NORTHERN PIPELINE INTERCONNECTOR

NORTHERN SECTION (NORTH OF NOBELS ROAD)

ASSESSMENT OF IMPACTS ON FLORA

Frontispiece: Recycled Water Pipeline being instated amongst powerlines between Swanbank Power Station and Bundamba Water Treatment Plant.

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INTRODUCTION

Due to on-going water supply issues across large parts of South-East Queensland, a series of pipelines are proposed to connect a regional water grid. One component of these proposed pipelines is the Northern Pipeline Interconnector. The present survey was conducted along that part of the proposed alignment between the southern boundary of Maroochy Shire in the north (Nobels Road, Eudlo) and Lake MacDonald (Noosa Shire) in the north.

Many sections of the preferred pipeline alignment follow existing powerline corridors or other easements. The feasibility of constructing pipelines within these existing corridors is well illustrated by associated pipeline constructions elsewhere in South-East Queensland (See Frontispiece). There are many areas traversed by the proposed alignment that contain little of flora significance or value as they have long been cleared for agriculture and increasingly converted to urban settlement.

Despite the degraded nature of much of the alignment, the inherent biodiversity values of South-East Queensland, and the north coast region in particular, there is a high probability of encounter of substantive flora values in any remnant or regrowth vegetation along the proposed pipeline alignment. This study concentrated on those parts of the alignment with the highest probability of occurrence of those flora values. In some instances, cleared agricultural lands still had some potential of occurrence of rare and threatened flora in narrow vestiges of vegetation retained around cultivated areas. These were also intensively sampled to ensure that any potential flora values of significance have been adequately considered with respect to the proposed pipeline.

METHODOLOGY

The focus of this report is the extant flora likely to be affected by the preferred route option. The data contained herein can provide decision-makers with some of the material to gauge the environmental impact upon the flora along the alignment of the preferred pipeline route option. Conclusions as to the most preferable options to minimise or mitigate the environmental impact upon known or likely flora values recognised from within this corridor will be detailed along with assessments of some limited alternative alignments.

Further study requirements will be proposed for the preferred option to ensure that all prudent and feasible considerations will be incorporated into the future design, survey, construction and operation phases of the ultimate alignment. Published topographic maps and the supplied locality maps and aerial photography were utilised for location purposes in the field. Analysis of Herbrecs data on collection records of rare and threatened flora purchased from the Queensland Herbarium provided a primary data source for these taxa. This information was enhanced by field inspection along the entirety of the proposed route.

Standard references relevant to the study area or region that have been employed for the taxa listed in this report are as follows: Queensland Herbarium, 1997; Royal Botanic Gardens, 1993; Sharpe, 1986; Simon, 1993; and, Stanley & Ross, 1983. Further nomenclatural changes have been incorporated via regular, personal communication with staff at the Queensland Herbarium. As there is no standard or commonly and universally accepted reference work for plant common names, all taxa mentioned in this report will be referred simply by their published scientific names.

The standard methodology of aerial photographic interpretation (API) of the nature, displacement and extent of the vegetation mosaic was undertaken with a subsequent selection process designed to facilitate efficient field sampling of the variation observed during the API procedures. The alignment was broken down into a number of defined segments (See Table 3 below) and with a number of photographs taken of diagnostic elements of the vegetation and significant sites (See appended Photographic Plates).
A series of vehicle based and foot traverses were undertaken to determine the field discernible variation in the vegetation mosaic. Considerable time was allocated to foot traverses, as much of the site was inaccessible to vehicles. Steep terrain and dense infestations of *Lantana camara* in some places made both positional location in the field

and access difficult. All areas (except the most inaccessible due to steep ground or impenetrable *Lantana camara* thickets) of remnant vegetation were traversed on foot, as were most regrowth areas and agricultural landscapes traversed accessing these areas. Rural landscapes were mainly surveyed from the vehicle, except where potential occurrences of rare and threatened flora called for a more careful examination where foot traverses were also employed.

DESCRIPTION OF THE STUDY AREA

It should be noted that a primary tenet of these discussions and analyses is that **ALL VIABLE REMNANT NATIVE VEGETATION IN THIS REGION IS SIGNIFICANT**, regardless of status, tenure or condition. The reduction in vegetative cover in Southeast Queensland since European settlement has conferred significant values to all remaining patches of remnant native vegetation. This is reinforced even more if the remaining patch/patches are still viable entities with self-maintaining ecological processes and functions and biotic components. Some of the remnant native vegetation mosaic exists as a series of large viable patches of diverse natural habitat. This is not to say that all of the former elements are currently in that state. There should be assurances that this regional and national biotic resource be retained for future generations. This matter requires attention if the substantial biotic resources of this area are not to be eroded further and aspects of the landscape suffer irrevocable losses.

Given the substantial losses incurred of many unique (in local, regional and national contexts) biological assets and the immense pressure exerted by anthropogenic influences on the often vestigial remnants of the former mosaic of this area, it is essential that adequate safeguards are put in place to protect and enhance the most significant aspects of these community assets. Empowerment of the community (both locally and regionally) through knowledge, education and involvement is the only mechanism that can practically provide adequate and appropriate solutions. Any attempts at retaining remnant native vegetation in the landscape ultimately falls within the realm of community understanding and desire driving the political process that has the mechanisms and capacity to implement and encourage appropriate land use.

The study area lies on the coastal plain and adjoining foothills to the east of coastal hills and ranges in Maroochy Shire and Noosa Shire. The southern end of the study area is Nobels Road, Eudlo in Maroochy Shire with the northern extent defined by the artificial water impoundment of Lake MacDonald in Noosa Shire. All of the drainage from the study area flows east via a number of major regional waterways such as the Maroochy and Mooloola Rivers into the Coral Sea on the eastern seaboard of South-East Queensland.

The alignment follows existing powerlines in many sections, with one alternative alignment surveyed (i.e. north of Maroochydore Road) along with an offshoot section link west to the

Image Flat Treatment Facility. The preferred route traverses a number of local roads and these provided access to many sections of the alignment. The landscapes of the alignment are varied, but several crossings of a number of locally and regionally significant waterways (Six Mile, Caboolture, Eudlo (several times), Paynter, Brown, Rocky and Tucker's Creeks and the Maroochy River and its tributaries) are proposed. These areas require care in the selection of the preferred route and during pipeline construction. Eudlo Creek's riparian vine forest requires particular care and attention with the final alignment selection and works in its vicinity. The elevated nutrient and water availability in such landscapes may provide enhanced opportunities for the establishment and proliferation of weeds in the disturbed areas following pipeline instatement.

A mix of urban, rural residential and rural lands dominates a large proportion of the lands that are traversed by the proposed pipeline alignment. Various industrial works (e.g. in the Nambour section) abut parts of the study area. This pattern is rapidly changing with a greater proportion of the area being occupied by more dense urban settlement of rural residential and low-density urban housing replacing the previously rural dominated matrix.

The topography is varied with the slopes of foothills of the coastal mountains retaining some of the more significant tracts of remnant native vegetation containing known concentrations of rare and threatened flora. The mosaic of the remainder of the study area contains many clearings and areas of regrowth forest with copses of remnant native vegetation embedded within this complex of landscapes. Fire, weeds and land clearance continue to erode the scattered remnants in this area and threaten the viability and integrity of all remnant bushland in this region. Part of the proposed route will traverse some steeper slopes with level or gently undulating lands traversed by the majority of the route along the coastal plains. Thus, rates of runoff and potential for erosion with consequent sedimentation and pollution of the waterways is an issue for construction activities of any kind in those sections proximal to waterways or on steeper sites.

Photo-mosaics of the entire route provided by the Southern Regional Water Pipeline Alliance proved to be the most effective for field location and delineation of the road alignment segments indicated on the accompanying GIS.

A number of previous studies have incorporated assessment of the native vegetation of this region within their boundaries (e.g. Elsol & Sattler, 1979; Batianoff & Elsol, 1989;

LAMR, 1992, 1993. 1995 and 1998). Whilst a number of products have developed from these studies, including GIS based vegetation maps for the local authorities, the current certified mapping (Version 5.0) remains the statutory tool relevant to the *Vegetation Management Act 1999* that determines the nature and extent of mappable remnant vegetation along the proposed pipeline alignment. The scale of field survey was able to detect finer scales of resolution than was practicable for the depiction and scale of the certified mapping layer. Scale factors account for the refinements possible for some sites/areas surveyed and detailed herein within the current study. The discrepancies between the two products are scale related and the current certified mapping should be the driver when legislative considerations relative to the *Vegetation Management Act 1999* are to be considered with respect to the statutory agencies.

DEFINITIONS APPLIED TO STUDY

Copses of scattered trees in paddocks, thickets of secondary vegetation (e.g. *Lantana camara*) and other vegetation not considered to be remnant native vegetation that may still provide useful fauna habitat have not been incorporated into the analyses presented in this report. Tree hollows and other habitat features of significance to fauna have, therefore, been excluded from this study if they did not fall within the definition given below for remnant native vegetation. This does not imply stasis for future assessments as these remnants or secondary communities may well develop remnant native vegetation characteristics subsequently or be enveloped by expanding areas of regenerating native vegetation.

Much of the variation in local vegetation patterns observable with casual foot traverses of remnant native landscapes cannot be mapped at a regional mapping scale of 1:50,000. It is only with finer scales of resolution that some of these variations are discernible. This is certainly the case with the current study area where linear remnants of riparian vegetation are rarely extensive enough to map at a scale of 1:50,000, but can be clearly delineated at the scale of mapping for this study (1:10,000). As with all field-based exercises, resources and logistics are often major constraints that ultimately have a stronger influence over the final products and their information content than technical issues.

Associated with the aforementioned difficulties is the pragmatic issue of what precisely constitutes a map unit. Various schemata have been devised within Australia and

overseas to describe vegetation based upon vegetation structure, floristics or a combination of both. Experience with local government needs has lead LAMR to the firm conclusion that a floristic assessment related to landscape pattern and management demands best suit the vegetation mapping projects undertaken over many years. This approach is not directly compatible with some other schemata. For instance, present bioregional ecosystem mapping (Young & Dilleward, 1999) that forms the basis of the current certified mapping relies upon landform and geology – the land zone – as primary determinants of pattern. The available scale of geological mapping is often too coarse a scale as overestimates of the extent of land zone 3 (alluvium) and underestimates of adjoining landscapes (e.g. land zone 5) is apparent in some areas.

This situation is further exacerbated where a number of regional ecosystems are represented that could not be differentiated on the ground as discernible entities with clear boundaries. This issue also presents a similar problem with internal delineation. Interpolation of criteria such as geology or topography is not suitable in many instances due to the inadequacy of much of the available data e.g. scale inappropriate data or incompatible products. It is not practicable to resolve these issues herein as it lies outside the scope of this project, but it would be useful for all map products to detail the various caveats and constraints on interpretation so that misinterpretation by other stakeholders occurs less frequently than at present.

It should also be noted that vegetation boundaries are neither static nor clearly differentiable or evident entities in the field. Implicit in any vegetation-mapping program is the delineation of differentiable vegetation units. This is a purely artificial imposition on a highly dynamic and complex system. It is simply not feasible to adequately or appropriately define variations in the remnant native vegetation mosaic within the confines of rigid mapping demands. Thus, it is critical that any vegetation mapping be interpreted as an artificial delineation and determination of boundaries within a variable natural matrix. The difference between closely associated entities may be impossible to define either spatially on a hardcopy map product or via an expedient and readily interpretable report structure.

Essential to the understanding of vegetation mapping exercises is the knowledge that biologically untenable definition constraints have been imposed upon natural ecosystems that are neither segregated biologically or spatially from each other. This is specifically problematic when related units are contiguous (as they often are in the field) and the

various requirements of a particular mapping exercise require delineation of the two entities. It may be feasible to clearly recognise any specific vegetation unit when standing in the core of a “typical” area of any unit, but this clarity rapidly dissipates as boundaries with other units are approached or less obvious variants of the unit are encountered. This matter cannot be resolved without equally unrealistic definition of a plethora of vegetation units. Resulting management of the mosaic would be impossible as the large number of units (without any means of effectively defining their individual characteristics or boundaries) ensure a lack of practical utility.

In several instances, despite the finer scale of resolution (1:10,000) than earlier vegetation mapping of this area, it has not been possible to ascribe some patches of remnant native vegetation to a single regional ecosystem. In these cases, a heterogeneous polygon has been employed to describe the plant cover within that site with an approximation made of the relative (proportional) contribution each makes to the total area of the respective polygons. Again, the intimate relationship between some units is evident if these heterogeneous polygons are reviewed. Some combinations are highly improbable and do not appear in the compiled data set. Other associations of units occur more regularly and their total area can be substantial. These latter occurrences can also be an artefact of the inability of an artificially imposed schemata being applied to natural systems that are not readily discernible as distinct vegetation units as required by a mapping exercise. This issue is beyond the capacity of this project to resolve and remains the major constraint on the utility of vegetation mapping products to our understanding of the interrelationships between the dynamic elements comprising the observable mosaic of our natural landscapes.

Despite these important caveats and constraints on this and other vegetation mapping exercises, the products do provide useful land management tools for landholders, statutory authorities and other stakeholders. Specifically, it is possible to gauge the extent, displacement and frequency of occurrence of the albeit artificially defined units. This allows for comparisons with extrapolations back in time to assess loss rates of the respective vegetation units and to determine the rarity of the extant communities and their component biota, some of which may, in themselves, have a designated rare and threatened status. These tools can provide a means for future review of our stewardship of the landscape and the viability and integrity of the patches of remnant native vegetation delineated in these “snapshot” studies.

NOTEWORTHY FLORA

Only species supported by published data or Herbrecs specimen based records at the Queensland Herbarium have been listed in the following discussion. The substantial number of noteworthy flora in the region supports the values that have been attributed to the conservation significance of some elements of the landscape. Many of the species listed below may be naturally spatially restricted and present at low population densities. The following listing of taxa is based upon Herbarium records from this region (although not necessarily from the confines of the study area). Several species recorded from the region have been excluded on the basis of habitat or altitudinal limits suggesting that they have little, if any, probability of occurring within the study area.

Species are ascribed to categories according to their conservation status as given by their respective listing on Schedules 1 (Presumed Extinct), 2 (Endangered), 3 (Vulnerable), 4 (Rare) within the *Schedules 1994 of the Nature Conservation Act 1992*. Complementary listing of presumed extinct, endangered and vulnerable flora (Schedules 2, 3 and 4) occurs within the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. There have been several changes to the Schedules of the *Nature Conservation Act 1992* and these have not been fully translated to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* schedules. In these instances, the updates to the *Nature Conservation Act 1992* will take precedence.

Each of these categories has associated management intent prescribed in the relevant sections of the respective Acts that should be referred to if the final alignment is likely to impact upon any individuals/populations of the species listed below in Table 1. These lists should not be considered comprehensive as they are only based on collections lodged at the Queensland Herbarium and entered onto their database, Herbrecs and other data sources.

There are numerous taxa found within the study area that could be inferred to be of significance. For this study, the species discussed in the following section are restricted to those listed under the *Schedules of the Nature Conservation (Wildlife) Regulations 1994 SL No. 473 and 474* of the *Nature Conservation Act 1992*; Schedule 2 – Endangered Taxa, Schedule 3 – Vulnerable Taxa, and, Schedule 4 – Rare Taxa. Several species of flora of commercial significance are also listed under Schedules 5 and 12 (Common (SL

No. 474) and Restricted (SL No. 473) Wildlife respectively), but these are not considered further in this report, although some species such as *Xanthorrhoea* spp. and *Cymbidium* spp. may be under some pressure due to illegal collection from the wild. Several are also listed under the complementary *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth Government).

Table 1. Species recorded from the study region and with some potential of occurrence within the study area.

Schedule 2 (Endangered Flora)

Graptophyllum reticulatum, Liliaeopsis brisbanica, Phaius australis, Phaius tancarvilleae, Plectranthus torrenticola, Pouteria eerwah and *Triunia robusta.*

Schedule 3 (Vulnerable Flora)

Acacia attenuata, Arthraxon hispidus, Cryptocarya foetida, Floydia praealta, Gossia inophloia, Gossia punctata, *Macadamia integrifolia, Macadamia ternifolia, Marsdenia coronata, Romnalda strobilacea, Syzygium hodgkinsoniae, Thesium australe* and *Xanthostemon oppositifolius.*

Schedule 4 (Rare Flora)

Acianthus amplexicaulis, Alyxia magnifolia, Aponogeton elongatus, Choricarpia subargentea, Corynocarpus rupestris ssp. *arborescens, Eulophia bicallosa, Lenwebbia* sp. (Blackall Range P. R. Sharpe 5387), *Lepiderema pulchella, Nothoalsomitra suberosa, Papillilabium beckleri* and *Symplocos harroldii*.

Whilst this suite of species may be found across the entire suite of vegetation observed within the study area, the riparian vine forests are the sites most likely to contain these listed taxa, with only a few recorded from the associated eucalypt forests and woodlands.

Only two (3) taxa were observed along the proposed pipeline alignment (*Alyxia magnifolia, Symplocos harroldii* and *Xanthostemon oppositifolius*), although several others occur in close proximity (e.g. *Triunia robusta* on the North Maroochy River and *Syzygium hodgkinsoniae* on Eudlo Creek). Eudlo Creek is the recorded locality of several rare and threatened taxa in association with the fringing vine forests. Both *Alyxia magnifolia* and *Symplocos harroldii* are listed as Rare under the *Schedules of the Nature Conservation (Wildlife) Regulations 1994 SL No. 473 and 474* of the *Nature Conservation Act 1992* –

Schedule 4. *Xanthostemon oppositifolius* is listed as Vulnerable under the *Schedules of the Nature Conservation (Wildlife) Regulations 1994 SL No. 473 and 474* of the *Nature Conservation Act 1992* – Schedule 3. All of these rare and threatened plants were observed within the Six Mile Creek catchment as several localities. *Xanthostemon oppositifolius* is listed complimentarily as a Vulnerable plant on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* schedules.

Symplocos harroldii is found in association with *Xanthostemon oppositifolius* in the vine forest patch along one of the tributaries of Six Mile Creek (Segment 404, Photographs 28 and 29). *Symplocos harroldii* is a subcanopy tall shrub whereas *Xanthostemon oppositifolius* can attain canopy stature in places. Both species have a restricted distribution and are found in vine forest associations along waterways and adjacent floodplains. *Xanthostemon oppositifolius* is also found along most reaches of Six Mile Creek and its tributaries (Segments 404, 405, 406, 407, 408, 410, 411, 413 and 417, Photographs 23 - 29). These populations could be avoided (if the alignment of the pipeline were varied in places and works restricted to the minimum width practicable when traversing Six Mile Creek and its tributaries). These taxa could be utilised in rehabilitation work on the flanks of the waterway on which it occurs.

Alyxia magnifolia was only observed adjacent to the alignment in south of the Tewantin Road (Segment 393 and Photographs 30 and 31) either side of the powerline clearing. It is an understorey woody shrub within the regrowth vine forest and as an understorey element. It is considered that no disturbance should occur proximal to this population or its associated habitat.

REGIONAL ECOSYSTEMS

The following discussion of vegetation types will refer to both the regional ecosystem classifications as utilised by Young and Dilleward (1999) and Young *et al*. (1999) in Sattler and Williams (1999) and their status ascribed under the *Vegetation Management Act 1999*. The Regional Ecosystems observed for the study area (1:10,000) are tabulated below in Table 2. The short description and status for each is that current within Version 5.0 of the REDD (Regional Ecosystem Digital Database on the Queensland Herbarium website).

Table 2 – Status of Regional Ecosystems mapped within the study area.

Floristic and Geological Association	**Regional Ecosystem**	**Status (*Vegetation Management Act 1999*)**
Gallery rainforest (notophyll vine forest) on alluvial plains	12.3.1	**Endangered**
Eucalyptus grandis tall open forest on alluvial plains	12.3.2	*Of Concern*
Melaleuca quinquenervia open forest on coastal alluvium	12.3.5	No Concern At Present
Eucalyptus siderophloia, E. tereticornis, Corymbia intermedia open forest on alluvial plains usually near coast	12.3.11	*Of Concern*
Eucalyptus pilularis tall open forest on sedimentary rocks	12.9-10.14	No Concern At Present
Open forest complex often with *Eucalyptus acmenoides, E. major, E. siderophloia* ± *Corymbia citriodora* on sedimentary rocks	12.9-10.17	No Concern At Present
Eucalyptus siderophloia, E. propinqua, E. acmenoides open forest on near coastal hills on Mesozoic to Proterozoic igneous rocks	12.12.15	No Concern At Present

The regional ecosystems observed in the study area conform to a number of recognised bioregional ecosystems as defined by Young and Dilleward (1999). Their spatial displacement is further defined by the descriptions of the segments digitised along the pipeline alignment as detailed in Table 3 below. The segment numbers are sequential to those assigned to the section of the pipeline alignment south of Nobels Road surveyed previously.

The data presented in Table 3 illustrates the distribution of these regional ecosystems and other noteworthy features along segments of the pipeline alignment. Floristic surveys were conducted in order to allocate the various remnant vegetation patches traversed by the proposed route to regional ecosystems and hence their significance assessed. The segments are indicated on the accompanying GIS products. The precise dimensions of cuttings fill areas or culverts/bridges was not available at the time of assessment and it was not feasible to indicate the precise areas that will be directly impacted by the

proposed construction, operational and maintenance works for the proposed pipeline. Similarly, it is apparent that the final alignment may be adjusted in a manner that may permit avoidance of significant copses of remnant native vegetation or other noteworthy features such as riparian zones and individuals or populations of rare and threatened flora.

Table 3. Description of alignment of proposed pipeline between Morayfield in Caboolture Shire and Maroochy Shire Boundary.
The Endangered Regional Ecosystem in this table is 12.3.1; Of Concern Regional Ecosystems in this table are 12.3.2 and 12.3.11. Where non-remnant vegetation occurs on only one side of the powerline clearing, this is the preferred side for instatement of the pipeline.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
203	12.9-10.14		PN1 - 12.9-10.14
204	Rural Landscape		
205	12.9-10.14	vine forest elements in understorey along ephemeral waterway	PN2 - 12.9-10.14
206	Rural Landscape		
207	Rural Landscape - W; some regrowth - E		
208	Rural Landscape - W; poor regrowth - E		
209	Ilkley Road		
210	Rural Landscape		
211	degraded 12.3.2		PN3 no vegetation under powerline
212	Rural Landscape		
213	Slaughter Yard Road		
214	12.3.6/12.3.11		
215	weedy 12.3.1/12.3.2 non-remnant		PN4 no vegetation under powerline
216	Rural Landscape		
217	McGilchrist Road		
218	Rural Landscape		
219	McGilchrist Road		
220	Rural Landscape		
221	12.3.2/12.3.5	cleared horse paddocks under powerlines	PN5, PN6 & PN7 - 12.3.2 & 12.3.5
222	Rural Landscape - W; 12.3.2/12.5.3 - E		
223	12.3.1/12.3.2/12.3.5		
224	Rural Landscape - W; 12.3.1/12.3.2/12.3.5 - E		
225	12.3.1/12.3.2/12.3.5	Eudlo Creek to E avoid vine forest along Eudlo Creek	
226	Rural Landscape - S; 12.3.1/12.3.2 - N	avoid 12.3.1 elements - realign to avoid these vine forests	
227	12.3.5/12.3.11 - W; Rural Landscape - E	remnant and road complex avoid remnant vine forest on Eudlo Creek	PN8 12.3.1/12.3.2 Eudlo Creek
228	Chevallum Road		
229	Rural Landscape - S; 12.3.1/12.3.2/12.3.5 - N	remnant degraded in parts	
230	12.3.1/12.3.2		PN9 - 12.3.1 along waterway to S
231	Rural Landscape	scattered remnant canopy trees and weedy regrowth	
232	Rural Landscape - E; regrowth - W		

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
233	Winston Road South		
234	Winston Road South	old pine plantation and 12.3.2/12.3.5 scattered regrowth	
235	Rural Landscape	sand extraction - N	
236	Rural Landscape - W; regrowth 12.3.2 - E	sand extraction - W	
237	Rural Landscape	sand extraction	
238	12.3.1/12.3.2/12.3.5	Eudlo Creek avoid vine forest along Eudlo Creek	
239	Rural Landscape - W; 12.3.1/12.3.2/12.3.5 - E	dam - W; Eudlo Creek - E avoid vine forest along Eudlo Creek	
240	Rural Landscape		
241	12.3.1/12.3.2/12.3.5	Eudlo Creek avoid vine forest along Eudlo Creek	
242	12.3.1/12.3.2/12.3.5 - N; Rural Landscape - S		
243	Bruce Highway		
244	12.3.1/12.3.2/12.3.5 - N; Rural Landscape - S	12.3.1/12.3.2/12.3.5 S of clearing	
245	12.3.1/12.3.2/12.3.5		
246	Rural Landscape		
247	12.3.1/12.3.2/12.3.5		
248	12.3.1/12.3.2/12.3.5 - E; Rural Landscape - W	dam - W; Eudlo Creek - E avoid vine forest along Eudlo Creek	
249	12.3.1/12.3.2 - E; Rural Landscape - W	dam - W; Eudlo Creek - E avoid vine forest along Eudlo Creek	
250	Rural Landscape - S; regrowth 12.3.2 - N		
251	12.3.1/12.3.2	Eudlo Creek avoid vine forest along Eudlo Creek	PN10 - 12.3.1 along Eudlo Creek
252	Rural Landscape		
253	Ti Tree Road	scattered remnant canopy trees and weedy regrowth	
254	Rural Landscape		
255	tidal drain - freshwater reach	lined with regrowth 12.3.11	PN11 - regrowth 12.3.11
256	Rural Landscape		
257	artificial drain	lined with regrowth 12.3.11	
258	Rural Landscape		
259	regrowth 12.9-10.14 non-remnant	narrow sliver	
260	Rural Landscape		
261	12.9-10.14		
262	Rural Landscape	scattered remnant canopy trees and weedy regrowth	
263	Diddillibah Road		
264	Rural Landscape		

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
265	Paynter Creek	degraded tidal wetlands with marine plants	
266	Rural Landscape		
267	Paynter's Creek Road	12.1.1 - E with marine plants	PN12 - 12.1.1
268	Rural Landscape - W; 12.3.11 - E	12.3.11 weedy understorey and degraded	
269	Rural Landscape		
270	Petrie Creek Road		
271	Rural Landscape		
272	Petrie Creek	tidal wetlands and marine plants	PN13 - mangrove lined waterway
273	Rural Landscape		
274	Bli Bli Road		
275	Rural Landscape		
276	regrowth 12.9-10.14 non-remnant		
277	Rural Landscape		
278	degraded regrowth and landscaping		
279	Francis Road		
280	Rural Landscape		
281	12.12.15		
282	12.12.15 - E; house - W		
283	12.12.15	*Melaleuca quinquenervia* along waterway	PN16 - 12.12.15
284	Rural Landscape		
285	12.12.15		PN15 - 12.12.15
286	Rural Landscape		
287	Rural Landscape - W; regrowth and Rural - E		
288	Rural Landscape		
289	regrowth 12.12.15 - W; Rural Landscape - E		
290	Rural Landscape		
291	Rocky Creek	*Acacia melanoxylon* dominated regrowth	
292	Rural Landscape		
293	Yandina - Bli Bli Road		
294	Rural Landscape		
295	degraded 12.3.2 with tidal waterway	Caboolture Creek - marine plants	PN17 - marine plants
296	Rural Landscape		

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
297	Yandina - Bli Bli Road		
298	Rural Landscape		
299	Sheanans Road		
300	Rural Landscape		
301	Bruce Highway		
302	Railway Line		
303	Urban (Industrial) Landscape		
304	Nambour Connection Road		
305	Urban (Industrial) Landscape		
306	weed dominated waterway		
307	Urban - W; weed dominated waterway - E		
308	regrowth - W; weed dominated waterway - E		
309	Urban Landscape		
310	weed dominated waterway		
311	Rural Landscape		
312	South Maroochy River	degraded 12.3.1	PN18 - grazing into riparian zone
313	Rural Landscape		
314	Urban Landscape	Yandina	
315	Rural Landscape		
316	weed dominated waterway		
317	Urban (Industrial) Landscape		
318	Steggalls Road		
319	Rural Landscape		
320	weed dominated waterway		
321	Rural Landscape		
322	weed dominated waterway		
323	Rural Landscape		
324	Brandon's Road		
325	Rural Landscape		
326	weed dominated waterway		
327	Rural Landscape		
328	weed dominated waterway		

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
329	Rural Landscape		
330	weed dominated waterway	Lee's Road crossing of Brown's Creek	PN19 - degraded waterway
331	Bunya Road		
332	Rural Landscape		
333	weed dominated waterway		
334	Rural Landscape		
335	weed dominated waterway	Running Creek	
336	Rural Landscape		
337	North Arm - Yandina Creek Road		
338	Rural Landscape		
339	Monak Road		
340	Rural Landscape		
341	weed dominated waterway		
342	Rural Landscape		
343	farm dam		
344	Rural Landscape	farm dams E & W at 97.25 km	
345	weed dominated waterway		
346	Rural Landscape		
347	farm dam		
348	Rural Landscape		
349	farm dam		
350	Rural Landscape		
351	farm dam		
352	Rural Landscape		
353	Bunya Road		
354	12.9-10.14/12.3.2	Carrick Creek to S and waterway	PN20 - 12.9-10.14
355	Rural - W; Bruce Highway - E		
356	12.3.2 and dam - W; Bruce Highway - E	waterway	
357	12.9-10.14 - W; Bruce Highway - E		
358	Rural - W; Bruce Highway - E		
359	12.9-10.14/12.3.2 - W; Bruce Highway - E		
360	Rural - W; Bruce Highway - E		

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
361	Unnamed creek	waterway with *Araucaria bidwillii*	
362	Rural - W; Bruce Highway - E	includes Eumundi - Kenwilworth Road and Strong Lane	
363	Rural Landscape		
364	Rural - W; Bruce Highway - E		
365	12.3.1	North Maroochy River - use old highway - avoid vine forest	PN21 - 12.3.1 W of old highway
366	Rural - W; Bruce Highway - E		
367	Neeraway Road		
368	Rural & regrowth - W; Bruce Highway - E		
369	Rural - W; Bruce Highway - E		
370	weed dominated waterway		
371	Rural - W; Bruce Highway - E		
372	Rural & regrowth - W; Bruce Highway - E		
373	Rural Landscape		
374	regrowth non-remnant vine forest	cleared and weed dominated under powerline	
375	Rural Landscape		
376	regrowth non-remnant vine forest	cleared and weed dominated under powerline	PN22 - regrowth vine forest
377	Bruce Highway		
378	poor regrowth		
379	Rural Landscape		
380	Urban (Industrial) Landscape W; R - E	old pine plantation and scattered regrowth E	
381	Nandroya Road		
382	Rural Landscape		
383	Railway Line		
384	Rural Landscape		
385	Rural Landscape	some regrowth NE and SW fringes	
386	Rural Landscape		
387	Cooroy Mountain Road		
361	Unnamed creek	waterway with *Araucaria bidwillii*	
388	Rural Landscape		
389	regrowth 12.3.1/12.3.2 - non-remnant	*Acacia disparrima* dominated regrowth	
390	Rural Landscape		
391	regrowth 12.3.1/12.3.2 - non-remnant	*Acacia disparrima* dominated regrowth	PN 32 - regrowth with track

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
392	Rural Landscape		
393	12.12.14/12.3.2	*Alyxia magnifolia* fringing powerline clearing	PN30 and 31 - 12.12.14 and Alyxia
394	Rural Landscape		
395	Tewantin Road		
396	Urban Landscape		
397	degraded 12.3.1/12.3.2 non-remnant		
398	Urban Landscape		
399	Lake Macdonald Drive		
400	storm damaged regrowth		
401	Widgee Court		
402	Rural Landscape - W; 12.12.14 regrowth - E		
403	Rural Landscape - W; Urban Landscape - E		
404	12.3.1/12.3.2	*Symplocos harroldii* and *Xanthostemon oppositifolius* - avoid	PN28 and 29 - 12.3.1/12.3.2 - avoid
405	Rural Landscape	12.3.1/12.3.2 to W with *Xanthostemon oppositifolius*	
406	12.3.2/12.3.1 and Urban mosaic	*Xanthostemon oppositifolius* in 12.3.1/12.3.2	
407	Rural - W; regrowth 12.3.1/12.3.2 - E	*Xanthostemon oppositifolius* in 12.3.1/12.3.2	
408	Rural - E; regrowth 12.3.1/12.3.2 - E	*Xanthostemon oppositifolius* in 12.3.1/12.3.2	
409	Rural Landscape		
410	Six Mile Creek 12.3.1/12.3.2 degraded remnant	*Xanthostemon oppositifolius* in 12.3.1/12.3.2	PN27 - 12.3.1/12.3.2 regrowth
411	Six Mile Creek 12.3.1/12.3.2 - W; Rural - E	*Xanthostemon oppositifolius* in 12.3.1/12.3.2	
412	Rural Landscape		
413	regrowth along waterway	*Xanthostemon oppositifolius* in 12.3.1/12.3.2 regrowth	
414	Rural Landscape		
415	Urban Landscape - N; Rural Landscape - S		
416	Lake Macdonald Drive		
417	Lake Macdonald - S; 12.3.2 - N	*Xanthostemon oppositifolius* in 12.3.2 copse next to park	
418	Noosa Water Treatment Plant		
Options			
EC1	Rural Landscape	12.3.1/12.3.2 - W of alignment	
EC2	Maroochydore Road		
EC3	12.3.1/12.3.2 - W; Rural Landscape - E		

EC4	Eudlo Creek Road	12.3.11 both sides of road	PN14 - 12.3.11 large *E. tereticornis*

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
EC5	Rural Landscape		
EC6	poor regrowth non-remnant 12.3.11		
EC7	Rural Landscape		
Offshoot			
IF1	Rural Landscape	Bli Bli Road N	
IF2	Bli Bli Road and Proposed Pump Station		
IF3	Rural Landscape	Bli Bli Road N	
IF4	degraded regrowth	tidal drain to S with marine plants	
IF5	Rural Landscape	Bli Bli Road N	
IF6	degraded 12.3.1 non-remnant		
IF7	Petrie Creek and Rural	Bli Bli Road N	
IF8	Bli Bli Road		
IF9	Rural Landscape		
IF10	degraded regrowth 12.3.1 along waterway	narrow sliver	
IF11	Rural Landscape		
IF12	degraded regrowth 12.3.1 along waterway	narrow sliver	
IF13	Bruce Highway - S; U (Industrial) - N	some regrowth N	
IF14	Bruce Highway - S; regrowth - N	formerly 12.3.1/12.3.2	
IF15	Bruce Highway - W; Rural Landscape - E		
IF16	Bruce Highway		
IF17	12.12.15/12.3.1/12.3.2	avoid vine forest in gully shift alignment to south of gully head	PN33 - 12.3.1/12.3.2 - avoid
IF18	Rural Landscape - E; U (Industrial) - W		
IF19	weedy 12.3.2 - S; U (Industrial - N)	Tucker's Creek - waterway	
IF20	Nambour Connection Road		
IF21	U (Industrial) - S; weedy 12.3.2/12.12.15 - N	Tucker's Creek - waterway	
IF22	U & regrowth - S; 12.3.2/12.12.15 - N		PN34 - 12.3.2 N new development
IF23	Rural Landscape	cleared pad	
IF24	Railway Line		
IF25	Rural Landscape		
IF26	Brockhurst Road		
IF27	Urban Landscape - S; 12.12.15 - N		

IF28	12.3.1/12.3.2/12.12.15	waterway with scattered rural residential embedded in remnant	

Table 3 cont'd.

Segment Number	Vegetation/Landscape Description	Comments	Photo Number
IF29	12.3.1/12.3.2 - S; 12.12.15 - N	Tucker's Creek - waterway S	
IF30	12.3.1/12.3.2/12.12.15	Tucker's Creek - waterway	
IF31	Rural Landscape		
IF32	Image Flat Road		
IF33	Rural Landscape		
IF34	Savilles Road		
IF35	Rural Landscape		
IF36	degraded waterway	Rocky Creek - some *Araucaria bidwillii*	
IF37	Rural Landscape		
IF38	Perry Road	regrowth vine forest lining W side of Perry Road to N	
IF39	Rural Landscape		
IF40	degraded waterway	dam E with *Araucaria bidwillii*	
IF41	Rural Landscape		
IF42	Rural Landscape	small copses of degraded regrowth NE in gully	
		EC - Eudlo Creek Option	
		IF - Image Flat Offshoot	

There are a number of areas that will require consideration of the potential impacts of the proposed pipeline alignment with respect to remnant native vegetation cover and 2 instances where rare and threatened flora were observed. These are:

- Riparian crossings of streams with remnant vegetation in varying states of viability (particularly in the Maroochy River and Six Mile Creek catchments and their tributaries);
- Copses of the Endangered regional ecosystem 12.3.1 associated with some of the aforementioned waterways;
- Copses of the Of Concern regional ecosystems 12.3.2 and 12.3.11; and,
- Habitats for the rare and threatened flora observed – *Xanthostemon oppositifolius, Symplocos harroldii* and *Alyxia magnifolia*.

WEEDS IN REMNANT AND REGROWTH VEGETATION

The *Lantana camara* dominated areas, in places, have numerous seedlings/saplings of vine forest taxa establishing amongst the *Lantana camara* thickets. With the possible increased impact of biological controls for *Lantana camara* in the future, these native species may ultimately gain a competitive advantage over the weed flora. Thus, the currently weed infested areas that were formerly vine forest should be considered potential components of this Endangered regional ecosystem where they occur as inclusions within remnant vegetation patches. This would require any further artificial disturbances being considered in the context of their future management. This matter is discussed below with regard to mitigatory measures to minimise or remove negative environmental impacts.

With respect to weeds, the following taxa were observed in the study area that are listed on the *Land Protection (Pest And Stock Route Management) Act 2002*: *Ambrosia artemisiifolia* (Class 2), *Baccharis halimifolia* (Class 2), *Bryophyllum delagoense* (Class 2), *Eichhornia crassipes* (Class 2), *Salvinia molesta* (Class 2), *Senecio madagascariensis* (Class 2), *Anredera cordifolia* (Class 3), *Asparagus aethiopicus, Asparagus africanus* and *Asparagus plumosus* (Class 3), *Celtis sinensis* (Class 3), *Cardiospermum grandiflorum* (Class 3), *Cinnamomum camphora* (Class 3), *Lantana camara* and *Lantana montevidensis* (Class 3), *Cardiospermum grandiflorum* (Class 3), *Ligustrum lucidum* and *Ligustrum sinense* (Class 3), *Macfadyena unguis-cati* (Class 3), *Schinus terebinthifolius* (Class 3), *Spathodea campanulata* (Class 3) and *Sphagneticola trilobata* (Class 3).

Many other environmental weeds are also present. They range from grasses (e.g. *Setaria sphacelata*), woody native plants from other areas (e.g. *Schefflera actinophylla* and *Corymbia torelliana*) and numerous smothering legumes (e.g. *Macroptilium atropurpureum, Neonotonia wightii, Desmodium uncinatum* and *Desmodium intortum*). These latter weeds (indeed all of the smotherers) will prove the greatest challenge to any rehabilitation efforts, despite their not being listed on the *Land Protection (Pest And Stock Route Management) Act 2002.* Management of these taxa requires careful consideration due to potential collateral damage to the other biota that may be retained on the sites in which many of them occur, particularly within the riparian zones traversed by the proposed pipeline alignment. The riparian zones are typically those with the greatest diversity and abundance of weed invasion due to increased disturbance regimes due to the nature of this flooding cycle environment and the elevated levels of nutrients and water availability that enhances the ability of weeds to establish and proliferate.

POTENTIAL IMPACTS

The current degradation of the landscape in the areas traversed by the preferred alignment is related primarily to urbanisation, land clearance, rural land uses such as grazing and associated weed and fire related degradation, artificial fire regimes and eutrophication of waterways. Grazing and weed infestations are important direct and chronic factors in the formation of environmentally degraded sites along this route. Fire must be effectively managed if the remnant vegetation along the future pipeline alignment is to be maintained and rehabilitated in areas where it is presently degraded. This is particularly relevant to the slopes and crests where containment of fires, once ignited, is difficult, if not impossible. It will continue to erode the extent and threaten the viability and integrity of all remnant native vegetation within the study area.

Whilst the vegetation types and their expected resident and migratory fauna are not in imminent danger of extinction if the artificial disturbance regimes are effectively managed, many of their attributes are currently under threat from sources as varied as the aforementioned artificial fire regime and rural residential settlement and associated landscape hazards. Biodiversity management issues are pertinent in the study area and it is important that no reduction in local or regional biodiversity should result. To prevent this occurring, appropriate management of the pipeline alignment may result in the implementation of management measures that can impact upon surrounding landowners, or require their assistance to implement. This is particularly relevant to fire management. Humans for a variety of reasons light the overwhelming majority of fires. Regardless of the motive, the artificial fire regime in the study area is degrading the remnant natural vegetation. It is expected that this is also impacting detrimentally upon the component fauna of those areas. These synergistic impacts upon a wide range of the native biota are a typical feature of the ubiquitous anthropogenic disturbance regimes found throughout this region.

The role of artificial disturbance regimes such as fire cannot be overstated. With subsequent grazing impacts, the structure and floristics of the former communities can be irrevocably altered. In many instances, this can also result in landscape instability. The role of weed infestations, fire and grazing in retarding ecosystem recovery following disturbance has been detailed extensively.

RECOMMENDED MILITATION MEASURES

Some generic mitigation measures are applicable across the study area. They are as follows:

- All personnel working in areas of remnant natural vegetation should undertake a training course in responsible, practical environmental management.
- Works in all areas of remnant vegetation should be restricted to the minimum footprint practicable. Soil and materials stockpiles should be located outside areas of remnant vegetation.
- No exotic species of flora or fauna should be introduced into areas of remnant natural vegetation (including exotic flora in landscaping and rehabilitation works)
- Slope stabilisation activities should not introduce topsoil with different physical, chemical and soil seed bank characteristics to the site being protected from erosion.
- Excavated materials from areas of remnant vegetation should be disposed of in areas removed from any remnant vegetation to avoid weed proliferations and damage to the remnant vegetation.
- Maintenance of completed works should ensure that conditions are not created which would enhance the chance of successful establishment of exotic species of flora and fauna in remnant natural vegetation.

Therefore, in order to achieve these objectives, the following recommendations are proposed:

- During construction and maintenance operations, then all excavated materials be disposed off-site in areas removed from remnant vegetation, but not in a manner that would result in the transfer of weed propagules or soils into non-analogous landscapes;
- Areas disturbed as a result of earthworks be rehabilitated such that exotic weed species (e.g. *Lantana camara*) pose a lesser threat to remnant vegetation than at present; and,
- Return of the former vegetative cover can be accelerated with the use of canopy trees with rapid growth characteristics to ensure rapid “site capture” and allow adjacent native canopy tree taxa, grasses and shrubs to establish beneath their canopy. A proposed species compliment for rehabilitated areas within each regional ecosystem is detailed in Appendix 1.

- Suitable rehabilitation techniques would include seed collection from local canopy taxa – germination – propagation – planting out in rehabilitation areas; transplanting of plants directly into habitat-matched rehabilitation areas if prudent and feasible; and collection of seed/brush with seed capsules/cones and direct seeding/brush matting into habitat-matched rehabilitation areas. Precautions to avoid transfer of weeds and non-endemic soil types should be complimentary to these methods.

With respect to the observed occurrences of rare and threatened flora, all individuals and/or populations of rare and threatened flora adjacent to areas that will be directly affected by works associated with the instatement and maintenance of the proposed pipeline should be fenced off with temporary fencing to avoid inadvertent damage.

Riparian crossings require care in order that much of the existing degradation observed on many streams will not be exacerbated by any pipeline instatement works or maintenance regimes. Reducing the impact of weeds is paramount. None of the observed weeds pose a significant management problem if managed effectively. This requires particular care in riparian areas where nutrient and water availability enhances their colonising and proliferation capacities. Soil disturbance should be minimised and followed by planting of taxa that will ensure rapid site capture and canopy closure. In this way, the competitive abilities of the planted native taxa will be enhanced at the expense of the exotic flora.

SITE SPECIFIC RECOMMENDATIONS

There are a number of recommendations specific to certain localities and vegetation types as follows:

- Avoid populations of Rare and Threatened Flora – *Xanthostemon oppositifolius* (Segments 404 – 408, 410, 411, 413 and 417 – instate pipeline or re-align to avoid individuals); *Symplocos harroldii* (Segment 404 – avoid this vine forest patch by re-alignment) and *Alyxia magnifolia* (Segment 393 – restrict works to powerline clearing);

- Minimise Impact upon crossings of streams/waterways/wetlands with remnant vegetation in varying states of viability should be targeted for more cautious construction activities and more detailed rehabilitation programs – Segments 205, 211, 215, 225 – 227, 229, 230, 234, 238 – 242; 248, 249, 251, 283, 291, 306 – 308; 310, 312, 316, 320, 322, 326, 328, 330, 333, 335, 341, 345, 356, 361, 365, 370, 389, 391, 397, 404, 406 – 408, 413 and 418, IF04, IF06, IF10, IF12, IF19, IF21, IF22, IF28, IF30, IF36, IF40;

- Minimise Impact upon marine plants in tidal areas – Segments 265, 267 (E of alignment), 272 and 275;

- Minimise Footprint in remnant areas of the Endangered regional ecosystem 12.3.1 (or realign in particularly significant areas such as Six Mile Creek and Eudlo Creek and their tributaries that is a component of some reaches of the riparian and waterway vegetation listed above) – Segments 223 – 226, 229, 230, 238, 239, 241, 242, 244, 245, 247 – 249, 251, 365, 404 (avoid this patch of vine forest completely via realignment), 406, 411, EC3, IF17, IF28 – IF30; and,

- Minimise Footprint or Avoid Areas of remnants with the Of Concern regional ecosystems 12.3.2 and 12.3.11 – Segments 214, 221 – 227, 229, 230, 236, 238, 239, 241, 242, 244, 245, 247 – 249, 251, 268, 354, 356, 359, 393, 404, 406, 411, 417, EC3, IF17, IF21, IF22, IF28 – IF30.

Some of the latter Of Concern regional ecosystem segments contain elements of stream/waterway/wetland vegetation or endangered regional ecosystems that would designate a higher level of protection and care in works in their vicinity. None of the alternative alignments surveyed (Coonowrin Creek Alternative, Coochin Creek Alternative or Dularcha National Park Alternative) appear to offer better environmental outcomes. It is considered that all (particularly the Dularcha National Park Alternative) offer poorer options with respect to impacts upon flora assets and values than the original alignment.

In conclusion, some alignment adjustments and careful work in specific locations can minimise the environmental impact of the native flora along the proposed pipeline alignment. It is recommended that the environmental management plans be prepared with these matters taken into account in order to militate against any significant negative environmental impacts associated with the final preferred alignment.

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APPENDIX

Appendix 1 – List of Suggested Canopy Taxa for Rapid Site Capture during rehabilitation works in areas of remnant native vegetation potentially to be disturbed during pipeline instatement.

Regional Ecosystem	Suggested Canopy Taxa for Rehabilitation Works
12.3.1	*Lophostemon confertus, Glochidion ferdinandi, Glochidion sumatranum, Archontophoenix cunninghamiana, Syzygium oleosum, Acmena smithii, Waterhousea floribunda, Ficus coronata*.
12.3.2	*Eucalyptus grandis, Eucalyptus microcorys, Lophostemon confertus, Glochidion ferdinandi, Glochidion sumatranum, Archontophoenix cunninghamiana, Syzygium oleosum, Acmena smithii, Ficus coronata.*
12.3.5	*Melaleuca quinquenervia, Eucalyptus robusta, Lophostemon suaveolens, Glochidion ferdinandi, Glochidion sumatranum.*
12.3.11	*Melaleuca quinquenervia, Corymbia intermedia, Eucalyptus tereticornis, Lophostemon suaveolens, Glochidion ferdinandi, Glochidion sumatranum.*
12.9-10.14	*Eucalyptus pilularis, Syncarpia verecunda, Corymbia intermedia, Eucalyptus microcorys.*
12.9-10.17	*Eucalyptus siderophloia, Eucalyptus propinqua, Eucalyptus acmenoides, Eucalyptus microcorys, Corymbia intermedia, Corymbia trachyphloia, Eucalyptus tereticornis*.
12.12.15	*Eucalyptus siderophloia, Eucalyptus propinqua, Eucalyptus acmenoides, Eucalyptus microcorys, Corymbia intermedia, Corymbia trachyphloia, Eucalyptus tereticornis*.

PHOTOGRAPHIC PLATES

PN1 RE 12.9–10.14

PN2 RE 12.9–10.14

PN3 No vegetation under the powerline

PN4 No vegetation under the powerline

PN5 RE 12.3.2/12.3.5

PN6 RE 12.3.2/12.3.5

PN7 RE 12.3.2/12.3.5

PN8 RE 12.3.1/12.3.2 Eudlo Creek

PN9 RE 12.3.1 along waterway

PN10 RE 12.3.1 along Eudlo Creek

PN11 Regrowth RE 12.3.11

PN12 RE 12.1.1

PN13 Mangrove lined waterway

PN14 RE 12.3.11 large *Eucalyptus tereticornis*

PN15 RE 12.12.15

PN16 RE 12.12.15

PN17 Marine plants

PN18 Grazing into riparian zone

PN19 Degraded waterway

PN20 RE 12.9–10.14

PN21 RE 12.3.1 west of old highway

PN22 Regrowth vine forest

PN23

PN24

PN25

PN26

PN27 RE 12.3.1/12.3.2 regrowth

PN28 RE 12.3.1/12.3.2

PN29 *Symplocos harroldii*

PN30 RE 12.12.14

PN31 *Alyxia magnifolia*

PN32 Regrowth with track

PN33 RE 12.3.1/12.3.2

PN34 RE 12.3.2