acceptable.
- There is a target height to which vegetation should be cut. If the vegetation is cut too low, then recovery of the grass layer will be slow and this may encourage erosion and an increase in alien invasion. On the other hand, if the vegetation is not cut low enough, then recovery will be rapid and frequent follow-up control may be required. It is recommended that the target height for vegetation after mowing should be not less than 10 cm.
- The maintenance of a fire-break around the facility is an important safety control and the service road around the perimeter of the facility should be maintained free of vegetation. Within the facility itself, some vegetation recovery along the internal roads should be considered acceptable.
- Where dense stands of alien species have established that cannot be controlled by manual means, some use of herbicides may be acceptable. However, the associated safety precautions should be taken with regards to the appropriate application methods as well as the use of personal safety equipment (These are outlined in greater detail below). The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water Website. http://www.dwaf.gov.za/wfw/Control/
- The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control till late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not

contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.

- Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- Some alien species such as *Opuntia* (Prickly Pear) and trees such as *Prosopis* (Mesquite) are best individually pulled by hand when young and in the case of *Opuntia* removed from the site as the leaves are able to root and grow again.
- It is expected that regular vegetation control to reduce plant biomass within the array field will be conducted and that this will be timed so as to coincide with the critical growth phases of the most important alien species. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.

BASIC GUIDELINES ON THE USE OF HERBICIDES FOR ALIEN CONTROL

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which further stimulates alien invasion and may also be ineffective for many woody species which resprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of in a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation. Broad-spectrum herbicides should only be used in extreme cases.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following guidelines should be followed:

Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.

ALIEN PLANT MONITORING & CONTROL SCHEDULE

In order to implement the alien plant management plan, a monitoring and control schedule is required to evaluate the presence and on-going control of alien plants within the facility. This is not intended to be highly onerous, but simple provides a guideline on the frequency with which alien plants should be monitored and what parameters are likely to be important. Monitoring could be conducted more frequently if desired or deemed necessary.

The following monitoring and evaluation actions should take place as part of the alien management plan.

Monitoring Action	Indictor	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map or records of which sections of the site alien species were observed to be a problem in and which species were present.	Biannually for the first three years, annually thereafter Monitoring should take place before mowing or at the peak of alien growth then they are most conspicuous.
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually for the first three years, annually thereafter
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually for the first three years, annually thereafter

CONCLUSIONS AND RECOMMENDATIONS

- The problem species present at the site will change over time and as a result, the alien plant management plan needs to accommodate these changes as they occur and therefore some monitoring, feedback and evaluation of the plan on an on-going basis is required.
- There are a number of Category 1 listed alien invaders are present in the area and within the adjacent PV facilities. These species have a demonstrated capacity to invade and disrupt

ecosystems and the management of alien species at the site should pay specific attention to these species.

- There are some alien species which are present in the area which are naturalised and are not likely to pose a significant threat and low levels of abundance of such species can be tolerated. However, the abundance of these species should be monitored to ensure that they do not become a problem.

- This management plan includes a guide to aid in the identification of alien species likely to be encountered at the site. This is based on the species observed at the adjacent PV facilities. However, additional species may be present or may invade in the future and so the management of the site should be aware that the guide is not exhaustive and that attention should be paid to the potential presence of additional species.

- In the short-term, soil disturbance is likely to be the dominant driver of alien invasion at the site. While, in the long-term the distribution of runoff is likely to be a key driver as those areas which receive water will be wetter and likely to contain a higher alien abundance. With large parts of the site being cleared of vegetation and extensive tracts of hardened surface present, it is likely that the development will generate large amounts of runoff. The fate, distribution and management of this runoff is likely to be an important contributing factor to alien plant species abundance within the areas which receive the runoff.

- As disturbance is the major initial driver of alien species invasion, keeping the disturbance footprint to a minimum is a key element in reducing alien abundance. Wherever possible, the indigenous vegetation should be encouraged to return as this will significantly reduce the likelihood of alien invasion.

ALIEN & PROBLEM SPECIES IDENTIFICATION GUIDE ·

IDENTIFICATION OF ALIEN SPECIES

A list of all the alien species that were observed at the adjacent PV sites is detailed below. This table includes the English and Afrikaans common names for the species as well as whether or not the species is a listed alien under CARA. The list includes some weedy indigenous species as these can become a problem or are frequently mistaken for alien species.

Following the list a photographic guide to the common alien species of the area is included. Each species is rated and colour coded according to the perceived risk it poses as an alien invasive and the level of control that should be exercised. It is important to note that the list and guide is not exhaustive as it is impossible to predict which alien species may invade the site. The list and guide includes those species which are known to occur at the site and which are likely to be a problem, but the list should be updated from time to time as additional alien species are encountered at the site.

List of alien species observed in the vicinity of the Redstone Solar Thermal Facility and which are likely to become a problem at the site

Family	Species	English name	Afrikaans name	Category
Amaranthaceae	*Alternanthera pungens*	Paperthorn	Kakiebubbeltjie	Not Listed
Amaranthaceae	*Amaranthus hybridus*	Common Pigweed	Kaapse Misbredie	Not Listed
Amaranthaceae	*Amaranthus viridus*	Slender Amarath	Skraal Misbredie	Not Listed
Amaranthaceae	*Gomphrena celosioides*	Globe Amaranth	Mierbossie	Not Listed
Amaranthaceae	*Guilleminea densa*	Carrot Weed		Not Listed
Apiaceae	*Ciclospermum leptophyllum*	Wild Celery	Wildeseldery	Not Listed
Asclepiadaceae	*Asclepias fruticosa*	Shrubby Milkweed	Melkbos	Not Listed
Asteraceae	*Bidens pilosa*	Blackjack	Knapsekerel	Not Listed
Asteraceae	*Cirsium vulgare*	Scotch Thistle	Speerdissel	1
Asteraceae	*Conyza bonariensis*	Fleabane	Skraalhans	Not Listed
Asteraceae	*Lactuca seriola*	Wild Lettuce	Wildeslaai	Not Listed
Asteraceae	*Schkuria pinnata*	Dwarf Marigold	Klainkakiebos	Not Listed
Asteraceae	*Senecio consanguineus*	Stravation Senecio	Hongerbos	Not Listed
Asteraceae	*Sonchus oleraceus*	Sowthistle	Sydissel	Not Listed
Asteraceae	*Tagetes minuta*	Khakiweed	Kakiebos	Not Listed
Asteraceae	*Taraxacum officinale*	Common Dandelion	Perdeblom	Not Listed
Asteraceae	*Tragopogon porrifolius/dubius*	Goat's Beard	Bokbaard	Not Listed
Asteraceae	*Verbena bonariensis*	Purple Top	Blouwaterbossie	Not Listed
Asteraceae	*Xanthium spinosum*	Spiny Cocklebur	Boetebossie	1
Brassicaceae	*Lepidium africanum*	Pepperweed	Peperbossie	Not Listed
Brassicaceae	*Sisymbrium thellungi*	Wild Mustard	Wildemosterd	Not Listed
Cactaceae	*Opuntia ficus indica*	Prickly Pear	Turksvy	1
Cannabaceae	*Cannabis sativa*	Cannabis	Dagga	Not Listed
Chenopodiaceae	*Atriplex semibaccatta*	Australian Saltbush	Brakbossie	Not Listed
Chenopodiaceae	*Chenopium carinatum*	Green Goosefoot	Groenhondebossie	Not Listed
Chenopodiaceae	*Chenopodium album*	White Goosefoot	Withondebossie	Not Listed
Chenopodiaceae	*Salsola kali*	Russian Tumbleweed	Rolbossie	Not Listed
Fabaceae	*Medicago lanciniata*	Little Burweed	Klitsklawer	Not Listed
Fabaceae	*Prosopis glandulosa*	Honey Mesquite	Heuningprosopis	2
Malvaceae	*Malva parviflora*	Mallow	Kiesieblaar	Not Listed
Onagraceae	*Oenothera indecora/stricta*	Evening Primrose	Nagblom	Not Listed
Papaveraceae	*Argemone ochroleuca*	Mexican Poppy	Bloudissel	1
Polygonaceae	*Emex australis*	Spiny Emex	Kaapse Dubbeltjie	Not Listed
Polygonaceae	*Polygonum aviculare*	Prostrate Knotweed	Voelduisendknop	Not Listed
Polygonaceae	*Rumex crispus*	Curly Dock	Tongblaar	Not Listed
Solanaceae	*Datura ferox*	Large Thorn Apple	Groot Stinkblaar	1
Solanaceae	*Nicotiana glauca*	Wild Tobacco	Wildetabak	1
Zygophyllaceae	*Tribulis terrestris*		Dubbeltjie	Not Listed

AMARANTHACEAE – Amaranthus viridis

Amaranthus viridis

It is likely that there are several species of *Amaranthus* present in the area which may become problematic, they are however all very similar in appearance and impact. Most species do not grow very tall as they are weedy and sprawling. As a result, they are not likely to be a significant problem, but they can become quite abundant, especially in wetter situations and are also quite persistent.

Concern Rating:

The overall level of threat posed by this and similar species is considered to be moderate. Control should be exercised where this species becomes dominant, but occasional plants are not likely to be considered a significant concern.
Broadleaf herbicides are used to control this species in cropland situations.

AMARANTHACEAE - Gomphrena celosioides

Gomphrena celosioides

Gomphrena celosioides is a South American weed that has become naturalised on South Africa. It is not usually a significant problem as it is low-growing and does not usually out-compete other vegetation. It may become common in areas where there is additional disturbance and moisture present.

The overall level of threat posed by this species is considered to be low. Specific control is unlikely to be required. It can be controlled manually by pulling if required.

AMARANTHACEAE - Alternanthera pungens

Alternanthera pungens

Alternanthera pungens is another South American weed that has become naturalised on South Africa. It is more of an irritation than a significant problem as the seeds stick to shoes and are easily spread. It can become a problem on bare areas where it is difficult to eradicate. As it can grow quite dense it can supress other species.

The overall level of threat posed by this species is considered to be generally low. Specific control may be required in bare or sparely vegetation areas, but it is unlikely to be a problem where there is a good cover of grass. It can be controlled manually by pulling if required.

APIACEAE - Ciclospermum leptophyllum

Ciclospermum leptophyllum

Ciclospermum leptophyllum is of South American origin. It is not usually a significant problem in arid areas and it is not likely that the site is wet enough for this species to grow sufficiently well or large enough to pose a significant problem.

The overall level of threat posed by this species is considered to be low. Specific control are not likely to be required and a low abundance of this species at the sites can be tolerated.

ASCLEPIADACEAE - Asclepias fruticosa

Asclepias fruticosa

Asclepias fruticosa is an indigenous weed. It can commonly be seen along road sides across the country. It can become a problem in disturbed sites such as old lands and may become a problem at the sites due to its large size.

The overall level of threat posed by this species is considered to be low. Due to its large size, it takes more than one season to reach maturity and can be relatively easily controlled manually.

ASTERAEAE - Bidens pilosa

***Bidens pilosa* - Fruit**

***Bidens pilosa* - Flowers**

Bidens pilosa is common weed of disturbed places and the seeds that cling to clothes or animals are well known. Under the right circumstances this species can form fairly dense stands and it is quite tolerant of grass as a competitor. Due to its height, which can exceed 1m, this species is a potential problem at the site that should be monitored.

The overall level of threat posed by this species is considered to be moderate. However, as it is quite tall, regular mowing will quickly eradicate this species if mowing is done often enough.

ASTERAEAE - Cirsium vulgare

Cirsium vulgare

Cirsium vulgare is common weed of disturbed places and old lands. It is however usually associated with relatively moist environments and it is only likely to be a potential problem where there is large amounts of run-on moisture available. It is large and regular mowing will prevent this species from becoming a significant problem. It can however also grow as a rosette flat on the ground and may persist in mowed areas in this manner and so manual clearing may be necessary.

The overall level of threat posed by this species is considered to be moderate to low. It can be controlled manually quite easily if required.

ASTERAEAE - Conyza bonariensis

Conyza bonariensis

Conyza bonariensis is common weed of disturbed places such as roadsides and old lands. It is ubiquitous and very difficult to totally eradicate. Due to its' height, which can exceed 1m, this species is a potentially problem at the sites that should be monitored.

The overall level of threat posed by this species is considered to be moderate. It is resistant to mowing as young plants form a rosette. In cultivated situations broadleaf herbicides are used to control Conyza spp.

ASTERAEAE - Lactuca seriola

Lactuca seriola

Lactuca seriola is a wild relative of lettuce and is a common weed of disturbed places. This species can form fairly dense stands and it is quite difficult to eradicate once established. Due to its height, which can exceed 1m, this species is a potentially problem at the sites that should be monitored.

The overall level of threat posed by this species is considered to be moderate. It is difficult to control. In cultivated situations herbicides are used to control this species.

ASTERAEAE - Schkuria pinnata

Schkuria pinnata

Schkuria pinnata is common weed of disturbed places such as roadsides and fields. It is however uncommon within intact vegetation and it is not likely to be a strong competitor. It does not usually grow very large and it is unlikely that this species will be a significant problem at the site.

The overall level of threat posed by this species is considered to be low. With regular mowing the abundance of this species is likely to be kept to a low level.

ASTERAEAE - Senecio consanguineus

Senecio consanguineus

Senecio consanguineous is an indigenous species common in disturbed veld. It is an indicator of disturbance or overgrazing and it is likely that the abundance of this species at the site will decline over time as the grass layer recovers.

The overall level of threat posed by this species is considered to be low. The plants are not usually large and it is not alien.

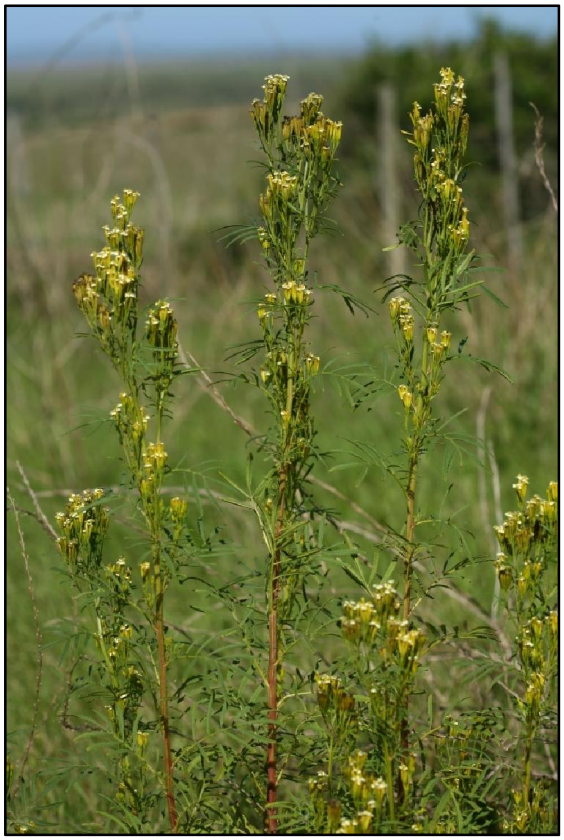
ASTERAEAE - Sonchus oleraceus

Sonchus oleraceus

Sonchus oleraceus is common weed of disturbed places. It may be difficult to control, but manual clearing of plants before they have flowered may be most effective.

The overall level of threat posed by this species is considered to be moderate to low. A good cover of grass will supress this species and with some control, it is likely to decline over time.

ASTERAEAE - Tagetes minuta



Tagetes minuta

Tagetes minuta is common weed of disturbed places and has a very distinctive and strong smell when crushed. Control of this species is likely to be difficult as it is plastic with regards to germination and growth. A good cover of grass is however likely to retard the germination of this species and it is likely to only become a problem if bare areas persist within the site.

The overall level of threat posed by this species is considered to be moderate. Controlling this species with normal vegetation control mowing may not be successful and it should be monitored in case additional control measures need to be implemented.

ASTERAEAE - Tragopogon porrifolius

Tragopogon porrifolius

Tragopogon porrifolius is common weed of disturbed places, but is not likely to become a significant problem at the sites as it is relatively small and is not likely to outcompete indigenous vegetation.

Although this species has a thick taproot which makes it difficult to control manually or with herbicides, it is not likely to become a significant problem at the sites and is considered a low risk species.

ASTERAEAE - Verbena bonariensis

Verbena bonariensis

Verbena bonariensis is common weed of disturbed places such as roadsides. It can sometimes form fairly dense stands and as it quite tall, it is likely to shade the panels.

The overall level of threat posed by this species is considered to be moderate. It also lives for more than 1 year but appears to reproduce relatively slowly and could probably be controlled manually if required.

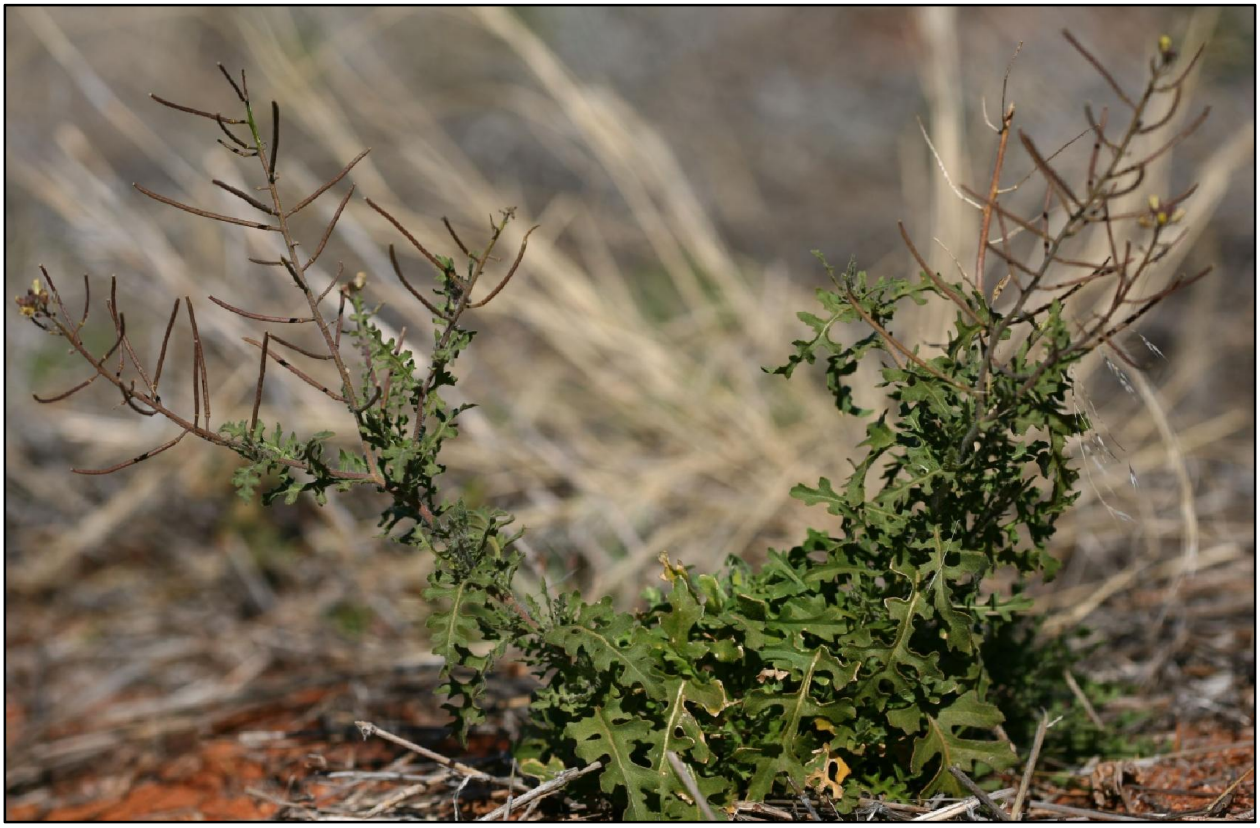
ASTERAEAE - Xanthium spinosum

Xanthium spinosum

Xanthium spinosum was the first declared weed in South Africa and is a Category 1 invader. It has tough burrs that stick to clothes or animals. It should be controlled whenever this plant is observed as large populations can be difficult to eradicate.

The overall level of threat posed by this species is considered to be moderate to high. It is a Category 1 invader and requires intensive control to eradicate. It is considered a significant threat, but if disturbance levels are kept as low as possible then it likely that this species will not be a big problem.

BRASSICACEAE - Sisymbrium thellungi



Sisymbrium thellungi

Sisymbrium thellungi or wild mustard can grow to 1m which makes it a potential problem. Under the dry conditions at the sites, it however rarely likely to reach this size except in wetter places.

The overall level of threat posed by this species is considered to be moderate to low. Under the dry conditions prevalent at the sites, it does not appear to be a very strong competitor and it is likely that manual control of occasional large plants will be sufficient to control this plant.

CACTACEAE - Opuntia ficus indica

Opuntia ficus-indica

Opuntia humifusa

Cylindropuntia imbricata

Prickly pears are likely to be brought onto the sites by birds and other animals which feed on the fruits. As these plants can reproduce from leaves as well, plants need to be poisoned or removed to be killed. All *Opuntia* species are Category 1 invaders and must be controlled.

Although it is likely that these species will occasionally need to be controlled, they are relatively slow-growing and can easily be manually within the context of the Plant.

CANNABACEAE - Cannabis sativa

Cannabis sativa

Cannabis does not normally grow under the arid conditions that characterise the site but it is possible that seed will be brought onto the site during construction. Even if some plants are present after construction, it is highly unlikely that the populations will persist.

The overall level of threat posed by this species is considered to be Low. Although plants can grow large, they will not do so in an arid environment and it is likely that any populations present will die out naturally.

CHENOPODIACEAE - Atriplex semibaccatta

Atriplex semibaccatta

Atriplex semibaccatta is a naturalised Australian weed common in semi-arid areas. Although it occasionally forms dense patches, it is not considered a significant problem as grazing animals usually utilise it to some degree. Within the context of the Plant, it is not likely to be a significant problem due to its low stature.

The overall level of threat posed by this species is considered to be low. It is naturalised and does not usually invade disturbed areas to a large degree.

CHENOPODIACEAE - Chenopodium album

Chenopodium album

Chenopodium carinatum

Chenopodium album and *carinatum* are similar weedy species of annual or biennial forbs. They can grow over 1m tall under good conditions and as a result may pose a potentially problem at the sites. They are not usually highly invasive and are not likely to invade areas with intact ground cover.

The overall level of threat posed by this species is considered to be low. Although these species can grow quite large, they are not usually highly invasive in less disturbed environments. Large plants can be controlled manually if necessary.

CHENOPODIACEAE - Salsola kali

Salsola kali

Sasola kali is a widespread weed of disturbed places. The shrubs come loose from the soil when dry and roll around, packing up against fences sometimes pushing them over with the force of the wind. This species is a potentially problem at the site that should be monitored.

The overall level of threat posed by this species is considered to be moderate to high. This species can be difficult to eradicate and it can also cause problems when it rolls around. It can be very persistent. It should be cleared manually while still green, before the seed has been set.

MALVACEAE - Malva parviflora

Malva parviflora

Malva parviflora can act as an annual or a perennial. Although it can grow quite large, it is unlikely to do so on a regular basis at the site. However, it should be controlled when observed as established populations can be difficult to eradicate.

The overall level of threat posed by this species is considered to be moderate. It is flexible, adapting its growth form to be flat or upright depending on the conditions.

PAPAVERACEAE - Argemone ochroleuca

Argemone ochroleuca

Argemone ochroleuca is a Category 1 invader and should be controlled. This spiny plant can be a nuisance in disturbed areas and it is highly likely that this species will need to be controlled at the Site.

The overall level of threat posed by this species is considered to be high. It can be difficult to eradicate. However if populations are controlled effectively immediately after construction, then it is unlikely to build up to problem proportions.

POLYGONACEAE - Polygonum aviculare

Polygonum aviculare

Polygonum aviculare usually grows on open disturbed places. It is usually sprawling or low-growing and it is not likely to become a significant problem at the sites. It is not highly invasive and is likely to occur predominantly along the sides of the roads and other places with little other vegetation cover.

The overall level of threat posed by this species is considered to be low. It is not highly invasive and does not grow very large. Specific control is not likely to be required.

POLYGONACEAE - Rumex crispus

Rumex crispus

Rumex crispus usually occurs in moist places and will probably benefit from any runoff from the site. As it is associated with moist habitats, it is not likely to be a significant problem and any large plants can be cleared manually.

The overall level of threat posed by this species is considered to be low. It is associated with wetter environments and is therefore likely to be associated with places with receive runoff from other areas.

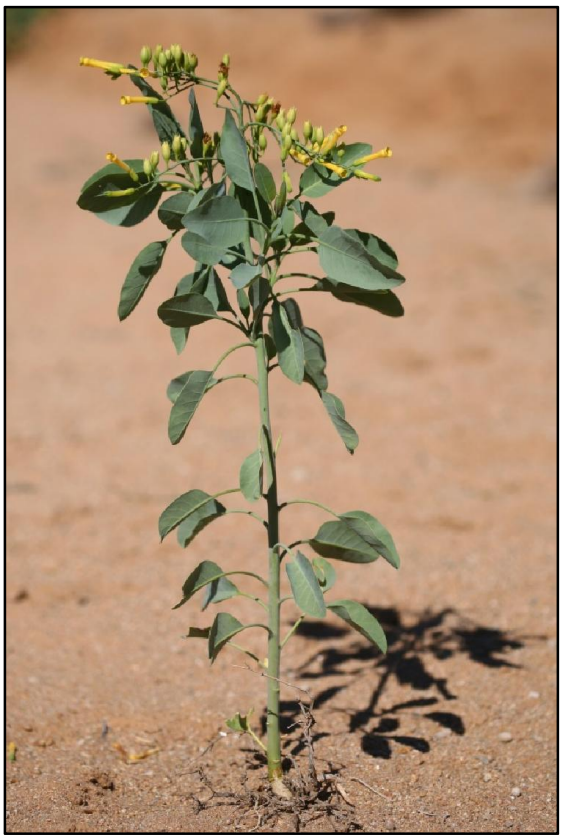
SOLANACEAE - Datura ferox

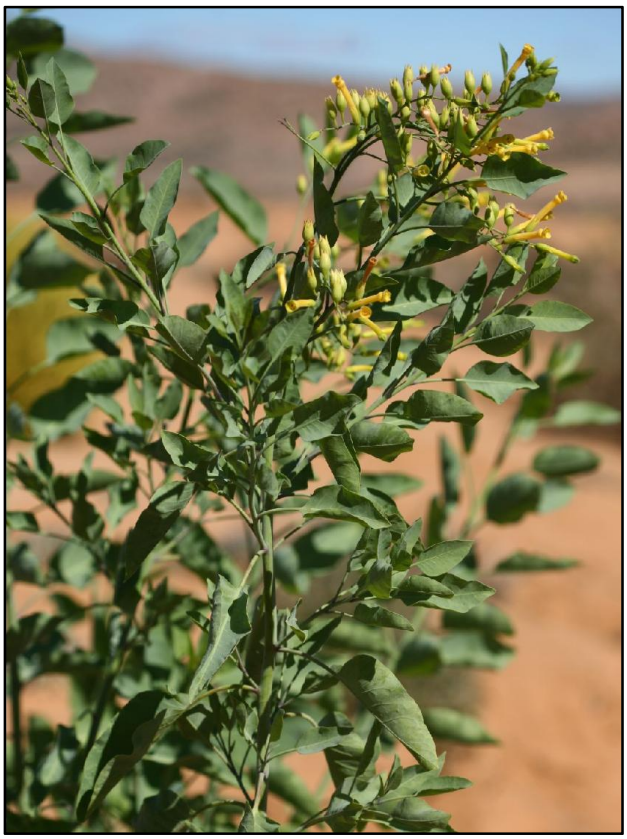
Datura ferox

Datura ferox is common in disturbed places such as fields, but also in natural vegetation around watering points and other disturbance. It is a Category 1 invader and should be cleared. Although it is annual, it can grow to more than a meter and has proven to be problematic within the adjacent PV facilities.

The overall level of threat posed by this species is considered to be high. It is a demonstrated problem in the country as well as within the adjacent PV sites. It produces a lot of seed and can be hard to control, but mowing at the appropriate time of year should be effective. Encouraging the return of the grass layer will also discourage this species.

SOLANACEAE - Nicotiana glauca





Nicotiana glauca

Nicotiana glauca usually occurs in river beds and on floodplains, but will also grow in other situations were sufficient moisture gathers. Although it is a Category 1 invader, it is large and conspicuous and as such should be relatively easily controlled within the Site.

The overall level of threat posed by this species is considered to be moderate. Although it is serious invader in some habitats, it is not likely to become a significant problem within the Site as it should be easy to control manually as it is not currently abundant in the area.

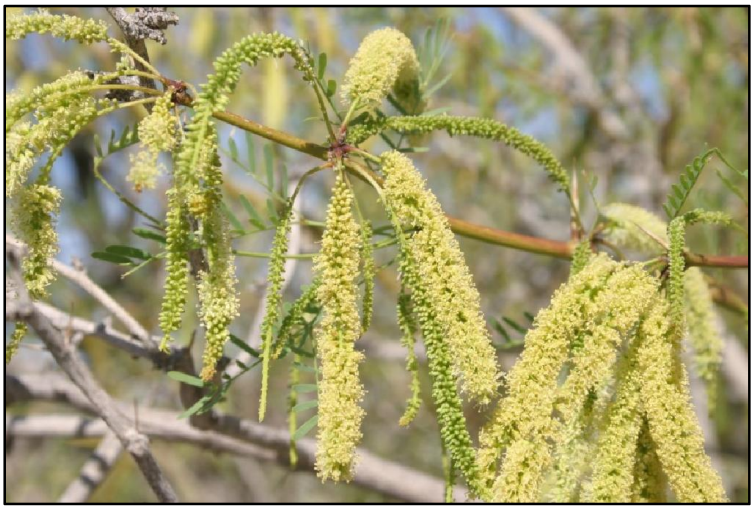
ZYGOPHYLLACEAE - Tribulis terrestris

Tribulis terrestris

Tribulis terrestris is an indigenous weed characteristic of disturbed ground. Although it is likely to increase at the site, where it is likely to be considered a nuisance due to its thorny seeds, ecologically its presence is not highly significant.

The overall level of threat posed by this species is considered to be moderate to low. Although it may increase rapidly and colonise bare areas, it is not alien and does not pose an ecological threat. Plants can be cleared manually during flowering from bare ground where this species typically dominates

FABACEAE – Prosopis glandulosa



Prosopis glandulosa, pods and inflorescences

Prosopis glandulosa is already present within the affected area and is likely to become a potential problem in areas which receive runoff from the facility. This tree is a significant problem in large parts of the Northern Cape and once established, the dense stands that develop can be very difficult to eradicate. Category 2 invader.

The overall level of threat posed by this species is considered to be moderate. Although it is serious invader in some habitats, it would only be likely to become a problem in wetter areas, where it should be controlled regularly with manual clearing and the application of cut-stump arboricide treatment.