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Our Ref: 133312
Date: 22 March 2017

Attn: Catherine Suggate
Centennial Springvale


Via: Email

Dear Catherine,

**RE: ECOLOGICAL DUE DILIGENCE SURVEY, SPRINGVALE SUBSIDENCE LINES
EXTENSION, NEWNES PLATEAU, NSW**

RPS Australia East Pty Ltd (RPS) was engaged by Centennial Springvale Pty Ltd to undertake a due diligence assessment for the extension of four proposed subsidence lines. The four lines are named; subsidence line BB, subsidence line GG, subsidence line GGE and subsidence line GGSW and development of one newly delineated GG_SUP subsidence line (see **Figure 1**). These lines are hereafter collectively referred to as the Project Area. The proposed subsidence lines cover areas being under-mined via longwall mining from longwalls 420-422. The purpose of the proposed activity is to provide monitoring pre, during and post mining operations to allow the comparison between predicted and measured subsidence parameters for a given feature

The site inspection conducted on the 3rd March 2017 aimed to ensure that the proposed works do not identify potentially occurring threatened flora, fauna or ecological communities listed under the *Threatened Species Conservation Act 1995* (TSC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Where threatened species and communities were identified mitigation measures have been recommended in order to avoid and minimise any potential impacts.

This Ecological Due Diligence Assessment is an addendum to RPS (2016) and should be read in conjunction with RPS 2016. RPS 2016 report outlines the constraints for the original subsidence lines which this report extends.

Legislation

This due diligence assumes that relevant approvals under the Environmental Planning and Assessment Act 1979 (EP&A 1979) have been granted for the related parent activity (i.e. Springvale Coal mining operations). Validation assessments have been provided (e.g. Seven Part test under Section 5A of the EP&A Act), where appropriate, to confirm consistency with prior assessments prepared for the related parent activity.

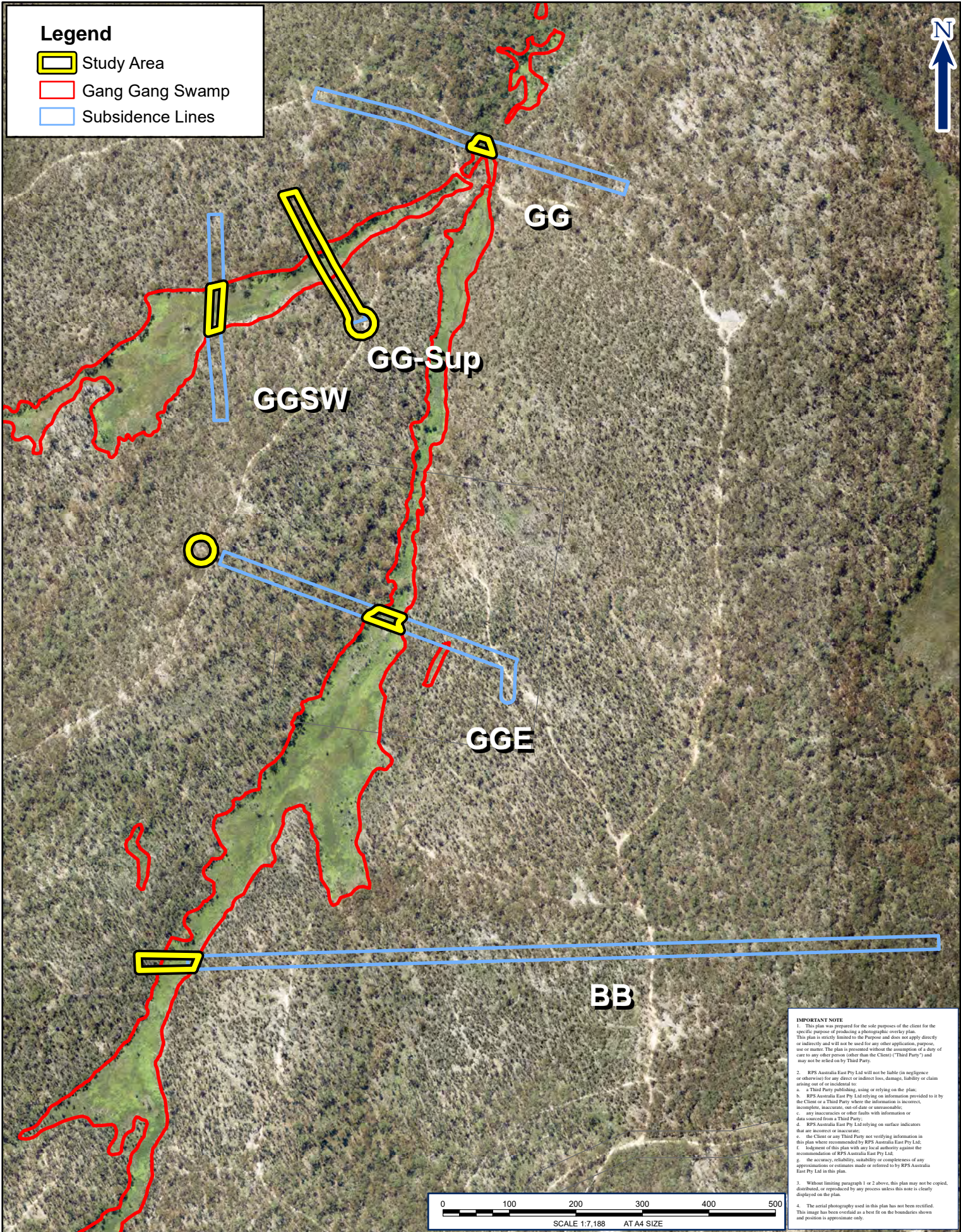


FIGURE 1: STUDY AREA	LOCATION: NEWNES PLATEAU	DATUM: GDA94
	JOB NO.: 133312	PROJECTION: MGA Zone 56
PURPOSE: ECOLOGY	Technician: kieran_marshall	Date: 21/03/2017
		Data Sources: RPS Land and Property 2015

Construction activities

Centennial Springvale is proposing to carry out subsidence monitoring at five locations within existing leases across mining longwalls 420-422. The purpose of the proposed activity is to provide monitoring prior, during and post mining operations to allow the comparison between predicted and measured subsidence parameters for a given feature. Subsidence lines are installed to measure valley closure and upsidence (at the base of the valleys).

Depending on the ground surface conditions, a monitoring peg, star dropper driven to refusal or FENO mark is proposed to be installed along each line. Each site where one of these markers is installed is herewith referred to as a 'station'. Stations will be positioned along the line at a spacing interval of 15 m.

The spacing around each subsidence line monitoring station would be approximately 1m either side of the line. Each station requires line of sight between stations to accommodate straining/direct measuring between stations.

No trees with a trunk diameter of greater than 300 mm will be removed to accommodate any of the stations.

Methodology

Field surveys were undertaken by an RPS ecologist on 2nd March 2016 concurrently with Surveyors from Centennial Springvale marking the proposed subsidence line. The Project Area was traversed on foot to determine the biodiversity values present within a 10m radius of the subsidence line marked by Centennial Springvale surveyors including targeted surveys for threatened flora species, ground-truthing of threatened ecological communities (if any) and location of fauna habitat features including hollow-bearing trees.

Additionally a 20m radius from two points which were identified to be cleared for GPS Receiver Base Stations (hereafter referred to as a 'GPS Clearing') were inspected for threatened species and habitat features including hollow bearing trees. All threatened flora and habitat features were recorded with a Trimble differential GPS unit.

Results

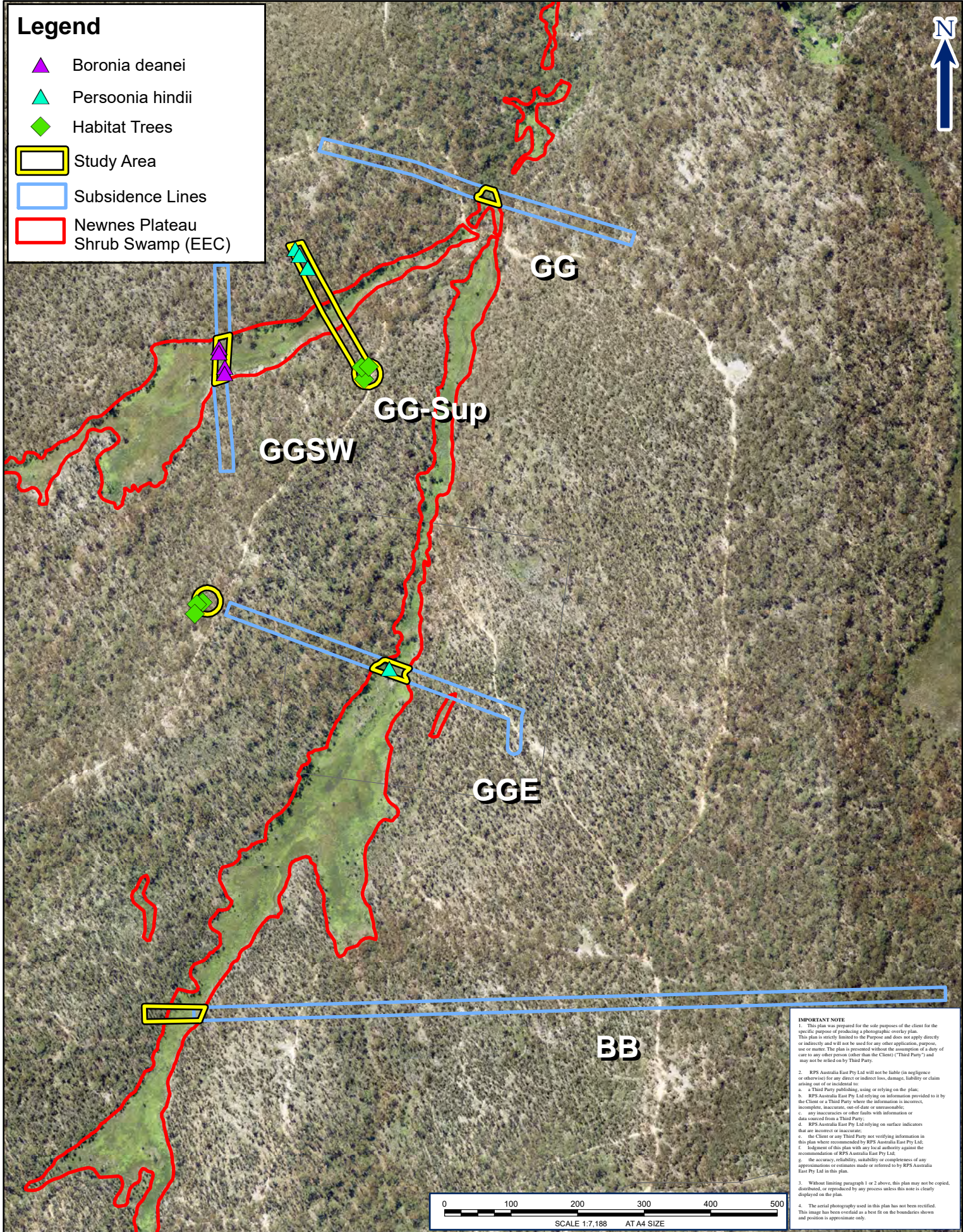
A summary of the ecological survey results from the 3rd March 2017 are presented in Table 1 and Figure 2.

Table 1: Results from ecological field surveys

Project Area	Results
GG Sup Subsidence Line	Field surveys conducted along the proposed GG-Sup subsidence line identified the presence of over 100 individuals of the threatened <i>Persoonia Hindii</i> within the last 50m of the northern end of the line (Figure 2), the population extant was flagged with tape. Additionally three Habitat trees were identified and marked with an 'H' within the

	GPS Clearing zone.
GGSW Subsidence Line	Four threatened <i>Boronia Deanei</i> were identified and flagged along peripheries of the Project Area.
GGE Subsidence Line	Three threatened <i>Persoonia hindii</i> were identified on an island within the swamp boundaries, plants were flagged individually. Additionally two Habitat trees were identified and marked with an H' within the GPS Clearing zone
GG Subsidence Line	No threatened flora species or habitat features were identified within the Project Area.
BB Subsidence Line	No threatened flora species or habitat features were identified within the Project Area

Please note that the surveys were conducted outside of the flowering period for *Caesia parviflora var. minor*. Based on the habitat value and the cryptic nature of this species RPS have applied the precautionary principle and have assumed presence of this species..



Legend

- ▲ Boronia deanei
- ▲ Persoonia hindii
- ◆ Habitat Trees
- Study Area
- Subsidence Lines
- Newnes Plateau Shrub Swamp (EEC)



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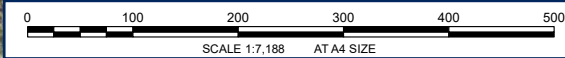


FIGURE 2: SURVEY RESULTS

LOCATION: NEWNES PLATEAU	DATUM: GDA94
JOB NO.: 133312	PROJECTION: MGA Zone 56
PURPOSE: ECOLOGY	Data Sources: RPS Land and Property 2015
Technician: kieran.marshall	Date: 22/03/2017

CLIENT: CENTENNIAL SPRINGVALE PTY LTD

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Potential Impacts

The majority of direct potential impacts are associated with vegetation modification associated with installation of star pickets approximately every 15 metres and ongoing monitoring. There is potential for weed incursion and trampling due to the entry of humans and equipment into the sites. Monitoring of the above subsidence lines involves two persons accessing MU50- Newnes Plateau Shrub Swamp EEC by foot, subsequently having the potential to cause minor alterations to the shrub layer. However, existing animal tracks will be utilised where possible. No trimming of any vegetation within the EEC is proposed. Stakes will be placed within the EEC at 15m intervals. No significant changes to species assemblage or EEC structure are expected to occur.

Additionally, the minor alterations predicted from the proposed activities to the shrub layer and the installation of stations are not expected to have a significant impact of the threatened obligate species the Giant Dragonfly (*Petalura gigantea*); Red-Crowned Toadlet (*Pseudophryne australis*) or the Blue Mountains Water Skink (*Eulamprus leuraensis*).

Threatened flora, including *P. hindii* and *B. deanei*, has been flagged and will be avoided along the subsidence lines. The proposed activities will have an assumed impact upon approximately 0.5Ha of potential habitat for the threatened *Caesia parviflora* var. *minor*. An assessment of significance concluded that the potentially occurring *Caesia parviflora* Var *minor* within line GG-Sup is unlikely to be significant to the viability of the local population.

Additionally, no mature trees (having a trunk diameter of over 300 mm) will be removed, nor will the project remove any hollow-bearing trees.

The following sections discuss the level of impacts specific to each subsidence line with regard to avoidance and minimising impacts.

Subsidence line GG-Sup

The GPS Clearing located at subsidence line GG will require the clearing of immature trees (less than 300mm trunk diameter) within 0.034Ha of MU 26a – (Variant of MU26) Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest in Gentle Depressions. All mature and habit trees will be retained and it is expected that the understory will have a limited impact due to trampling twice annually during subsidence line monitoring.

A population of *P. hindii* (90 individuals) were recorded and flagged for avoidance within 10 meters either side of proposed subsidence line GG-Sup (**See Figure 2**). *P. hindii* is a low lying plant that would not obstruct the line of site within a subsidence line. Although individuals were detected within Subsidence Line GG, it is not considered necessary to remove or harm any individuals to accommodate the line.

Subsidence line GGSW

Four *Boronia deanei* were identified and marked within the Project Area for subsidence line GGSW. Although individuals were detected within subsidence line GG, it is not considered necessary to remove or harm any individuals to accommodate the line as they are clear of the line of sight for surveying methodology and far enough away from the path to avoid any potential trampling impacts.

Subsidence Line GGE

The GPS Clearing located at subsidence line GGE will require the clearing of immature trees (less than 300mm trunk diameter) within 0.034Ha of MU 26a – (Variant of MU26) Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest in Gentle Depressions. All mature and habit trees will be retained and it is expected that the understory will have a limited impact due to trampling twice annually during subsidence line monitoring.

Three threatened *P.hindii* have been identified within the Project Area for subsidence line GGE and have been delineated with red flagging tape for avoidance during monitoring. It is not considered necessary to remove or harm any *P. hindii* individuals to accommodate the line. Additionally, there is a small section of MU26 – Newnes Plateau Narrow-leaved Peppermint - Silvertop Ash Layered Open Forest within the Newnes Plateau Shrub Swamp which will require some minor vegetation trimming.

Subsidence line GG

The Project Area for subsidence line GG contained no identifiable threatened species or significant habitat features such as hollow bearing trees.

Subsidence line BB

The Project Area for subsidence line BB contained no identifiable threatened species or significant habitat features such as hollow bearing trees.

Recommendations

- No vegetation clearing should but undertaken within the swamp vegetation identified as MU50- Newnes Plateau Shrub Swamp EEC.
- All individual *P. hindii* and *B. deanei* plants have been flagged to ensure trampling does not occur during ongoing monitoring.
- No trees should be cleared outside of the assessed GPS clearance Project Area (**Figure 2**), no trees marked with an 'H' should be cleared within the GPS clearance Project Area. It is recommended that an ecologist be onsite to monitor subsidence monitoring line installation at lines; GGE, BB, GG, GGSW and GG-Sub when it occurs, to avoid potential impacts on threatened flora *P.hindii* and *B. deanei* as well as limiting impact upon MU50- Newnes Plateau Shrub Swamp EEC.
- The Clearing of vegetation along Subsidence line GGE is particularly sensitive as it requires vegetation removal from an island within the swamp. As such it is important that an ecologist be present to delineate between the swamp vegetation and the island vegetation discussed

above. It is recommended that appropriate measures such as vehicle cleaning protocols be employed to ensure that working within the site does not result in bringing materials (soils, weeds or pathogens etc.) onto the sites that may cause the distribution of weed species or introduce pathogens such as Phytophthora. This will negate the Key Threatening Processes 'Weed Invasion by Exotic Perennial Grasses' and 'Infection of Native Plants by 'Phytophthora cinnamomi'.

- An ecologist should be present to supervise installation of star pickets for stations within the Swamps in an effort to avoid potential impacts to Blue Mountains Water Skink refuge habitat including burrows and clumping plants.
- Similarly to the above recommendation, an ecologist should be present to supervise the installation of star pickets for within the Swamps in an effort to avoid potential impacts to Giant Dragonfly refuge habitat including crayfish holes.

Conclusion

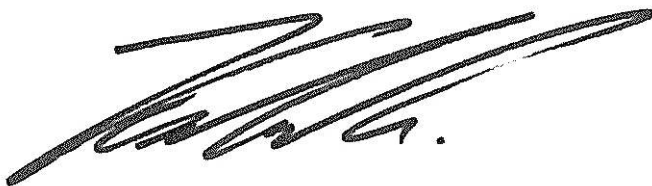
The ecological surveys conducted identified the potential to impact two threatened flora species *P. hindii*; *B. deanei* and assumes the presence and impact to approx. 0.5Ha of potential *C. parviflora* var. *minor* habitat within the Project Area. Provided the recommendations above are implemented the proposed activities will avoid impacting upon the threatened flora *P. hindii* and *B. deanei*.

Additionally the Newnes Plateau Shrub Swamp EEC was identified to occur within all five of the proposed subsidence line Project Area. Provided the above recommendations are adhered to the proposed activities are unlikely to have significant impacts upon the Newnes Plateau Shrub Swamp EEC and obligate threatened species such as the Blue Mountains Water Skink; Giant Dragonfly; and Red-Crowned Toadlet.

We trust this information is sufficient for your purposes; however, should you require any further details or clarification, please do not hesitate to contact the writer by telephone.

Yours sincerely

RPS



Kieran Marshall
Ecologist

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Attachment 1 EP&A Act 7-Part Test of Significance

Caesia parviflora var. minor (Small Pale Grass-lily)

C. parviflora var. *minor* grows in damp places in heath, woodland and dry sclerophyll forest on sandstone-derived soils. The species is known to occur on the Newnes Plateau.

- (a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Caesia parviflora var. *minor* has been recorded within the locality of the Project Area and it is assumed to be present in the absence of surveys. *C. parviflora* var. *minor* is small perennial herb under 20cm and as such will not be subject to any direct clearing activities associated with the subsidence line. The effects of trampling are not expected to have a significant impact of the viability as the species occurs in widely distributed local populations across the plateau with the proposed habitat impacts representing approximately 0.01% of habitat that is potentially suitable for this species within the region. On this basis it is considered proposed action is not likely to have an adverse effect on *Caesia parviflora* var. *minor* such that a local population of the species is placed at risk of extinction. The placement of the Star pickets is unlikely to directly impact upon the species if installation of stations is undertaken in conjunction with an ecologist avoiding impacting any potential *Caesia* species.

- (b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population.

- (c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for this species as it is not a community.

- (d) In relation to the habitat of a threatened species, population or ecological community:**
- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Approximately 0.5ha of habitat suitable for *Caesia parviflora* var. *minor* will be modified as part of the proposed works. No known individuals of this species are likely to be removed as a consequence of the proposed clearing activities. The proposed habitat loss represents approximately 0.01% of habitat that is potentially suitable for this species within the region.

- (ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

- (iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of the proposed works. Suitable habitat exists immediately adjacent to the Project Area and throughout the Newnes Plateau. Habitat to be modified is not considered important for the long term survival of the species in the locality, as the area of affectation is negligible when compared to the extent of regional habitat.

- (e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Area.

- (f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *Caesia parviflora* var. *minor*.

- (g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

The action will incrementally contribute to the key threatening process 'Clearing of Native Vegetation'. Habitat loss is a threat to this species, however the loss of habitat due to the project is considered negligible (i.e. 0.001% of available regional habitat).

Persoonia hindii

P. hindii occurs in dry sclerophyll forests and woodlands on sandy soils. The species is known only from the Newnes Plateau, in the Newnes State Forest.

- (a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Approximately ninety individual *P. hindii* were identified within the Project Area for the subsidence line GG-Sup and three individuals within GGSW. Due to the growth nature of *P. hindii* it is not anticipated that any species will impede line of sight between survey stations and as such will not be subject to any clearing activities. The impacts of trampling have been mitigated by flagging individuals where applicable or marking population extents in the case of GG-Sup. The placement of the star pickets is unlikely to directly impact upon the species if installation of stations is undertaken in conjunction with an Ecologist. Provided the recommendations above are adhered to the local populations identified are unlikely to be placed at risk of extinction.

- (b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to**

be placed at risk of extinction,

The species does not constitute an endangered population.

- (c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- (i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - (ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for this species.

- (d) **In relation to the habitat of a threatened species, population or ecological community:**
- (i) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Approximately 0.1 ha of habitat suitable for *P. hindii* will be modified as part of the proposed works.

- (ii) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

- (iii) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

- (e) **Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this threatened species does not occur within the Project Areas.

- (f) **Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

A recovery plan has not been developed for *P. hindii*.

- (g) **Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

The action will incrementally contribute to the key threatening process 'Clearing of Native Vegetation'. Habitat loss is a threat to this species, however, the loss of habitat due to the project is incremental.

Boronia deanei

B. deanei occurs in on the margins of high altitude swamps and in drier open forest on low nutrient, poorly drained peaty soils on sandstone or granite. The species was identified within the Project Area for subsidence line GGSW during targeted surveys.

- a) **In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Four individual *B. deanei* were recorded within the Project Area for subsidence line GGSW. These individuals were located on the peripheries of the Project Area and will not require any trimming nor are they likely to be affected by trampling are located approximately 5m away from the path used to access monitoring stations. Additionally, these plants have been marked in order to avoid any potential impacts in the future.

- b) **in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population.

- c) **in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
 - (i) **is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - (ii) **is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for this species.

- d) **In relation to the habitat of a threatened species, population or ecological community:**
 - (iii) **the extent to which habitat is likely to be removed or modified as a result of the action proposed,**
 - (iv)

Approximately 0.05 Ha of habitat suitable for *B. deanei* will be modified as part of the proposed works. However, no individuals will be removed as part of the proposal.

- (v) **whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

- (vi) **the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Critical habitat for this threatened species does not occur within the Project Areas.

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan has not been developed for *B. deanei*.

g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The action will incrementally contribute to the key threatening process 'Clearing of Native Vegetation'. Habitat loss is a threat to this species, however, the loss of habitat due to the project is incremental.

Endangered Ecological Communities

Newnes Plateau Shrub Swamp in the Sydney Basin Bioregion

Newnes Plateau Shrub Swamps occur in narrow, linear formations in low-slope headwaters of the Newnes Plateau. This community is present within the Project Area for all of the Subsidence Monitoring Lines which have been assessed herewith.

(a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Not applicable for this EEC.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable for this EEC.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

Subsidence monitoring will occur twice a year involving two persons traversing through or around the swamp. This monitoring will involve Star pickets being driven to refusal every 15m within the swamp boundaries. Existing animal tracks will be used where possible, otherwise the swamp will be walked around. This frequency is not considered substantial enough to alter structural integrity of the swamp if they are being avoided.

The Project is therefore unlikely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

- (d) In relation to the habitat of a threatened species, population or ecological community:**

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,**

Up to 0.05 ha of this EEC may be modified as part of the proposed works.

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

Works occurring within the Project Areas will not cause fragmentation or isolation as the EEC extends over large areas of the swamp at sites GGE and GGSW.

- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality**

Areas of the Newnes Plateau Shrub Swamp EEC are considered very important to the ongoing survival of the EEC in the locality. As areas of this EEC are largely being avoided by the proposed works, they are not considered to cause impacts to the long-term survival of this EEC in the locality.

- (e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)**

Critical habitat for this ecological community does not occur within the Project Areas.

- (f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,**

No recovery plans are applicable for this EEC.

- (g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Blue Mountains Water Skink (*Eulamprus leuraensis*)

This species has been previously recorded by RPS in Shrub Swamps that are proposed to be intersected by X line, GGSW, GGE and GG-Sup. The Blue Mountains Water Skink is considered to be reliant on the presence of permanent groundwater seepage and/or waterlogging within parts of the inhabited swamp, even during times of drought and is typically associated with the more waterlogged areas of the swamp (Benson and Baird 2012). Genetic studies have also determined that the species experiences little dispersal between swamps (Dubey and Shine 2009), and therefore the shrub swamps present within the Project Area may constitute four separate 'local populations' of the species.

- (a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Subsidence lines X, GGSW, GGE and GG-Sup are proposed to traverse swamps known to provide potential habitat for this species. Installation and monitoring will involve trampling the swamps to accessing monitoring stations which will occur twice annually. Impacts are considered minor and are not expected affect the overall integrity of the swamp. The installation of star pickets for stations will be targeted to avoid potential refuge habitat including burrows and clumping plants should not be impacted the species directly. Provided the recommendations are adhered to it is considered unlikely that the Project will affect the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

- (b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population.

- (c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

This is not applicable for this species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,

Up to 0.05 ha of habitat suitable for *E. leuraensis* will be modified as part of the proposed works.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Critical habitat for this threatened species does not occur within the Project Areas.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

The Blue Mountains Water Skink (*Eulamprus leuraensis*) Recovery Plan (NPWS 2001) applies to this species. The proposed action is not consistent with the objective of the recovery plan due to potential degradation of the species' habitat; however, the limited modification and small extent of disturbance is not expected to impact the survival of the species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Giant Dragonfly (*Petalura gigantea*)

This species is found in permanent swamps and bogs with some water and open vegetation. This species is known to occur in Central Carne and in Gang Gang Swamp, which would be intersected by the proposed subsidence monitoring lines.

The Giant Dragonfly is known to construct burrows into the ground where it lays its eggs (oviposition) in the waterlogged substrate or under moist litter (Benson and Baird 2012). Burrow depth was recorded to range from 18 to 75 cm (Benson and Baird 2012), with some burrows showing evidence of adaptive burrow deepening by larvae of the species as a response to a lowering groundwater table.

- (a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.**

Subsidence lines X, GGSW, GGE and GG-Sup are proposed to traverse swamps known to provide potential habitat for this species. Installation and monitoring will involve trampling the swamps to access monitoring stations which will occur twice annually. Impacts are considered minor and are not expected to affect the overall integrity of the swamp. The installation of star pickets for stations will avoid potential crayfish holes and should not impact the species directly. Provided the recommendations above are adhered to the Project is unlikely to have an adverse effect on the lifecycle of this species such that a local population is likely to be placed at risk of extinction.

- (b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,**

The species does not constitute an endangered population and therefore the proposed action is not likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction.

- (c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:**
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction**

This is not applicable for this species.

(d) In relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed,

Approximately 0.05 ha of habitat suitable for *P. gigantea* will be modified as part of the proposed works.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

The area of habitat is not expected to become fragmented due to works as connectivity throughout the area will not be altered.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

Limited habitat will be modified as part of works. Suitable habitat exists immediately adjacent to the Project Areas. Habitat to be modified is not considered important for the long term survival of the species in the locality.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Critical habitat for this threatened species does not occur within the Project Areas.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan has not been developed for *P. gigantea*.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Key threatening processes relevant to the proposal have been discussed in the body of the report.

Attachment 2 EPBC Act Assessment of Significance

Blue Mountains Water Skink (*Eulamprus leuraensis*)

The Blue Mountains Water Skink (*Eulamprus leuraensis*) is listed as Endangered under the EPBC Act. It is restricted to areas of the Blue Mountains and Newnes Plateau in NSW. Thirty populations of the Blue Mountains Water Skink are known between Newnes and Hazelbrook in the Blue Mountains region. The species is restricted to isolated and naturally fragmented habitats of permanent sedge and shrub 'hanging' swamps. These develop at moderate to high-altitudes on sloping rock faces composed of Narrabeen sandstone (Wells and Wellington 1984). In the Blue Mountains, the skink has been found in dense clumps of swamp sedges or herbs (characterised by *Gymnoschoenus sphaerocephalus*, *Lepidosperma limicola* and *Xyris ustulata*) growing on peaty soils derived from sandstone.

The Blue Mountains Water Skink appears to prefer swamps that are permanently wet. On Newnes Plateau it has been found in Shrub Swamps bordering streams flowing over sandstone and surrounded by tall open forest.

Impact Assessment

(h) Lead to a long-term decrease in the size of a population;

Subsidence lines X, GGSW, GGE and GG-Sup are proposed to traverse swamps known to provide potential habitat for this species. Installation and monitoring will involve trampling the swamps to accessing monitoring stations which will occur twice annually. Impacts are considered minor and are not expected affect the overall integrity of the swamp nor impede the movement of *E. leuraensis*. The installation of star pickets for stations will be targeted to avoid potential refuge habitat and plants used by this species should not also be avoided. Consequently, the Project is unlikely to affect the lifecycle of the Blue Mountains Water Skink such that it will lead to a long-term decrease in the size of a population.

(i) Reduce the area of occupancy of the species;

Although areas of habitat for *E. leuraensis* may be modified by the action of trampling it has been observed by RPS that *E. leuraensis* occupies existing mammal tracks and as such is not expected that the area of occupancy for the species will be reduced.

(j) Fragment an existing population into two or more populations;

Although areas of habitat for *E. leuraensis* may be modified by the action of trampling it has been observed by RPS that *E. leuraensis* occupies existing mammal tracks and as such is not expected that the area of occupancy for the species will be reduced.

(k) Adversely affect habitat critical to the survival of a species;

All potential or known swamp habitats for Blue Mountains Water Skink can be regarded as critical to the survival of the species. No areas of critical habitat will be adversely affected such that it would compromise the survival of this species.

(l) Disrupt the breeding cycle of a population;

The minor predicted modification to potential habitats from subsidence line monitoring would not disrupt the breeding cycle of a population if present within the study area.

(m) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

The minor predicted modification to potential habitats from subsidence line monitoring would not decrease the availability or quality of habitat to the extent that the species is likely to decline.

(n) Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat;

The Project is unlikely to contribute to an increase in invasive species, such as foxes and cats, which may be harmful to this species.

(o) Introduce disease that may cause the species to decline; or

The Project is unlikely to introduce diseases that may cause this species to decline.

(p) Interfere with the recovery of the species.

The Project is unlikely to interfere with the recovery of the *E.leuraensis*.

Deane's Boronia (*Boronia deanei*)

Boronia deanei (Deane's Boronia) is listed as Vulnerable under the EPBC Act. It is a small erect shrub to 1.5 m tall typically found in high elevation areas of the Blue Mountains, north of Clarence and Kanangra-Boyd National Park, NSW. The species grows on the margins of high-altitude swamps, in wet heath on sandstone and in drier open forest.

Impact Assessment**(q) Lead to a long-term decrease in the size of an important population;**

The four individual *Boronia deanei* identified within the study area are outside of the line of sight for monitoring and are located approximately 5m away from the path used to access monitoring stations and as such will not be directly impacted through subsidence monitoring works. Additionally, these plants have been marked in order to avoid any potential impacts in the future. Consequently, the Project is unlikely to lead to a long term decrease in the size of an important population of *B. deanei*.

(r) Reduce the area of occupancy of an important population;

Less than 0.05 Ha of potential habitat not currently occupied by the species will be impacted by trampling effects during survey periods. Furthermore no important population of the species has been identified within the Project Area. If an important population is assumed present the Project is unlikely to reduce the area of occupancy provided the recommendations above are adhered to.

(s) Fragment an existing important population into two or more populations;

The impacts of the project are not likely to result in a fragmentation of the population.

(t) Adversely affect habitat critical to the survival of a species;

The predicted impact of less than 0.05ha of Temperate Highland Peat Swamps on Sandstone is unlikely to impact the potential survival of the species locally nor is it likely to have an impact on the species to colonise this site post monitoring.

(u) Disrupt the breeding cycle of an important population;

It is unlikely that the Project will disrupt the breeding cycle of a population of *B. deanei* as no individuals are being impacted, nor is the flow of genetic material being impeded.

(v) Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;

It is unlikely that the Project impacts will decrease the availability or quality of habitat to the extent that the species is likely to decline.

(w) Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;

The wash-down procedures which are recommended in this report are likely to mitigate any potential impacts associated with invasive weed species.

(x) Introduce disease that may cause the species to decline; or

The implementation of the wash-down procedures recommended in this report is likely to mitigate the introduction of diseases and as such the Project is unlikely to introduce diseases that may cause this species to decline.

(y) Interfere substantially with the recovery of the species.

The Project is unlikely to interfere with the recovery of *B. deanei*.

Temperate Highland Peat Swamps on Sandstone (THPSS)

The Study Area contains Temperate Highland Peat Swamps on Sandstone (THPSS) which is commensurate with the Newnes Plateau Shrub Swamp community under the TSC Act. THPSS is typically situated on peat substrates in drainage lines between open forested slopes and is dominated by shrubs such as *Epacris paludosa* (Swamp Epacris), *Grevillea acanthifolia* and occasional occurrences of *Leptospermum lanigerum* (Woolly Tea Tree) and *Baeckea diosmifolia* (Fringed Baeckea). Understorey vegetation is dominated by the sedges *Baumea rubiginosa* (Twig Rush), *Baloskion australe* and *Empodisma minus* and the fern *Gleichenia dicarpa* (Pouched Coral Fern).

Impact Assessment**(z) Reduce the extent of an ecological community**

Subsidence monitoring will occur twice a year involving two persons traversing through or around the swamp. This monitoring will involve Star pickets being driven to refusal

every 15m within the swamp boundaries. Existing animal tracks will be used where possible, otherwise the swamp will be walked around. These impacts are not expected to reduce the overall extent of the ecological community

(aa) Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;

The Project will not clear any areas of THPSS and therefore not cause fragmentation of this community.

(bb) Adversely affect habitat critical to the survival of an ecological community;

The project is expected to affect the habitat through tramping during biannual surveys. The impact of this action is not expected to be of a magnitude that it would affect habitat critical to the survival this EEC.

(cc) Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns;

The project is not expected to have any direct or indirect impacts upon the abiotic functions necessary for the survival of the EEC

(dd) Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting;

The project will not change the flora or fauna species composition of the THPSS.

(ee) Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

- **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
- **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**
- **Interfere with the recovery of an ecological community.**

The biannual Subsidence Line monitoring proposed will cause a minor reduction in the health of THPSS flora within the bounds of the mammal tracks necessary to conduct monitoring. However, provided the recommendations above are adhered to these impacts are not likely to cause a substantial reduction in the quality or integrity of the EEC.