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Memorandum

То	Patrick Atkinson	From	Corey Roderick / Chris Schell			
Сору	Adam Yem, Morag Elliott	Reference	247/103-008			
Date	24 February 2017	Pages (including this page)	7			
Subject	Assessment of proposed amen Revegetation Plan	dments to the Ellen	dale Rehabilitation and			

Patrick,

This memorandum details the findings of Aurecon's assessment of the amendments to the Ellendale Rehabilitation and Revegetation Plan (for the development previously known as the Cedar Woods Development) made by on behalf of the proponent (Cedar Woods Properties Limited) on the 8th February 2017. This assessment was undertaken with the view to determine if the intent of Condition 8 of the Ministerial approval has been achieved.

Specifically within Condition 8 (Rehabilitation Plan), point (v) states:

"Bushland restoration works to target areas that are currently deficient of an existing vegetation structure and floristic composition and will ultimately aim to achieve vegetation structure and floristic composition that is commensurate with the regional ecosystem identified on the site. Alternative regional ecosystems may be appropriate for areas with landforms influenced by unnatural levels or soil moisture or altered landform."

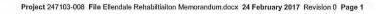
It is understood that amendments to the previous Ellendale Rehabilitation and Revegetation Plan were made on behalf of the proponent in order to alleviate issues associated with potential bushfire hazard ratings associated with the proposed vegetation communities, with the updated Rehabilitation Plan significantly reducing these risks.

1 Methodology followed

In order to determine if the intent of Condition 8 of the Ministerial decision has been achieved, Aurecon undertook an assessment of the original *Rehabilitation and Revegetation Plan* prepared by 28 South Environmental for Cedar Woods Properties Limited (dated Monday 21 September 2015 and referred to in the development approval dated 15th January 2016), and compared this to the updated Rehabilitation and Revegetation Plan titled *Cedar Woods Regional Ecosystem* prepared by Land Partners (plan number WC006686.000-015) on the 8th February 2017 for Cedar Woods Properties Limited.

Specifically, the following comparisons were undertaken in relation to the Category 3 Corridors as identified in the Infrastructure Agreement for the development:

- Comparisons of the Regional Ecosystem (RE) codes used for rehabilitation purposes detailed in the Rehabilitation and Revegetation Plans
- Comparisons of the habitat differences between the RE codes detailed in the Rehabilitation and Revegetation Plans
- c. Determination of whether any changes are "commensurate" of the RE codes for the development
- d. Assessment of whether any changes will fulfil an ecosystem function role for the development.





In addition to the consideration of ecological matters relating to the proposed updated Rehabilitation and Revegetation Plan, an assessment has also been undertaken to confirm whether proposed changes to vegetation types for the development will materially impact on the stormwater function of the Category 3 corridors, and therefore compliance with the conditions of the Ministerial decision.

2 Findings

Ecology assessment

Assessment of the original Rehabilitation and Revegetation Plan indicates that within Category 3 Corridors three (3) REs were proposed (ie RE 12.3.2, RE 12.3.7 and RE 12.11.3). By comparison, these areas have now, as part of the updated Rehabilitation and Revegetation Plan, been amended to reflect five (5) REs (ie RE 12.3.7, RE 12.3.7b, RE 12.3.16, RE 12.11.3a and RE 12.11.25). In addition to these REs, several additional "non-remnant" treatments are proposed (ie. Low grass or tree Cover in rural areas, Low grass or tree Cover in built-up areas and Low grass or tree Cover in built up areas – Fig treatment).

A summary of the original RE code proposed for revegetation and the updated RE codes/treatments is provided in **Table 1** attached with this memorandum.

Comparison of the two Rehabilitation and Revegetation Plans indicates that reduction in the fire risk/frequency of burns has occurred as a result of the modified RE codes (refer to "fire management guidelines" within Table 1). In addition it is also noted that the updated RE codes, with the addition of "Fig treatments", provide increased habitat opportunities for fauna when areas are fully restored (eg Wetland REs, increased availability of food and structurally diverse ecosystems). Furthermore, the additional REs contained within the updated Rehabilitation and Revegetation Plan are known to support conservation significant species (ie Coxeris Fig Parrot (*Cyclopsitta diophthalma coxeni*), Native Jute (*Corchorus cunninghamii*), *Macadamia* spp. and Native Milk-vine (*Marsdenia* spp.). The greater diversity of habitats and vegetation structure is likely to result in an increased ecosystem role for the development.

It is considered from this assessment that although some of the amendments in the updated Rehabilitation and Revegetation Plan are not analogous to the original Plan or REs present on site, the proposed RE changes are likely to result in the following benefits:

- An increased ecosystem function role for the development
- Reduction in potential bushfire hazard ratings
- Vegetation that is structurally similar to the REs proposed by the original Rehabilitation and Revegetation Plan
- Provision of a diversity of habitats capable of supporting conservation significant species
- Provision of continuous rehabilitation zones that will facilitate fauna movement through the development

It is therefore considered that, from this assessment of the updated Rehabilitation and Revegetation Plan, the proposed REs generally correspond to the REs identified on the site in relation to vegetation structure and general species diversity. In addition, alternative REs have been proposed where landforms/landzones dictate a more appropriate RE.

Project 247103-008 File Ellendale Rehabiltiailon Memorandum.docx 24 February 2017 Revision 0 Page 2



Stormwater Assessment

Vegetation has the potential to impact upon flooding, as denser vegetation has the ability to siew down flood waters and therefore increase flood levels. Aurecon have reviewed the proposed change in vegetation densities at elevations which are potentially impacted by flooding. This review shows that no changes are proposed to the vegetation types in the immediate vicinity of the flow paths.

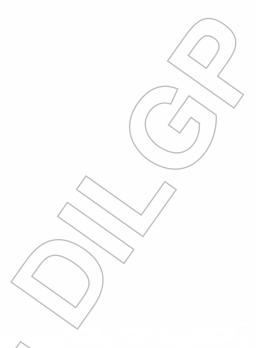
There are some changes in vegetation density proposed in areas not directly connected to the flow paths, which may increase flood levels a small (presently unquantified) amount. Calibre undertook a sensitivity analysis as part of their original assessment, which showed that if vegetation densities were significantly increased, the minimum development levels would still maintain adequate freeboard. For this reason it is expected that a small increase in flood levels would not impact upon the flood immunity or freeboard of the development and it is not considered necessary to quantify any increase in flood levels.

Overall, Calibre's assessment that "there will be no material change to the outcomes of the flood investigation as a result of the updated vegetation rehabilitation plan" is consistent with the outcomes Aurecon's review.

3 Conclusion

Aurecon's assessment of the updated Ellendale Rehabilitation and Revegetation Plan has found that the proposed changes to vegetation types and densities within the Category 3 corridors will maintain the intent of the original rehabilitation strategy and will not materially impact on the stormwater function of the corridors. Accordingly, it is considered that the updated Ellendale Rehabilitation and Revegetation Plan is consistent with the conditions of the Ministerial decision, and specifically with the intent of Condition 8 (Rehabilitation Plan).





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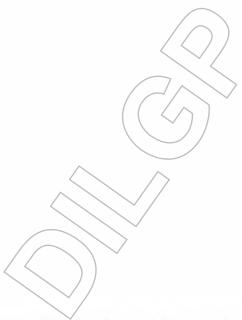
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Memorandum

Original Rehabilitation Units			Amended Rehabilitation Units				Differences	Summary of benefits/detractions as a	
RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	between proposed REs	result of the proposed changes
Category 3	Corridors					[]			
12.3.7	Narrow fringing woodland of Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +I-Melaleuca viminalis, Waterhousea floribunda. Other species associated with this RE include Melaleuca bracteata, M. trichostachya, M. linariilolia and M. fluviatilis in north of bioregion. Lomandra hystrix often present in stream beds. Occurs on fringing levees and banks of rivers and drainage lines of alluviat plains.	Provides habitat for Koala (Koala food trees present) Acts as a fauna conduit along riparian corridors	STRATEGY: Avoid intentionally burning this fringe vegetation. Burn surrounding ecosystems in conditions that would minimise fire incursion.	12.3.7b	Narrow fringing woodland of Eucalyptus tereticomis, Casuarina cunninghamiana subsp. cultura subsp. cunninghamiana subsp. cultura subsp. c	Provides habitat for Koala (Koala food trees present) Acts as a fauna condett along riparian corridors Provides habitat for wetland species	STRATEGY: Avoid intentionally burning this fringe vegetation. Burn surrounding ecosystems in conditions that would minimise fire incursion.	No difference – Same RE Welland associated community	Overall the amendment to the RE provides additional habitat in the form of wetland communities and maintains the intent of this original rehabilitation strategy. The change is considered to be commensurate in relation to vegetation communities on site. No change in fire management
12.3.2	throughout the region Eucalyptus grandis +I- E. microcorys, Lophostemon confertus tall open forest with vine forest understorey (Wet sclerophyll'). Patches of Eucalyptus pitularis sometimes present especially in vicinity of sedimentary rocks	Acts as a fauna conduit along riparian corridors Habitat for threatened flora species including Marsdenia longiloba and near	SEASON: Late summer to autumn INTENSITY: Moderate to high INTERVAL: Minimum 20 years, maxinum usknown,	12.11.3a	Lophosterion confertus +/- Eucalyplus microcorys, E. carnea, E. propinqua, E. major, E. siderophloia woo'dland. Occurs in gullies and exposed ridges of Palaeozoic and older moderately to strongly deformed and metamorphosed sediments and interbedded volcanics	Acts as a fauna conduit along riparian corridors Habitat for threatened flora species including Marsdenia longilloba and near threatened species including Liparis simmondsii.	SEASON: Late summer to autumn. INTENSITY: Moderate to high. INTERVAL: Minimum 20 years, maximum unknown, requiring further research.	Different landzones Absence of Eucalyptus grandis (Flooded Gum) RE 12.113a represents onsite vegetation	When compared to the original RE, the proposed REs vary significantly in relation to landzone, canopy cover (le Vine forest, Tall open forest, open forest and woodland and habitat that they would provide to flora and fauna. However, the proposed REs do reflect vegetation and landscape features that are currently present on site (le wetland areas,

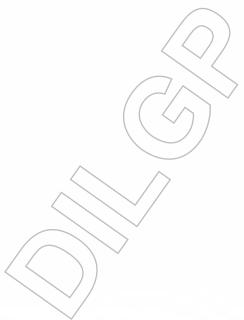
Project 247/03-008 File Ellendale Rehabitisten Memorandum door 24 February 2017 Revision 0 Page 4



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Original Rehabilitation Units				Amended Rehabilitation Units				Differences	Summary of benefits/detractions as a
RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	between proposed REs	result of the proposed changes
	Fringing streams and in narrow guillies in high rainfall areas thigh rainfall areas simmondsii Provides habitat for Kosla (Kosla food trees present)	species	requiring further research			Provides food resources for Koalas			presence of Corymbia henryi and existing landzones [ie Land zone 11]).
		Liparis simmondsii Provides habitat for Koala (Koala food trees		12.3.16	Complex notophyll to microphyll vine forest on alluvial plains	Habilat for threatened flora species including Xanihostemen oppositiolius, Fentainea rostrala, Macadamia integrifolia and M. ternifolia. Habilat for threatened fauna species including Coxon's Fig Parrot (Cyclopsitta diophthalma coxon) and the Richmond Birdwing Butterfly (Ornithoptera richmondia) Important for fruiteating birds, many of which migrate	STRATEGY: Avoid intentionally burning this community	Community generally lacks Myrtaceous species (Eg. Eucalyptus, Lophostemon, Corymbia and Melaleuca)	In relation for flora and fauna habitat values, the proposed REs are likely to provide a greater diversity of fauna habitat values and an increase in food availability to frugivorous (ie fruit -ealing) species (ie Flying foxes, possums, parrots and native pigeons) as a result of incorporating native Fig species into the rehabilitation area. In relation to fire management strategies, the proposed amendments to the rehabilitation REs would result in a reduce fire risk overall.
				12.11.25	Corymbia henryi andlor Eucalyptus	seasonally from upland to lowland rainforest Habitat for	SEASON: Summer	Landzone,	
		E. cemea, E. tind meiamorphics H- volcanics 12.3.7b Melateuca bracte emergent Eucally	fibrosa subsp. fibrosa +/- E. crebra, E. cemea, E. tindaliae woodland on maiamorphics +/- interbedded volcanics	threatened flora species including Sophora fraseri Provides food resources for Koala	INTENSITY: Low to moderate dominated Eucalypts species off	community dominated by Eucalypts species other than E. grandis			
				12.3.7b	Melaleuca bracteata open forest +/- emergent Eucalypts tereticomis. Occurs in drainage depressions on	Provides habital for small insectivorous birds such	STRATEGY: Avoid intentionally burning this community	Absence of E. grandis and vine forest understory and presence of	

Project 247103-003 File Elendaio Robabiliation Momorandum door 24 February 2017 Revision 0 Page



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Original Rehabilitation Units				Amended Rehabilitation Units				Differences	Summary of benefits/detractions as a	
RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	between proposed REs	result of the proposed changes	
	1	The state of the s			Quaternary alluvial plains. Riverine wetland or fringing riverine wetland.			emergent E. terelicornis and M. bracleata		
				Low grass or tree Cover in built up areas - Fig treatment	Non-remnant, N/A	Figs will provide a valuable food source for vagile frugiverous species such as Flying Fox (Pterorus spe).	N/A	Non-remnant area		
		P		Low grass or tree Cover in built up areas	Non-remnant, N/A	Open a eas will provide nabitat for grassland species, the inclusion of trees will provide cover for insectivorous birds.	N/A	Non-remnant area		
12.11.3	intermedia, E. Marsdenia biturbinata, E. coronata, and acmenoides, E. Sophora tereticornis, E. fraseri and moluccana, near	siderophloia and E. propinqua open forest flora incluing the from the flora incluing the	threatened flora species including Corchorus cunninghamii, Marsdenia coronata, and Sophora fraseri and	SEASON: Summer to winter INTENSITY: Plan for low to moderate Unplanned occasional high intensity wildfire will occur.	12.11.25	Corymbia henryl andlor Euselyptus fibrosa subso, fibrosa +F E. crebra, E. camea, E. indalijee woodland on metamorphics +F interbedded volcanics	Habitat for threatened flora species including Sophora fraseri Provides food resources for Koala	SEASON: Summer to winter INTENSITY: Low to moderate INTERVAL: 4-25 years	Corymbia henryi is the dominant species - Reflect species identified on site. Presence of E. fibrosa in RE12.11.25. Absence of vine forest understory	When compared to original RE, the proposed REs have a reduced fire risk (ie burn intervals are greater). Although RE 12.11.3a is considered analogous to RE 12.11.3 in relation to vegetation management status, dominant species within these two communities differ, with RE 12.11.3a being typical of gullies and areas of higher moisture. The proposed REs are characterised as Woodland', and the original RE is
	Syncarpia verecunda with vine forest species and E. grandis or E. saligna In guillies. Eucalyptus pilularis and E. tindaliae sometimes present. Occurs predominantly on hills and ranges of Palaeozolic and older moderately to	species including Acomis acome Provides habitat for Koala (Koala food trees present)	years maintains a healthy grassy system. 8-20 years fo shrubby elements of understorey	12.11.3a	Lopins lemor confertus +1- Eucalyptus microcorys, E. camea, E. propingus, E. major, E. siderophloia woodland. Occurs in gullies and expised ridges of Palaeozoic and older moderately to strongly seformed and metamorphosed sediments and interbedded volcanics	Acts as a fauna conduit along riparian corridors Habitat for threatened flora species including Marsdenia konglioba and near threatened species including Liparis simmondsii	SEASON: Late summer to autumn INTENSITY: Moderate to high INTERVAL: Minimum 20 years, maximum unknown, requiring further research	Dominated by L. confertus, with lesser quantitles of Eucalyptus species. Community typical of gullies.	categorised as "Open Forest" therefore plantling densities would be slightly reduced as a result of the proposed changes.	

Project 247103-003 File Elendale Rehabituation Memorandum.docx 24 February 2017 Revision 0 Page



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Original Rehabilitation Units				Amended Rehabilitation Units				Differences between	Summary of benefits/detractions as a result of the proposed changes
RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	RE proposed	Description (REDD)	Habitat features	Fire Management Guidelines (REDD)	proposed REs	result of the proposed smallges
	strongly deformed and metamorphosed sediments and interbedded volcanics.			Low grass or tree Cover in rural areas	Non-remnant, N/A	Open areas will provide habitat for grass and species, the inclusion of trees will provide cover for insectivorous birds.	N/A	Non-remnant area	
				Low grass or tree Cover in built up areas	Non-remnant, N/A	Open areas will previde habitat for grassiand species, the inclusion of trees will provide cover for insectivorous birds.	N/A	Non-remnant area	

