

# Giant Gippsland Earthworm Assessment at a proposed residential development – 99 Bena Rd, Korumburra

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## Revision List

Revision	Date Submitted	Reviewer
Draft report	07/11/2019	B. Van Praagh
Final Report	20/11/2019	

## ABREVIATIONS

SGSC: South Gippsland Shire Council  
 DELWP: Department of Environment, Land, Water and Planning  
 DoE: Department of the Environment  
 DPO; Development Plan Overlay  
 EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999*  
 EVC: Ecological Vegetation Class  
 FFG Act: *Flora and Fauna Guarantee Act 1988*  
 GGE: Giant Gippsland Earthworm, *Megascolides australis*  
 WGCMA: West Gippsland Catchment Management Authority

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## SUMMARY

### PROJECT BACKGROUND

INVERT-ECO was commissioned by Planning Central on behalf of Hill Rise View Pty Ltd to undertake a targeted survey for the Giant Gippsland Earthworm *Megascolides australis* (GGE) at the site of a proposed residential development at 99 Bena Rd, Korumburra. The subject land occurs within the South Gippsland Shire and is subject to Schedule 6 of the Development Plan Overlay (DPO). This Schedule specifies the requirement for a Flora and Fauna survey to include the Giant Gippsland Earthworm to support a permit application. The GGE is listed under Federal (*Environment Protection Biodiversity Conservation Act 1999*) and State (*Flora and Fauna Guarantee Act 1988*) planning policies.

The purpose of this assessment is to facilitate the planning and design of the proposed subdivision to avoid or reduce any environmental impacts to GGEs should they occur within the subject land.

A field assessment was undertaken on October 29<sup>th</sup> 2019.

### RESULTS

No evidence of Giant Gippsland Earthworms was identified from within the subject land and suitable habitat was limited. Suitable habitat includes moist blue grey or red clay soils in sites that generally retain moisture all year round. This includes creekbanks and soaks on south facing slopes. Adequate soil moisture maintained all year round is thought to be critical for the survival of this species. The area with the most potential habitat was along the banks of the tributary of Foster Creek in the north-west corner of the site. However no suitable clay soils were found. The soils were primarily dry, silty and were comprised of large amount of sandstone/mudstone in parts. No evidence of soaks was observed on the south-facing slopes.

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## LEGISLATIVE AND POLICY REQUIREMENTS

The most relevant policies applicable to GGE are summarised below

Policy/ Legislation	Relevant Fauna	Requirement	Comment
<b>EPBC Act</b>	Giant Gippsland Earthworm	Required if action deemed significant to an <u>important</u> GGE population	No GGE were located within the study area  No significant impact
<b>FFG Act</b>	Giant Gippsland Earthworm	A permit is required from DELWP if an action on public land proposes to collect, kill, injure or disturb protected flora and fauna and ecological communities.	Permit not required as site private land
<b>DPO Schedule 6</b>	Giant Gippsland Earthworm	GGE Assessment required	Results of GGE assessment must be presented in a planning permit application to SGSC

## IMPACTS and RECOMMENDATIONS

The construction of housing developments has the potential to substantially modify GGE habitat from both direct and indirect impacts. These include loss and degradation of suitable habitat from soil disturbance (excavation & infrastructure, compaction & isolation of colony) and hydrological disturbances (increased run-off, lower infiltration rates and lowering of base flows).

The construction of the proposed development at 99 Bena Road, Korumburra is unlikely to have any impact on the Giant Gippsland Earthworm as they were not identified from within the study area. As a consequence, there is no impact minimisation actions required. A contingency plan is attached in the unlikely event that undetected GGE colonies are discovered during the construction of the development.

## 1 BACKGROUND

INVERT-ECO was commissioned by Planning Central on behalf of Hill Rise View Pty Ltd to undertake a targeted survey for the Giant Gippsland Earthworm *Megascolides australis* (GGE) at the site of a proposed residential development at 99 Bena Rd, Korumburra.

The subject land at 99 Bena Road, Korumburra occurs within the South Gippsland Shire and is zoned General Residential Zone (GRZ1). The land is subject to Schedule 6 of the Development Plan Overlay (DPO). This Schedule specifies the requirement for a Flora and Fauna survey to include the Giant Gippsland Earthworm to support a permit application. The GGE is listed under Federal (*Environment Protection Biodiversity Conservation Act 1999*) and State (*Flora and Fauna Guarantee Act 1988*) planning policies.

Background information on the Giant Gippsland Earthworm is provided in Appendix 1.

The purpose of this assessment is to facilitate the planning and design of the proposed subdivision to avoid or reduce any environmental impacts to GGEs should they occur within the subject land.

Specifically,

- Identify any presence and locations of GGE within the study area by a targeted field assessment;
- Provide an assessment of the potential impacts on GGE associated with the proposed subdivision;
- Provide recommendations for the mitigation and management of potential impacts on any GGE colonies recorded on site.

## 2 STUDY AREA

The subject land (Lot 1 PS321371) is 19.6 ha and is situated approximately 1 km south-west of the township of Korumburra (Figure 1). The site is zoned General Residential (GRZ 1) and is covered by the Development Plan Overlay (DPO).

The land has a moderate to steep topography with north and south facing slopes. The site is presently covered with pasture grasses but was planted for Millet crops about 12 months ago. (Plate1). Scattered Eucalypts occur along the water course and as wind rows which have recently been removed.

A tributary of Foster Creek flows through the north-west corner of the site (Plate 1).

The site occurs within the Strzelecki Ranges Bioregion. The Pre 1750 Ecological Vegetation Class (EVC) was Wet forest (EVC 30) found around the creekline and Damp Forest (EVC 29) over the remainder of the site (NatureKit Victoria 2019).



Figure 1 Location of subject land 99 Bena Rd, Korumburra

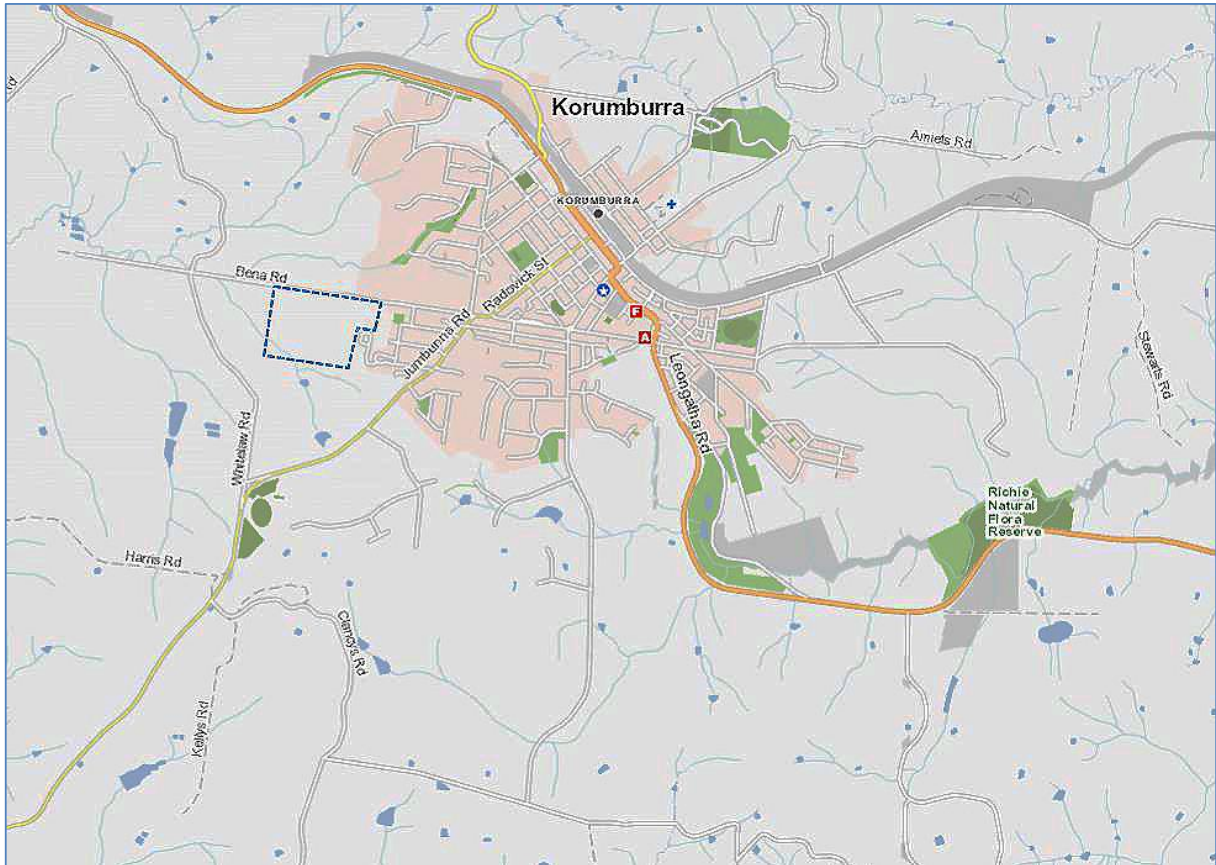




PLATE 1 Subject land at 99 Bena Rd, Korumburra  
A) Creekline in north- west of site -view east  
B) Site topography -view north  
C) Recent windrow removal-view south

## 3 METHODS

### 3.1 Survey Methodology

A field assessment targeting potential GGE habitat was undertaken on October 29<sup>th</sup> 2019.

A survey for the GGE was undertaken by hand digging soil quadrats (< 50 x 50 x 50 cm) in potential habitat within the subject land. Potential GGE habitat includes well drained, clay soils along waterways, terraced south facing slopes, soaks and wet gullies.

Potential habitat targeted for sampling included the creekbanks of the tributary of Foster Creek and some minor terraced areas on the south-facing slopes. Quadrats were examined for GGEs burrows and cast (waste) material. These areas were also walked over while banging a shovel to listen for the gurgling sounds sometimes made by the worms as they retreat down their burrows.

AMG data was recorded using a hand held GPS (GDA 94, accuracy  $\pm 5$  m)

### 3.2 Assessment Qualifications and Limitations

The assessment was undertaken during relatively good sampling conditions though the soils are beginning to dry out with the recent burst of very warm weather. GGE are more easily detected by the gurgling sound they make as they retreat down their wet burrows. This is more notable during the wetter months but movement can still be heard if local site conditions remain moist, as is often the case when GGE habitat occurs within a spring or soak. However, GGE burrows are present all year round and can be detected by the excavation of small soil quadrats.

There were some limitations to accessing parts of the creekbanks due to the presence of blackberries.

Overall, the results of this assessment are considered relatively robust.

## 4 RESULTS

No evidence of Giant Gippsland Earthworms was identified from within the subject land and limited suitable habitat was observed. The area with the most potential was along the banks of the tributary of Foster Creek. However, no suitable clay soils were found. The soils were primarily dry, silty and comprised of a large amount of sandstone/mudstone in some sections.

There were no soaks observed over the south facing slopes within the study area. The steeper banks adjacent to the creek were very dry and did not include soaks or areas of increased moisture (Plate 2). There was also no evidence of the presence of the chimneys constructed by burrowing crayfish (*Engaeus* sp) that often reflect the presence of moist clay soils. Soil moisture maintained all year round is thought to be critical for the survival of this species (Van Praagh *et. al* 2007) it is predominantly restricted to areas where there is adequate soil drainage.

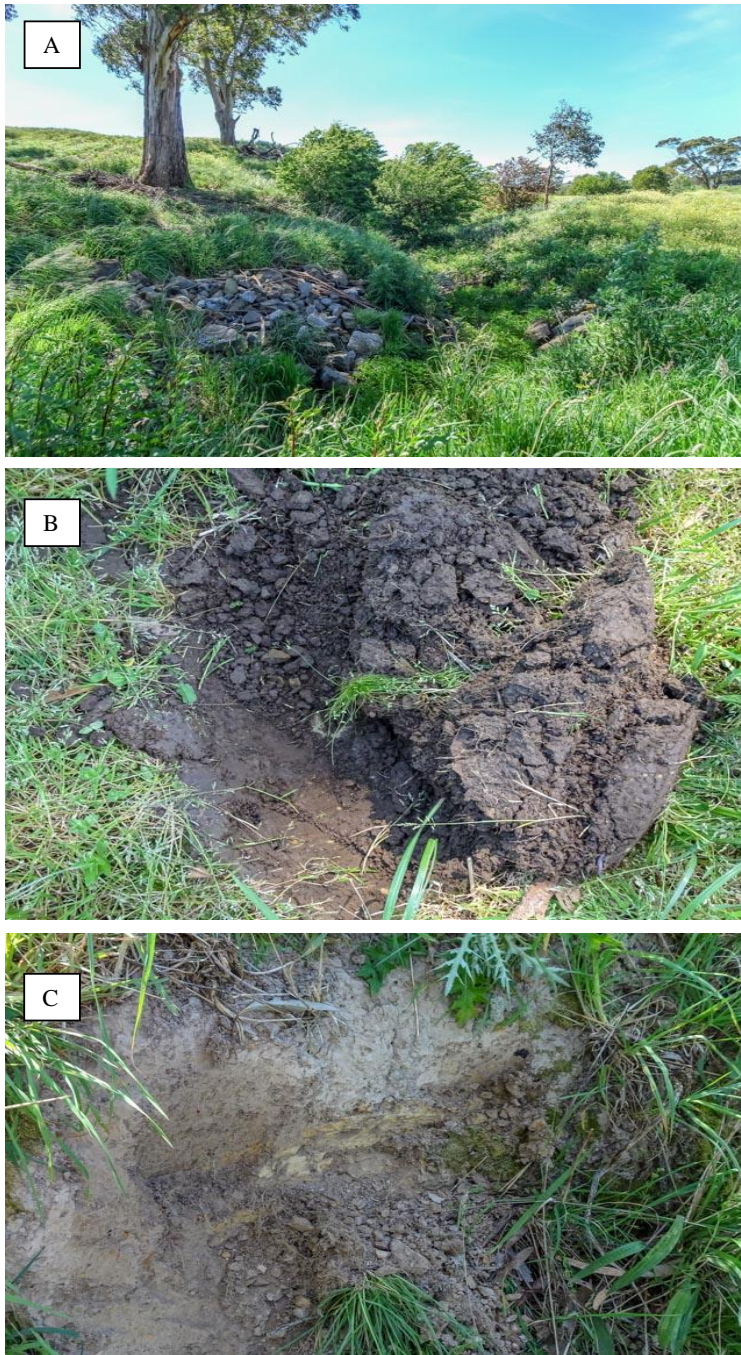


PLATE 2 Soils found along tributary of Foster Creek

- A) Creek- line with potential habitat
- B) Dry silty soils along the creek bank
- C) Dry soils with sandstone along south facing embankment of waterway

## 5 POTENTIAL IMPACTS

GGEs often live in small, isolated areas that support a complex of interrelated variables that create suitable habitat. They live entirely underground in permanent burrow systems (Kretschmar and Aries 1992) and have very low dispersal abilities (Woods 2006). This means that they are unable to move away from threatening processes and as such are highly vulnerable to changes in their environment.

The potential impacts of the proposed construction of a housing development on GGE include habitat loss and degradation. These processes result from soil disturbance and alterations to local hydrological and drainage patterns and construction of houses and related infrastructure within or adjacent to habitat. Threatening processes resulting from urban development on GGE can be found in Table 1.

As no GGE were located within the study area, there are unlikely to be any impacts on GGEs from the proposed housing development.

**TABLE 1 Summary of threats to GGE**

THREATS	IMPACT
<p>Direct Disturbance and fragmentation</p> <p>Direct disturbance of habitat: Excavation for housing, dams, pipes and road construction Addition of fill resulting in alteration to natural topography and removal of wetlands Soil compaction and churning from machinery</p> <ul style="list-style-type: none"> <li>- Removal of existing vegetation</li> <li>- Destruction of stream bank integrity</li> </ul>	<p>Loss and degradation of habitat</p> <p>Loss of colonies -death and injury of individuals and egg cocoons</p> <p>Fragmentation of colonies &amp; reduced gene flow</p> <p>Compaction and churning of soil resulting in loss of burrows</p> <p>Exposing burrows, changing hydrology and causing drying out of sites</p>
<p><b>Hydrological Disturbance -alteration in flows</b></p> <ul style="list-style-type: none"> <li>-Changes in surface and subsurface flows</li> <li>-Changes to water table</li> <li>-Dense revegetation within or adjacent to habitat</li> <li>-Storm water diversion and increased inflow</li> <li>-Clearing of riparian vegetation</li> </ul>	<p>Direct loss of habitat by drying or flooding soils/wetlands</p> <p>Loss of colonies</p> <p>Fragmentation of colonies &amp; reduced gene flow</p>
<p><b>Hydrological Disturbance - Reduced Water quality</b></p> <ul style="list-style-type: none"> <li>-sedimentation from soil disturbance activities (e.g. Road construction, trenching)</li> <li>-Increased nutrient loads from fertilisers</li> <li>-Chemical pollutants from chemicals e.g biocides and hydrocarbons</li> </ul>	<p>Degradation of habitat through reduced water quality</p>

## 6 ENVIRONMENTAL POLICY AND LEGISLATION

This section explores environmental policy and legislation most pertinent to the Giant Gippsland Earthworm and Warragul Burrowing Crayfish. However, it is not a comprehensive list of all legislation and the guidance provided does not constitute legal advice.

### 6.1 *Environment Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for assessment of proposed actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES). It applies to both public and private land. Matters of National Environmental Significance include nationally threatened species and ecological communities.

A person who proposes to take an action that will have, or is likely to have, a significant impact on a matter of national environmental significance must refer that action to the minister for a decision on whether assessment and approval is required under the EPBC Act.

A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

As the Giant Gippsland Earthworm is listed as **Vulnerable** under the EPBC Act, a referral to the Commonwealth Minister for DoE may be necessary if the works are deemed to have a **significant impact** on an **important population**. The criteria to consider in determining an important population under the Act are outlined below and assessment of the impacts of the proposed development on GGE in relation to the significant impact criteria for Vulnerable species are given in Table 2.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.



**TABLE 2 Assessment of the impacts of the proposed development on the GGE in reference to the *significant impact criteria for Vulnerable EPBC Act listed species***

CRITERION	ASSESSMENT
There is a real chance or possibility that the action will lead to a long-term decrease in the size of a population.	No GGE identified within the study area and little suitable habitat found <b>No significant impact.</b>
There is a real chance or possibility that the action will reduce the area of occupancy of an important population	No GGE identified within the study area and little suitable habitat found. <b>No significant impact</b>
There is a real chance or possibility that the action will fragment an existing important population into two or more populations	No GGE identified within the study area. The works proposed will not split or provide a barrier between the potential occurrence of the species and any other known population. <b>No significant impact</b>
There is a real chance or possibility that the action will adversely affect habitat critical to the survival of a species	No GGE identified within the study area. The action will not adversely affect habitat critical to the survival of a species <b>No significant impact</b>
There is a real chance or possibility that the action will disrupt the breeding cycle of an important population	No GGE identified within the study area. The action will not disrupt the breeding cycle <b>No significant impact</b>
There is a real chance or possibility that the action will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No GGE identified within the study area. As a precautionary approach potential habitat along the waterway will be protected within a buffer and planted as per the recommended guidelines and managed accordingly. <b>No significant impact</b>
There is a real chance or possibility that the action will result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No GGE identified within the study area. <b>No significant impact</b>
There is a real chance or possibility that the action will introduce disease that may cause the species to decline	No GGE identified within the study area. <b>No significant impact</b>
There is a real chance or possibility that the action will interfere with the recovery of the species	No GGE identified within the study area. The works proposed will not interfere with the management or recovery of these areas. <b>No significant impact</b>

### Implications

According to the significant impact criteria (Table 2), the current proposal is unlikely to have a significant impact on the Giant Gippsland Earthworm as they were not recorded within the study area.

A referral under the *EPBC Act 1999* is unlikely to be triggered as no GGE colonies will be impacted by this proposal.

## **6.2 Flora and Fauna Guarantee Act**

The Giant Gippsland Earthworm and Warragul Burrowing Crayfish are both listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act) which is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. The FFG Act has limited direct application to private land. The local planning authority is likely to consider impacts on FFG Act-listed species and communities under the Planning Scheme when deciding on planning permit applications.

Further information on the FFG Act can be found at:

<http://www.depi.vic.gov.au/environment-and-wildlife/threatened-species-and-communities/flora-and-fauna-guarantee-act-1988>

### Implications

A permit is required from DELWP if an action on public land proposes to collect, kill, injure or disturb protected flora and fauna and ecological communities. An FFG Act permit is generally not required for private land.

A permit under the *FFG Act 1999* is not required as the proposal is on privately owned land.

## **6.3 Wildlife Act 1975**

This Act forms the procedural, administrative and operational basis for the protection and conservation of native wildlife, specific use of, and prescriptions for access, prohibition and regulation of associated activities involving native wildlife within Victoria. This Act is the basis for the majority of wildlife permit/licensing requirements within the state. All terrestrial invertebrates listed under the *FFG Act 1988* are considered "wildlife".

### Implications

The GGE is listed under the *FFG Act* and are thus considered “wildlife” for the purposes of this Act. A license is required under this Act to take or destroy wildlife. This includes any handling, salvage and translocation of wildlife and a permit may be required if these activities are undertaken as a result of this proposal.

A permit under the *Wildlife Act* is unlikely to be required as the proposal is unlikely to involve any of the above activities.

## 6.4 Victorian Planning Provisions

- SCHEDULE 6 TO CLAUSE 43.04 DEVELOPMENT PLAN OVERLAY (DPO)

Applies to Korumburra residential growth areas

Under the conditions required for a permit under Schedule 6 of the DPO, Flora and Fauna, a Giant Gippsland Earthworm assessment is required. This assessment must include how any earthworms located will be protected from negative impacts associated with a proposed development.

This assessment satisfies the requirements under Schedule 6 of the DPO. No specific mitigation is required for GGEs as none were identified from the subject land.

Results of the GGE assessment must be presented in a planning permit application to South Gippsland Shire Council.

## 7 IMPACT ASSESMENT AND MITIGATION RECOMMEDATIONS

Threatening processes associated with the construction of housing developments have the potential to substantially modify GGE habitat from both direct and indirect impacts (Refer to Table 1).

Mitigation has the principle aim of avoiding significant impacts to threatened species that might arise from proposed works and should be applied in a hierarchical order:

1. **Avoid** adverse impacts-avoid habitat loss
2. **Minimise and/or mitigate** impacts-minimise habitat loss through appropriate consideration in planning processes and expert input to project design construction and management
3. **Offset** Identify appropriate offset options if avoidance or minimisation is not achievable.

Potential GGE habitat was identified along the banks of the tributary of Foster Creek. However no evidence of the species was found and the field assessment revealed that the soils were largely unsuitable due to disturbance and unsuitable soils. The site has been subject to cropping over the past 12 months.

The absence of any evidence of GGE, combined with the lack of a suitable habitat at the site suggests that this species is unlikely to occur within the subject land. No GGE colonies should be impacted by the proposal development of the site.

As a consequence, there are no impact minimisation actions required.

In some circumstances, a precautionary approach to mitigation is recommended even when no GGE colonies are identified due to the possibility that colonies can remain undetected. However, it is considered by INVERT-ECO that the area is unlikely to support suitable habitat. As the waterway is likely to be protected from building works by the installation of a 30 m buffer under the West Gippsland Catchment Authority recommendations (WGCMA) (Glenn Kell pers.com.), the creek banks will be afforded some protection in the event that small areas of habitat occur at the site.

### 7.1 Contingency Plan

While a targeted assessment aims to identify all GGE colonies and habitat, due to their subterranean and cryptic habits, there is a low likelihood that colonies may remain undetected. A contingency plan has been developed to address this (Attachment 1).

A Contingency Plan should be implemented in the event that undetected Giant Gippsland Earthworms are accidentally exposed during project construction. An immediate 30 m buffer zone should be established if live populations are found. This contingency plan requires the local translocation of uninjured worms to a suitable nearby site. Suitable release areas must be

secure sites with long-term protection. There should be a minimum of 30 m between the release site and project works.

- Ensure all contractors and on-site workers are familiar with the identification of Giant Gippsland Earthworms and the rescue and release procedures outlined in the Contingency Plan should any GGE colonies be accidentally unearthed during site works by providing the following information during inductions.
  - Attachment 1 Contingency Plan Contingency Plan for the accidental unearthing of Giant Gippsland Earthworms
  - Attachment 2 Fact Sheet 1- GIANT GIPPSLAND EARTHWORM - recognising habitat on your property
  - Attachment 3 Fact Sheet 2 PROTECTING GGE HABITAT - guidelines for revegetation and plantation projects
  - GGE website <http://www.giantearthworm.org.au/>

## 8 REFERENCES

- IUCN (International Union for Conservation of Nature) 2014. *Megascolides australis*. The IUCN Red List of Threatened Species. Version 2015.2
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- Victorian Department of Sustainability and Environment. 2009. Advisory List of Threatened Invertebrate Fauna in Victoria - 2009. Department of Sustainability and Environment, East Melbourne, Victoria.
- Woods, R. 2006. Genetic diversity and population structure of the Giant Gippsland Earthworm *Megascolides australis* Unpublished Honours thesis. Department of Genetics La Trobe University, Bundoora, Victoria

## APPENDIX 1 - Giant Gippsland Earthworm *Megascolides australis*

EPBC Act 1999 Conservation Status: Vulnerable  
 FFG Act 1988 Conservation Status: Threatened  
 IUCN Red List of Threatened Species (2015): Endangered  
 DEPI Advisory List of Threatened Invertebrates  
 (2009): Listed



The Giant Gippsland Earthworm is one of the largest species of earthworm in the world, with adults reaching lengths of over 1.5 m and weights of up to 400 g (Van Praagh 1992). The species is restricted to south and west Gippsland, Victoria with Warragul and Drouin representing the north of its range and Almurta and Korumburra in the south. Mt Worth represents the most easterly point of distribution. The closest GGE records occur within 50 m to the east and west of the waterway (Van Praagh 2010).

The majority of habitat occupied by this species occurs on private land used for agriculture. GGE colonies are most commonly found along clayey creek banks and drainage lines, usually above the areas prone to flooding. Away from waterways, they occur near underground springs and soaks, either in gullies or on south-facing slopes with terracettes. The species is generally found in the deep blue-grey or red clayey soils.

While the species occurs over an area of approximately 40,000 ha, suitable habitat within its range is patchy leading to small, fragmented populations. A combination of many interrelated factors such as slope, micro-topography, nature and depth of the soil and hydrological processes determine suitable habitat (Van Praagh *et.al.* 2007). GGEs live in complex, permanent burrows that extend to around 1.5 m in depth. Worms remain underground, feeding on the root material and organic matter ingested in the soil. They breed in spring and summer when they lay large, amber coloured egg cocoons (Van Praagh 1996).

Aspects of the biology and ecology of the GGE such as long lifespan, low reproductive and recruitment rates, and poor dispersal ability render the fragmented populations particularly vulnerable to threatening processes (Van Praagh 1992). There are a range of processes that threaten GGE colonies. The most widespread and serious are the physical disturbance and compaction of soils, alterations to water tables and drainage patterns at the local and regional level.

Further information can be found at [www.giantearthworm.org.au](http://www.giantearthworm.org.au)

## **GUIDELINES FOR THE ACCIDENTAL UNEARTHING OF GIANT GIPPSLAND EARTHWORMS MARCH 2016**

Even after appropriate survey, assessment and planning have been undertaken at a site, undetected populations of the Giant Gippsland Earthworm may be accidentally unearthed during project works. The following guidelines have been produced to manage these incidents.

### **IN THE EVENT OF THE ACCIDENTAL UNEARTHING OF GIANT GIPPSLAND EARTHWORMS THE FOLLOWING ACTIONS SHOULD BE IMPLEMENTED IMMEDIATELY.**

1. All works must cease within a 50m diameter AREA around the location of the incident.
2. The Site Supervisor must be alerted to the incident
3. The Site Supervisor must establish the AREA as an INCIDENT SITE by securing the boundary and preventing any movement of machinery into the site or any further disturbance to the soil.
4. The Site Supervisor must ensure that any earthworms left exposed in the soil are left in situ and covered with a 10cm layer of moist soil.
5. The Site Supervisor must ensure that any earthworms unearthed and appearing uninjured must be collected and relocated according to the instructions provided.
6. The Site Supervisor must ensure that any dead or fatally injured animals are collected and put in **95 % alcohol in sealed glass jar or plastic container or frozen storage** as soon as possible after unearthing for collection by DSE or deposit at Museum Victoria. All specimens must be accompanied by appropriate label with date, precise locality and organisation details.
7. The Site Supervisor must ensure that the Biodiversity Unit, DELWP Office, Traralgon (Ph: 03 51722111) is contacted within 24 HOURS regarding earthworms that required collection.
8. The Site Supervisor must ensure that an INCIDENT REPORT is completed in the format provided and sent to the Agency responsible for authorizing the works (e.g. DPI, shires, DELWP) within 24 HOURS OF THE INCIDENT.

### **RECOMMENCEMENT OF WORK**

Works can only recommence within the stop work area once all relevant statutory approvals and permits have been obtained. This may include the requirement for further expert assessment of the area, upon the advice of both the Victorian Department of Environment, Land, Water and Planning (*Wildlife Act 1975*) and the federal Department of the Environment (*Environment Protection and Biodiversity Conservation Act 1999*).



The Giant Gippsland Earthworm has been officially listed under both Victorian and Federal legislation as a threatened species. As a result, permits from both levels of government may be required to either remove animals or interfere with their habitat. Substantial penalties may apply for non-adherence.

**INCIDENT REPORT FOR THE ACCIDENTAL UNEARTHING OF GIANT GIPPSLAND EARTHWORMS**

,

Name of company/organisation:

.....

Name of contact:

.....

Contact details:

.....

Location of Incident:

.....

Date of Incident:

.....

Size of area from which earthworms unearthed.....

Estimate of numbers of worms unearthed.....

Number of earthworms recovered in situ.....

Number of earthworms taken for relocation.....

Description of Incident

.....

.....

.....

.....

.....

.....

Attach **photograph** of habitat/incident

**This Incident Report must be sent to the authorizing agency within 24 hours**

**INSTRUCTIONS FOR RELOCATING GIANT GIPPSLAND EARTHWORMS**

It is important that the following instructions are followed in order to ensure the best possible chance of survival for Giant Gippsland Earthworms that have been accidentally unearthed and need to be placed back into the soil.

1. Collect all uninjured earthworms. Giant Gippsland Earthworms are fragile and must be handled with great care. They cannot support their own weight out of their burrows. They must ALWAYS be carried in a HORIZONTAL position. They should NEVER be held vertically and allowed to dangle. This always results in DEATH.
2. If more than one earthworm is unearthed, they can be kept in plastic box or esky with moist soil with either wet hessian or newspaper over the top for up to ONE HOUR while the relocation site is prepared. If the WEATHER is VERY WARM, earthworms must be relocated as SOON AS POSSIBLE.
3. Earthworms must be kept in a shaded location while being kept for relocation.
4. Relocate uninjured earthworms to a nearby site that will not be subject to any earthworks. This site should have a moist, predominantly clay soil.
5. Dig a small trench to a depth of approximately 30 cm. The length of the trench should be at least as long as the earthworm. The earthworm should be placed in the trench and gently covered with loose moist soil and the removed clods of pasture placed on top.
6. Up to two earthworms can be placed in a single trench.
7. If the soil is dry, wet the trench. Watering may also be required in the following days, particularly in summer. Expert advice is available from the Biodiversity Unit, DELWP Office, Traralgon (Ph: 03 51722111) any on-going need for watering of relocation sites.

## Identification of Giant Gippsland Earthworms



**Adult :** 80-150 cm long x 2 cm diameter

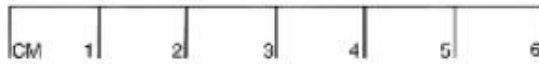
**Colour:** Dark purple head grading into pink-flesh colour

**Distinguishing Marks:** 3 bands positioned about 1/3 down the body on the ventral side (underneath) the adult worm



## Identification of Giant Gippsland Earthworms *Cont-*

### Egg Cocoons



#### **Egg Cocoons:**

Large (5-9 cm), amber coloured deposited within the burrow system and are found at an average depth of around 20 cm. They can be found all year round due to their long incubation period.





## GIANT GIPPSLAND EARTHWORM - recognising habitat on your property

Fact Sheet No. 1, January 2014

### What is the Giant Gippsland Earthworm?

The Giant Gippsland Earthworm (GGE) or *Megascolides australis*, is one of a thousand or so earthworms native to Australia. However, it is more famous than most earthworms because of its reputation as one of the largest known earthworms in the world. Mature adults have an average length of 80cm, a diameter of up to 2cm and weight of 200gm. However, lengths of over 1.5m and weights up to 400gm have been recorded. They have a purple-coloured head region and pinkish-grey body (Fig. 1).

GGE live entirely in underground colonies, each worm occupying its own permanent burrow system, generally built to depths of between 1-1.5m. They feed on root material and other soil organic matter. They are only seen above ground when washed out of their burrows by heavy rain or exposed by landslips.

GGE are hermaphroditic and breeding occurs in spring and summer. Breeding adults are recognisable by a large swelling (saddle) that occurs near their head. They lay large (up to 9cm long), amber-coloured egg cocoons, in special chambers branching from their burrows, usually within 40cm of the soil surface (Fig. 2).



**Fig. 1: Adult Giant Gippsland Earthworm exposed in burrow**

### Where are they found?

The only place GGE are found in the world is approximately 40,000ha of South and West Gippsland, Victoria where they have a naturally restricted distribution. This area lies roughly between Buln Buln to the north, Jumbunna to the south, Almurta to the west, and Mt Eccles to the east (Fig. 3). Within this range, worms are limited to small, widely dispersed pockets of suitable habitat.

### Habitat Requirements

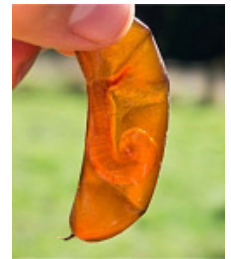
GGE are unusual because they can survive in locations where native vegetation has been completely removed. Most colonies live on farmland under improved pasture.

A very small number are found in open or disturbed patches within remnant native forest.

However, all of these forest patches have been altered by European settlement.

This makes it difficult to understand the environment in which GGE lived before European settlement of the area in the late 1800's.

Colonies are found mainly in two habitats: on the banks and terraces of streams and drainage channels, above the flood-level and on steep, south-facing hillsides, often with terracettes (Fig. 4 & 5). The sites away from waterways are often associated with underground springs or areas of higher soil moisture. Sites with GGE colonies generally have well-draining blue-grey clay soils or red-brown clay loam soils that, critically, remain moist year-round (Fig 6). GGE cannot survive in water-logged soils or areas subject to seasonal flooding.



**Fig. 2: Egg cocoon of Giant Gippsland Earthworm**



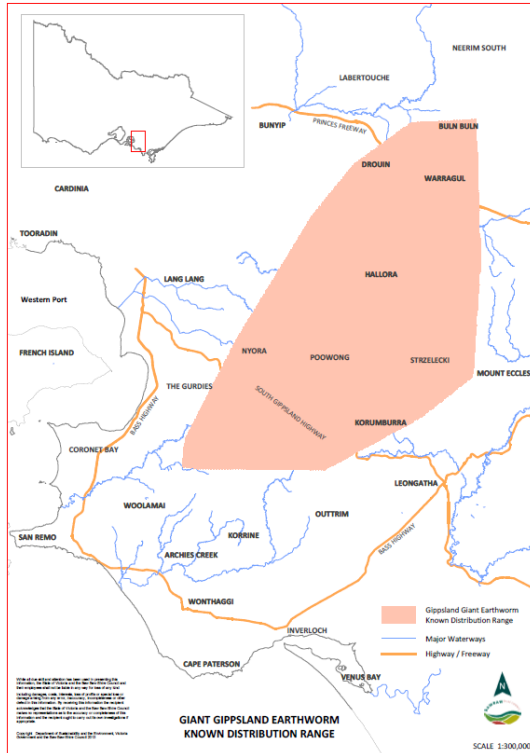
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Although yabbies (burrowing crayfish) are more widely distributed, they are often found together with GGE because they both prefer adequate soil moisture and heavy clay soils. Yabbies excavate large mounds of soil (known as chimneys) surrounding the entrance to their burrows. These chimneys are often mistaken for GGE casts (Fig 6).



**Fig. 3: Known range of Giant Gippsland Earthworm habitat**



**Fig. 4: Typical stream bank habitat of Giant Gippsland Earthworm**



**Fig. 5: Typical steep slope habitat of Giant Gippsland Earthworm**

The presence of introduced herb Creeping Buttercup *Ranunculus repens* and yabby mounds can indicate suitable conditions for colonies.



**Fig. 6: Clay soil habitat with buttercups and Yabby Mound**

**Why is the Giant Gippsland Earthworm under threat?**

The GGE is of conservation concern because of its very limited geographic range, highly specific habitat requirements and life-history characteristics.

GGE are long-lived for earthworms but they reproduce slowly, producing only one egg cocoon with one young per year. Worms are fragile and rarely recover from injury. The amount of area with the critical soil moisture conditions year-round is a fraction of the overall area across which GGE occurs. These areas are often isolated from each other by natural barriers that prevent worms moving between colonies. Therefore, areas where worms have disappeared are unlikely to be re-occupied by natural dispersal from neighbouring colonies. These features mean that the GGE can only slowly re-build colonies affected by harmful events.

**What are the threats to the Giant Gippsland Earthworm?**

There are a range of common activities that damage GGE colonies. These activities are a regular part of agriculture, urban and industrial development and construction of infrastructure (such as roads).

They include ploughing, deep ripping, pugging by stock, alteration to drainage systems, minor and major excavation works and hard-surfacing. They cause damage through:

- physical disturbance of soil resulting in direct injury to individual earthworms or whole colonies, collapse of burrows, compaction of soils causing reduced air and water infiltration and poor drainage;
- changes to flood regimes, drainage patterns and soil water movement, resulting in permanent changes to year-round soil moisture levels;
- chemical infiltration into soil (eg. pesticides, effluent) causing death through poisoning; and
- unusual flooding events or long-term drying of soils created by either natural cycles or human-induced climate change.

Soil preparation for re-vegetation and plantations can also damage GGE colonies. Evidence is emerging that the effects of the lowering of water-tables and drying up of springs and soaks in the early growth phase of broad-scale tree planting can dry soils so they are no longer suitable for GGE colonies (See Fact Sheet 2 - Protection Giant Gippsland Earthworm Habitat - guidelines for re-vegetation, agroforestry and plantation projects).

## Detecting Giant Gippsland Earthworms

Detecting GGE colonies can be difficult because there are no obvious above-ground signs to determine their exact location.

Searching for areas along creek-banks where buttercup and yabby mounds are present can help identify wetter sites that may support GGE habitat. Similarly, south facing slopes where wetter areas are obvious (e.g. presence of terracettes or landslips) may also help identify potential habitat.

One method that can be easily used is to walk over areas of possible habitat and listen for the gurgling sound that worms make when moving through their moist burrows. This is best done several times in winter and spring when worms are in the parts of their burrow systems that are closest to the surface of the ground.

Formal studies of the GGE rely on digging in systematic patterns to expose direct evidence of colonies.

This method is not recommended to landowners as it damages burrow systems and also has a high of risk of injuring worms and egg cocoons. Efforts to excavate colonies should only be done by suitably-qualified individuals with the necessary permits.

## Checklist for identifying habitat of Giant Gippsland Earthworm

Below is an easy-to-use checklist to assist landowners to determine whether their properties may contain areas suitable for GGEs.

1. Is your property located within the known range, or close to the boundaries of the known range of GGE?  
*(If you answer NO your property is unlikely to have GGE habitat).*
2. Does your property have soils composed of either blue-grey clay or brown or red clay loams?  
*(If you answer NO your property is unlikely to have GGE habitat).*
3. Does your property contain high-banked streams or drainage channels?
4. Does your property have south-facing slopes that may have terracettes?
5. Have you heard underground "gurgling" sounds on your property?

If you have answered YES to Questions 1 & 2 and YES to either Questions 3, 4 or 5 your property may have GGE habitat.

## Further Information

If you would like more information on GGE you can go to the following websites:

<http://museumvictoria.com.au/discoverycentre/infosheets/giant-gippsland-earthworm/>

<http://www.environment.gov.au/biodiversity/threatened/publications/recovery/pubs/giant-gippsland-earthworm.pdf>

[http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/lwm\\_biodiversity\\_earthworm](http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/lwm_biodiversity_earthworm)

[http://planningschemes.dpcd.vic.gov.au/bawbaw/ordinance/42\\_01s04\\_bawb.pdf](http://planningschemes.dpcd.vic.gov.au/bawbaw/ordinance/42_01s04_bawb.pdf)

[http://www.dse.vic.gov.au/\\_data/assets/pdf\\_file/0014/103217/077\\_Gippsland\\_Earthworm\\_1997a.pdf](http://www.dse.vic.gov.au/_data/assets/pdf_file/0014/103217/077_Gippsland_Earthworm_1997a.pdf)



## PROTECTING GIANT GIPPSLAND EARTHWORM HABITAT - guidelines for revegetation and plantation projects

Fact Sheet No. 2, April 2014

Careful thought and planning must be given when revegetating areas known to be habitat for the threatened Giant Gippsland Earthworm (GGE)



Figure 1 Giant Gippsland Earthworm (GGE)

(*Megascolides australis*) (Figure 1). In south and west Gippsland, revegetation frequently occurs on steep slopes and along stream banks, exactly where GGE love to live. We know that soil moisture is an important part of the GGE's habitat. Planting of trees in or close to GGE colonies can result in a reduction in soil moisture and therefore a loss in suitable habitat. Where GGE colonies are located in areas targeted for revegetation or plantations,

planning and practices need to be modified to protect earthworms from direct damage or longer-term habitat degradation.

### Threats to GGE from revegetation

Site preparation for revegetation projects, (including agro-forestry and plantations), usually involves ploughing, scalping or deep-ripping and herbicide treatments. These activities cause immediate harm to GGE colonies by damaging worms, destroying burrow systems and poisoning individuals.

Another long-term effect is a drying out of the upper layers of the soil and a lowering of water-tables, also affecting springs and soaks as growing trees use water. These effects can alter local hydrological conditions to the extent that soils no longer hold sufficient moisture year-round to allow colonies to survive.

Over time the change from open pasture to dense stands of trees causes changes to the soil environment. Roots of growing trees form physical barriers that may interfere with burrow building by earthworms.

Without action to avoid or mitigate these effects, revegetation projects can inadvertently result in local extinctions of GGE colonies.

The strategy to protect GGEs during revegetation projects is to apply a modified planting design and create a buffer around each colony to absorb any negative impacts from revegetation works. The modified planting design is characterised by the creation of three zones, each of which requires different planting (species composition and density) and management prescriptions.

### What can I do?

#### 1. Locate and Map GGE colonies

The first step is to identify whether there are any colonies within the area proposed for revegetation. Information on how to identify GGE habitat on your property and detect the presence of colonies is available in [Fact Sheet 1 - Recognising GGE habitat on your farm](#).

As well as its location, the extent of each colony needs to be determined. The area occupied by colonies is typically small, the smallest being a few square metres with the largest up to 2500 m<sup>2</sup>. You may encounter one colony or many small, isolated colonies separated by areas of unsuitable habitat (e.g. dry, silty or rocky soils).

Once the colony is identified, an additional 10 metres area should be included to account for GGEs on the edge of the colony.



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The area occupied by earthworms is known as **Zone 1 - GGE Colony** – No planting zone.

## 2. Establish buffer around colonies

Establish a buffer area around each colony. The minimum recommended width of buffers is 30 metres from the edge of the area occupied by the colony. However, actual buffer size may vary depending on individual site characteristics.

This buffer area is known as **Zone 2 - Modified planting zone**.

### *Buffers for colonies on hillsides*

Many colonies found on hillsides are associated with underground springs or soaks and the slopes are usually south facing. These areas may be obvious as greener patches often with areas of slumping (Figure 2). A colony on a hillside will require a larger buffer above the colony to protect the source soak from thirsty plants. In the example shown in Figure 2, it is recommended not to plant trees between the head of the soak and the top of the hill immediately above it.

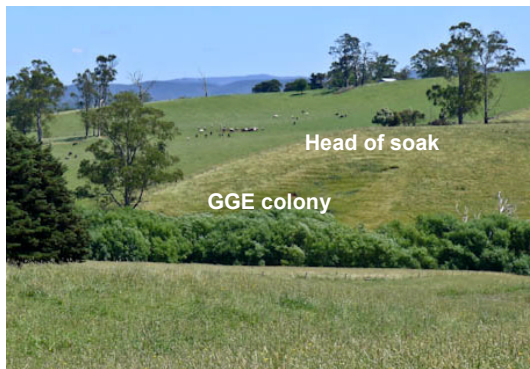


Figure 2 GGE colony on south facing slope with obvious soak and soil slumping

### *Colonies along creek banks*

Colonies located along the banks of creeks and drainage channels are generally found on terraces above the flood level. They rarely extend into surrounding pasture and are usually located within a few metres of the edge of the creek bank (Figure 3). However, if the creek occurs within a gully, colonies can extend higher up into the gully slopes (Figure 4).



Figure 3 GGE habitat on well defined banks



Figure 4 GGE habitat extending into surrounding slopes above creek

## 3. Planting Design

The following guidelines are recommended when designing revegetation works around GGE colonies. Figure 5 & 6 provide a diagrammatic representation of zoned planting for GGE colonies.

### **Zone 1 - GGE habitat – No planting zone**

This is the area occupied by GGEs in addition to a 10 metre buffer. No planting is undertaken within GGE habitat and original cover (e.g. pasture) remains. Any remnant vegetation occurring within GGE habitat should be retained.

### **Zone 2 – Modified planting zone**

This zone includes a 30 m area surrounding GGE habitat. The standard Ecological Vegetation Class (EVC) planting is modified to only include plants with minimally invasive root systems and low water usage e.g. native grasses, sedges and herbs.

*Modified planting for hillside colonies (Figure 5)*

The buffer area above GGE colonies on hillslopes must take into account protection of the entire soak (if recognisable). This may require an extension of Zone 2 to include the top of a slope.

*Modified planting for creekside colonies (Figure 6)*

The width of the area to be fenced out for revegetation along creek banks may be considerably less than 30 metres. It is therefore recommended that the area above the GGE colony (away from the creek bank) is either left as pasture or planted as per Zone 2. This will depend on the size of the area occupied by the colony. For example, a small colony extending a few metres perpendicular to a creek, may allow for Zone 2 planting within the area to be fenced. Colonies occupying the total width of the area to be fenced should be left as pasture or minimal Zone 2 planting.

**Zone 3 – Standard EVC Planting**

Zone 3 includes areas outside the GGE colony and buffer. These areas should be planted with reference to the appropriate bioregional Standard Ecological Vegetation Class (EVC) benchmark for the site ([www.depi.vic.gov.au](http://www.depi.vic.gov.au)).

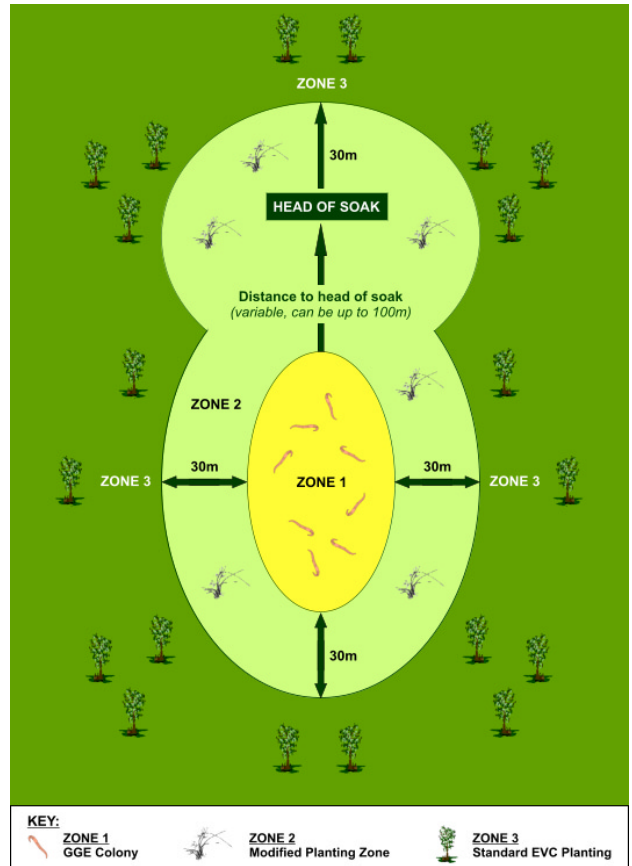


Figure 5 Modified planting for hillside colonies

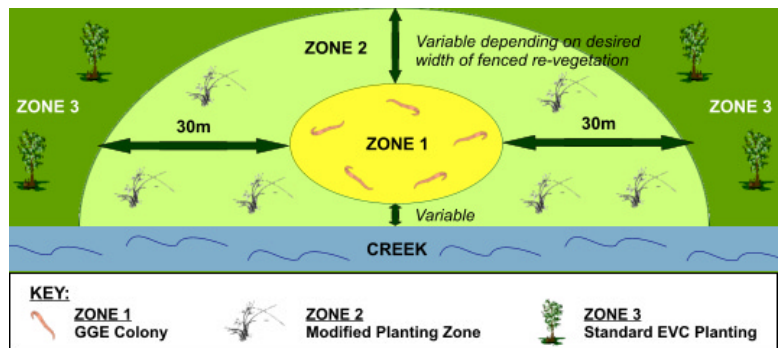


Figure 6 Modified planting for creekside colonies

**4. Management guidelines for colonies and buffer areas**

All activities that damage GGEs and their habitat should be excluded from the colony and its buffer.

**Zone 1**

- no excavation or soil disturbance (e.g. no ploughing, scalping or deep-ripping of soil);
- retain any existing native vegetation, except for regenerating trees or tall shrubs;
- no vehicle access;
- no broadscale use of herbicide. Manage weeds by hand or use spot application of herbicides with low toxicity to humans or animals and approved for use around waterways (e.g. Roundup biactive);
- manual slashing (anytime) or crash grazing (dry conditions only) are acceptable;
- if retaining cover of introduced pasture grasses is undesirable, vegetate as per Zone 2 using planting methods that cause minimal disturbance to soils;
- temporary fencing may be desirable to identify and protect GGE colonies during revegetation works; and
- install permanent fencing outside Zone 1.

**Zone 2**

- minimise soil disturbance;
- no broadscale use of herbicide. This does not exclude “spot” spraying for weed control;
- avoid the entry of heavy machinery, especially during wet or water-logged conditions;
- no planting of trees and tall shrubs;
- remove regenerating trees or tall shrubs; and
- re-plant with native understorey species including grasses, sedges or low-growing, shallow-rooted shrubs as per modified planting design.

**Zone 3**

- apply standard EVC planting and management practices apply;
- no restrictions on plantings;
- no restrictions on vehicle access; and
- no restrictions on chemical usage.

**5. Other management considerations**

Avoid constructing tracks where they will affect drainage into buffer and habitat areas.

Careful fencing procedures around the colony are required to minimise the impact of the fencing activity on GGEs.

These guidelines are based on the current understanding of the impacts of revegetation works on GGEs and may alter as further understanding of the relationship between GGEs and their environment is available. Remember to check our website [www.giantearthworm.org.au](http://www.giantearthworm.org.au) regularly for the latest information.

**Resources**

[http://www.dse.vic.gov.au/data/assets/pdf\\_file/0005/97349/NativeVeg\\_Reveg.pdf](http://www.dse.vic.gov.au/data/assets/pdf_file/0005/97349/NativeVeg_Reveg.pdf)

<http://www.giantearthworm.org.au>

<http://www.giantearthworm.org.au/sitefiles/fact-sheet1.pdf>

*Last updated April 2014  
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