

SUBMISSION TO BYRON VILLA WORLD

DA 10.2017.201.1 - 290 lot subdivision and concept plan for residual land, Ewingsdale Road Byron Bay

Dailan Pugh, BEACON, July 2017

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It is considered outrageous that Byron Shire Council accepts DAs in a secured form so that it is not possible to select and copy text or images to facilitate the ability to include them in submissions with comments. It is laborious to have to type in text in order to comment on it. Council needs to review its DA procedures to ensure that exhibited documents are in a useable form.

I strongly object to the proposed Villa World DA.

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Summary

Planning

The Villa World proposal is claimed to be for a total of 303 lots and 352 dwellings, though given that around a quarter of the single lots are large enough for multiple dwellings (with 6 over 1,000m²) there is the potential for more than an additional 100 dwellings when individual DAs are submitted. Given the allowance for further subdivision of such large lots it is essential that Villa World identify the maximum potential number of residences that could be constructed on West Byron over time and that these be considered in the context of potential traffic movements and sewerage demands.

The proposal to raise the 9m development height limit to 13.6m for the 5 "medium" density lots is strongly opposed.

Villa World identify that there will be 2 "minor" incursions into E2 zones though these have not been identified and therefore cannot be considered. They also propose subdivision of environmental zones below the 40ha minimum on the residue of their property though fail to identify these and have not submitted a SEPP1 objection. They propose a variety of works on public and other private lands for which they have not obtained the owner's consent.

Most importantly Villa World have only undertaken a partial assessment of West Byron and therefore have not considered their stage of the development in the context of the full development of the site, such as the overall impact of the drain, the full impact on Acid Sulfate Soils and the Belongil estuary, the full traffic impacts of the development, the impacts of fill transport, and the impact on Koalas in the context of a SEPP 44 Koala Plan of Management. It also needs to be recognised that Villa World is meant to be the last stage of the development, not the first.

Traffic

The traffic study undertaken by Villa World is limited to only the western part of West Byron and the partial impacts on one of the two roundabouts. Previous studies have identified the existing chronic traffic problems with the main entry into town, and predicted rapidly deteriorating conditions as traffic volumes increase. Increasing congestion has exceeded predictions and estimates need revision. There has been no study that has considered the full development as now allowed. It is clear that there has been no traffic study that adequately, fully or accurately identifies the likely consequences that either the full or partial development of West Byron will have on *"the safety, efficiency and ongoing operation"* of Ewingsdale Road, Shirley Street or the town centre and roundabouts. A traffic study needs to be prepared that identifies measures, including appropriate staging of the whole development, that ensures Ewingsdale Road *"will not be adversely affected by the development"*.

Acoustic barrier and visual obscenity

The proposals to construct a concrete barrier up to 4.6m high along the boundary with Ewingsdale Road, and to construct earth mounds and undertake plantings within the road reserve to obscure it, are strongly opposed. This is the principal access into Byron Bay and

an essential component of the feeling and attractiveness of Byron Bay for both residents and tourists. Any degradation of Byron's attractiveness to tourists will have significant local and regional economic impacts. The acoustic barrier needs to be set well back from the road and well screened with plantings of native species to preserve a semblance of Byron Bay's ambience. The bicycle track should be incorporated into this setback.

Estuary Processes and Flooding Risk

It is not accepted that the WBM 2010 Flood Study relied upon adequately considered flood risk and climate change increases in sea level rise and rainfall intensity. Therefore the design does not adequately consider 1:100 year flood events or Probable Maximum Floods. Aside from the inadequacies at the time the study was undertaken, there is a lot more known about the likely consequences of sea-level rise, increasing storm intensities, storm tides, tailwater levels and likely rainfall intensities now than at the time the study was done. Given the extremely high vulnerability of West Byron to climate change, and the associated risks of development of the site, there needs to be a new flood study done that accounts for new information and adopts a precautionary approach in assessing future flood risk.

Fill and excavation

It is claimed that it is intended to import 168,800m³ of fill, yet there are significant areas missing from the fill map so the volume may be intended to be higher. The import of the stated fill will require in the order of 16,900 trips. No information is provided to indicate the availability of fill, where the fill will come from, the haulage routes, or the number and frequency of truck movements involved so no assessment can be made of the impacts, particularly of truck movements, on both the level of service on Ewingsdale Road and on the road pavement. It is essential that this be undertaken in the context of the whole site as it is all being intended for filling and multiple fill operations may be happening at the one time.

Controlling Runoff

The depth of current water table ranges from the surface down around a metre, and this groundwater is contaminated with aluminium, copper, iron, lead, zinc and petroleum hydrocarbons. Underlying the groundwater are Actual and Potential Acid Sulfate Soils, which will generate sulfuric acid if drained and increase the contamination of groundwater. The proposal is to construct a large drain through the site, as well as a variety of swales, which will likely activate Potential Acid Sulfate Soils and drain polluted groundwater into the estuary. There must be further assessments to identify the extent of AASS and PASS and quantify the extent of soils to be drained and the likely consequences for pollution of the estuary.

The proposed swales are inadequate to protect water quality and do not have the full suite of ecological benefits provided by treed buffers.

Wetlands and Estuaries

It is wrong for Villa World not to have considered the impacts they will have on the mapped Coastal wetlands and littoral rainforest area as the south-eastern part of the development is mostly within the Coastal Wetlands Proximity Area and this area will be directly impacted by

fill and associated works and by the construction of drains and catchment areas outside the "Low Density Residential Zone". Similarly it appears that the intent is to construct drainage works, and potentially undertake some fill works, within the mapped Coastal wetlands. There will also be significant effects resultant from urban and flood runoff being discharged directly into the Coastal Wetlands and Coastal Wetlands Proximity Area that must be considered.

Any runoff above a 1:10 year event (which will become more frequent into the future) is proposed to be dealt with by overland flow, quickly overwhelming the capacity of the swales and running straight into the streams and estuary. The Belongil Estuary is already heavily degraded, cannot accommodate any increase in pollutants and has been identified as in need of environmental repair. The proposed drainage works will significantly increase the discharge of pollutants into the estuary and thus should not be acceptable. The drainage works need to be re-visioned to slow the movement of water through the site, improve infiltration, remove the need to deepen drains, increase the ability to trap pollutants, sediments and rubbish during periods of high flow, and expand riparian buffers to improve their capture of pollutants while providing ecological benefits to stream biota (ie shade, food inputs). The impacts and solutions need to be considered on a whole of site basis and not in a piecemeal manner.

Fauna

Villa World are proposing eliminating a population of the nationally vulnerable Wallum Sedge Frog and removing identified Koala habitat and feed trees in part of an area representing core habitat for the nationally vulnerable Koala, and so needs to be referred to the federal Minister in accordance with the Environment Protection and Biodiversity Conservation Act 1999.

West Byron contains core Koala habitat and is a pivotal link in a corridor for movement of Koalas within the larger population between north and south. There needs to be a Koala Plan of Management prepared for the whole site that identifies stands of Koala habitat, location of all feed trees >20 cm dbh, and actual Koala movement corridors through the site. Impacts of clearing, fill, drainage, roads, tracks and development on Koala habitat, Koala feed trees, Koala movements and Koala mortality need to be detailed and specific protection and mitigation measures identified. The establishment of a 200m wide Koala corridor through the site that maximises the inclusion of core Koala habitat and avoids unsuitable habitat and lands subject to inundation due to climate change is considered a vital requirement for the persistence of Byron's Koalas.

Villa World's proposals to eliminate the wetland comprising core habitat for the Wallum Sedge Frog, and the western drainage line representing core habitat for the Wallum Froglet, and bury them under metres of fill, roads and houses are strongly objected to. In accordance with the "National recovery plan for the wallum sedgefrog and other wallum-dependent frog species" the wetland and fernland home of the Wallum Sedge Frog, along with at least a 50m buffer, needs to be protected and linked to the western drainage line with its significant population of Wallum Froglets, along with at least a 20m buffer, to facilitated movement to the SEPP wetlands to the south and under Ewingsdale Road to wetlands to the north. Watertables within the vicinity of these habitat areas must be maintained in their natural state.

1. Planning

The developable part of the Villa World site is zoned low density residential. Within this area the proposal is to create 290 residential lots, 8 duplex lots, and 5 medium density lots. This said to be for 290 single dwellings 16 duplex dwellings and 46 medium density dwellings, giving a total of 352 dwellings. With an occupancy rate of 2.5 people this would represent 880 people.

Based on a rough digitising of the mapped lots, of the 290 single lots there are in the order of 56 lots 600-749m², 16 lots 750-1000m² and 6 lots 1000-1800m². There is allowance for dual occupancy on lots >600m² and multi-dwelling houses on lots >1000m². And single lots may be further subdivided into 3 or more lots with minimum areas of 250m² for attached and semi-detached dwellings or 300m² for dwellings. It is hard to imagine that the larger lots will not be subdivided. Over time, particularly when individual DAs are submitted, the overall yield of dwellings is expected to significantly increase. If a maximum yield was realised it could be in the order of an additional 110 dwellings. Given the allowance for further subdivision of such large lots it is essential that Villa World identify the maximum potential and likely number of residences that will be constructed within their development over time and that these be considered in the context of potential traffic movements and sewerage demands.

There is a 9m development height limit across the whole site. The proponents proposal to increase this to 13.6m for 5 "medium" density lots is strongly opposed.

It is not accepted that it is open for Villa World to submit a DA on the basis that Byron Shire Council refused to prepare a DCP. Villa World identify that clause 101 of the Byron LEP states:

(2) Development Consent must not be granted for development on land in an urban release area unless a development control plan that provides for the matters specified in subclause (3) has been prepared for the land.

They claim that they can ignore this requirement:

Despite cl101 of the BLEP, s74D(5) of the *Environmental Planning & Assessment Act 1979* (EP&A) authorises the making of a development application where the relevant planning authority refuses to make, or delays, a development control plan.

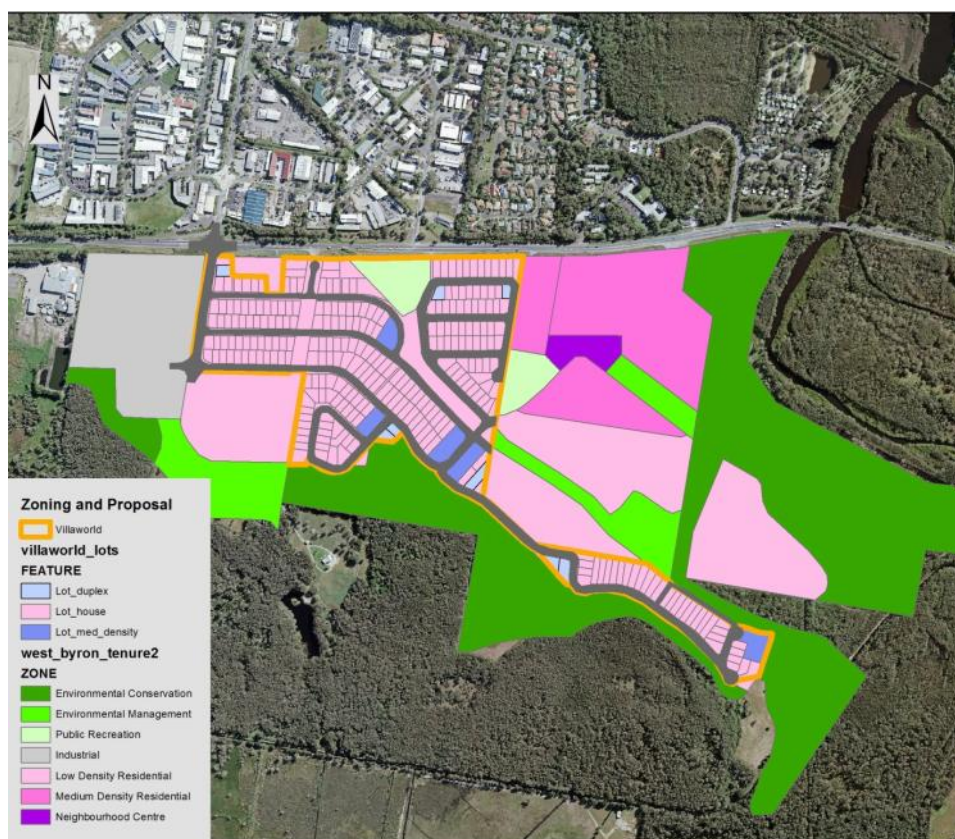
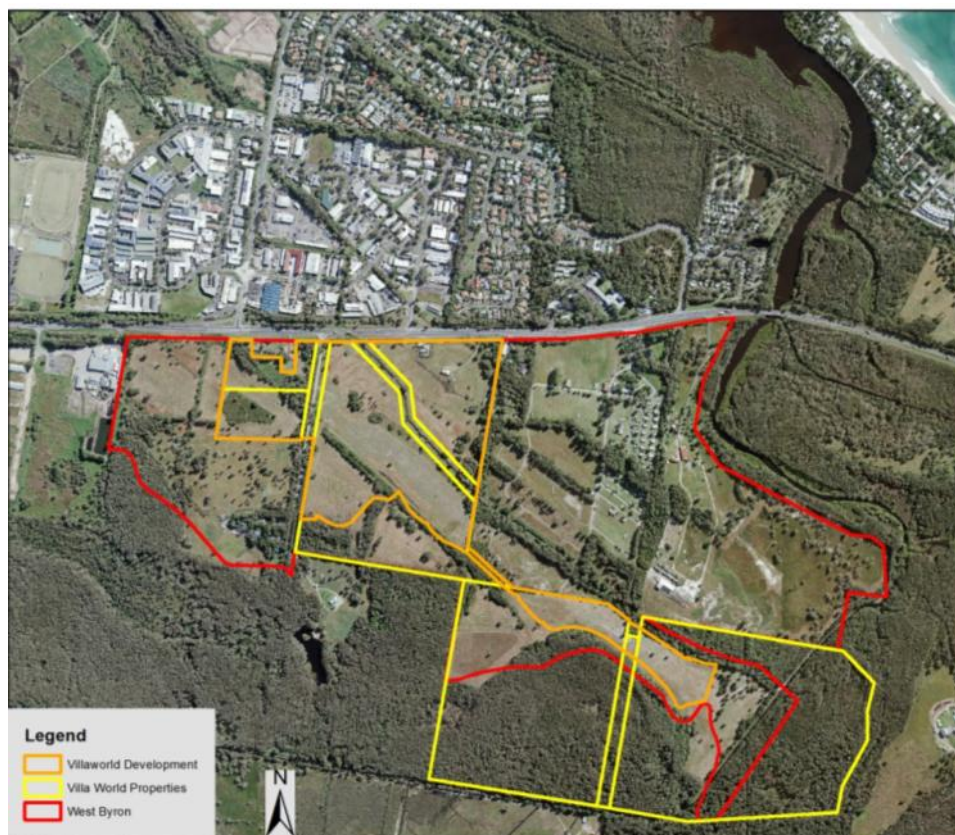
(5) If the relevant planning authority refuses to make a development control plan submitted to it under this section (or delays by more than 60 days to make a decision on whether to make the plan):

(a) the owners may make a development application despite the requirement of the environmental planning instrument concerned for the preparation of a development control plan, or

The logic of this is not accepted as Council never refused to make a DCP and did not delay a decision to make the plan by more than 60 days. This is a separate issue to the delays in finalising their DCP. It is not accepted that Villa World has a right to submit this DA without the DCP first being prepared.

The DA only deals with a part of West Byron and there is little information provided on other parts of the site and the proposal is not considered in the context of the whole site, thus crucial information is ignored, such as the overall impact of the drain, the full traffic impacts of the development, the need to consider the small area of core Koala habitat within Villa World in the context of a SEPP 44 Koala Plan of Management. There is not enough information to enable an assessment of the likely impacts associated with the whole of the Concept Plan.

Council's DCP identifies this site as being Stage 2 of the development, yet it is being put forward as Stage 1, which is not in accordance with the DCP.



Villa World propose *"minimal disruption and disturbance to E2 lands"* with *"two minor portions of proposed road and associated stormwater treatment/conveyance traversing the E2 zoned land"*. These need to be clearly identified and assessed and compensatory habitat identified.

The proposal involves works within a drainage reserve lot, which is Crown Land, within the Melaleuca Drive road reserve, which is a road maintained by Council, and on a number of other properties, yet the required owners consents have not been obtained.

The residue of existing lots 227 and 229 contain land outside of the **West Byron Bay Site**, which is zoned partly 7(a) Wetland and partly 7(b) Coastal Habitat. The minimum lot size for land in those zones is 40ha, and the subdivision will result in lots with less than the required area in those zones. There has been no formal objection under SEPP 1 to the need to adhere to this minimum lot size standard, as is required.

The Villa World proposal is claimed to be for a total of 303 lots and 352 dwellings, though given that around a quarter of the single lots are large enough for multiple dwellings (with 6 over 1,000m²) there is the potential for more than an additional 100 dwellings when individual DAs are submitted. Given the allowance for further subdivision of such large lots it is essential that Villa World identify the maximum potential number of residences that could be constructed on West Byron over time and that these be considered in the context of potential traffic movements and sewerage demands.

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Most importantly Villa World have only undertaken a partial assessment of West Byron and therefore have not considered their stage of the development in the context of the full development of the site, such as the overall impact of the drain, the full impact on Acid Sulfate Soils and the Belongil estuary, the full traffic impacts of the development, the impacts of fill transport, and the impact on Koalas in the context of a SEPP 44 Koala Plan of Management. It also needs to be recognised that Villa World is meant to be the last stage of the development, not the first.

2. Traffic

The traffic assessment identifies maximum peak hour trips as 290 vehicles/hour in AM and 305/hr in PM, which the acoustics report gives as being "equivalent to approximately 3,000 vehicles per day".

These figures are based on the NSW RTA Guide to Traffic Generating Developments (2002). For 290 single dwellings, 16 duplex dwellings and 46 medium density dwellings my assessment based on the RTA assumptions gives 3054 daily vehicle trips and 290 peak hour vehicle trips for Villa World. The traffic assessment makes some attempt to assess peak hour traffic from the balance of the western part of West Byron, but fails to consider the daily vehicle trips that would be generated and totally fails to consider the likely traffic generation (either daily or peak hour) from the eastern part of West Byron.

The traffic study limits its assessment to the impacts of the western part of West Byron on the proposed western roundabout. There has been no attempt to assess the likely traffic impacts of the full development, the impact the traffic from the eastern part of West Byron will have on the western roundabout, the impact that the increased traffic will have on Ewingsdale Road or the impact the traffic will have on the town centre and roundabouts.

Ewingsdale Road is a classified road, as such consent authorities must not grant consent unless it is satisfied that "*the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development*". There is inadequate information available to assess this or the impact on the main road and other streets in town.

The Byron Bay LES (BSC 2005) recognises that there are major infrastructure constraints on further development of Byron Bay, stating:

Council cannot maintain existing levels of service, let alone fund the substantial upgrades in capacity that would be required to facilitate additional growth. ...

...

Traffic coming into the study area on Ewingsdale Road (150m east of Highway) has increased from 11,048 per day in November 2000 to 13,296 per day in November 2002; a 20% increase over 2 years...

Ewingsdale Road is one of Byron Bay's most important roads linking the study area with the Pacific Highway and beyond. A number of intersections along its length have a history of congestion and accidents. The bridge over Belongil Creek is very narrow and becomes an obstacle to emergency vehicles when traffic gridlocks across it. Additional intersections will exacerbate existing problems and may require significant capacity upgrades. This is a major infrastructure limitation to potential "green field" development on the western edge of Byron Bay.

...

Transport infrastructure is under pressure from increases in population and high visitor numbers. Strategies and solutions must be researched and adopted that do not encourage motor vehicle dependence. In the interim, higher density residential development should be discouraged on major roads to help ease traffic related issues. Rather it should be encouraged in locations that are easy walking distance (approximately 400 metres) from commercial and service areas. Development, which has the potential to increase car dependency and exacerbate traffic issues, should be discouraged. ... The long term

development of any “green field” sites will be heavily reliant on resolving current transport problems.

It is clear that the current road system is operating beyond its capacity during peak periods, and that its capacity is being exceeded with increasing frequency . Veitch Lister state:

During peak holiday periods traffic demand in Byron Bay increases by 20-30 percent. This results in the Lawson Street/Jonson Street roundabout being seriously overloaded. This can cause long traffic queues to develop on all approaches to the roundabout for extended periods of the day. During such times a queue of traffic extending several kilometres along Ewingsdale Road is a not uncommon occurrence, causing significant delays to traffic attempting to enter the Town Centre from the west.

In their Main Road study Opus 2009 note:

Although the existing network is already showing signs of operating close to or beyond its capacity (long queues, delays, and poor travel time reliability), it is generally confined to weekends and/ or peak periods of the day. The occurrence of these visual signs is irregular and generally confined to summer holiday period; however, they appear to be increasing in occurrence.

Veitch Lister state:

During high tourism periods, when traffic demand on Ewingsdale Road is typically 30-50 percent higher, the Level of Service deteriorates markedly to LOS E, and even reaches system breakdown during the peaks of the tourism season (LOS F). This results in an extremely long queue of vehicles trying to enter the Byron Bay township from the west, and long delays. This phenomenon is not confined to the peaks, but occurs across protracted periods of the day - on both weekdays and weekends - during the peak tourism period.

By 2018 the situation is forecast to deteriorate significantly. Without the West Byron development V/C ratios are predicted to increase by 28 percent - and by 40 percent with West Byron land release area fully developed...

This results in several sections of Ewingsdale Road having Level of Service E in the “without” West Byron Development scenario, and most sections having LOS E in the “with” development scenario.

... If nothing is changed then an intolerable, and unsafe, traffic environment will develop in the near future - even without the West Byron Development proceeding. ...

...

The Jonson Street/Lawson Street intersection, at the heart of the Byron Bay Town Centre, is the most congested intersection in the Shire, and is the cause of most of the traffic problems experienced within the town....

Pedestrian activity at the intersection is also intense. Surveys conducted by VLC in 2003 for BSC revealed that about 3,000 pedestrians an hour cross the road on the approaches to the intersection, which is more than double the number of vehicles entering the intersection.

From the above analysis it is evident that the Jonson Street/Lawson Street intersection has limited spare capacity to accommodate the huge upsurge in traffic demand in the township during school holiday periods. During the peak tourism period traffic demand at the Lawson Street level crossing increases from 18,000 vpd (off season) to 27,000 vpd - a 50 percent increase.

With 2008 off-season traffic increased by 30 percent, Sidra estimates that the key movements into and out of town in the AM peak via the Jonson Street and Lawson Street west approaches will deteriorate to LOS F (refer Figure D1). The average queue length on the Lawson Street west approach increases to 553 metres, while the queue on Jonson Street extends to 264 metres.

In the evening peak, with off-season traffic increased by 30 percent, the situation is even worse (refer to Figure D2). The average queue length on the Larson Street east approach extends to 836 metres, and the Jonson Street approach to 560 metres.

With 2008 off-season traffic increased by 50 percent, the AM peak queue on the Lawson Street west approach increases to 1,270 metres, while the queue on Jonson Street extends to 842 metres (Figure D3).

In the PM peak the Lawson Street east approach queue extends for 1,734 metres (Figure D4) - effectively gridlock.

During school holidays traffic volumes increase dramatically and the peak periods extend. It is easy to see from the above sensitivity test that, if higher levels of traffic demand persist for several hours, traffic can queue back to the highway.

The Veitch Lister (2011) traffic study for West Byron identifies the existing chronic traffic problems and predicts rapidly deteriorating conditions as traffic volumes increase. The traffic study was predicated upon two new roundabouts being constructed along Ewingsdale Road (opposite Ozigos and SAE), reduced speed limits, four laneing of Ewingsdale Road, and a town bypass being in place. The cost estimates for the town bypass have (so far) doubled and there is no funding source yet identified for the project. Its completion before the development of Villa World, or West Byron generally, cannot be assured and thus should not be assumed.

Veitch Lister (2011) conclude that:

The West Byron Development, as proposed, will contain 856 residential dwellings housing a population of 2,182. It will also accommodate business and light industry with an estimated employment of about 379.

The Development, at this scale, is predicted to generate about 6,000 vehicle trips each weekday that will either enter or leave the site via Ewingsdale Road.

...

The West Byron Development will increase traffic on Ewingsdale Road. In the vicinity of the site the impact is estimated to be about a 7-8% increase in traffic in 2018 and 2028.

The traffic study undertaken for West Byron is fundamentally flawed in that it only accounts for 856 dwellings rather than the minimum of 1,100 now proposed, and most significantly because it fails to account for a single customer or delivery person visiting any of the numerous shops and businesses now proposed. Significantly the Veitch Lister (2011) study grossly under-estimated traffic volumes compared to estimates derived using the NSW RTA Guide to Traffic Generating Developments (2002).

The 2011 submission by Design Collaborative P/L included a report from CRG Traffic and Transport Engineering Consultants that applied the NSW RTA Guide to Traffic Generating Developments to manually identify likely traffic yields. Assumptions adopted were that light industry would generate 9 daily trips/100m² GFA, convenience retail 121 daily trips/100m² GFA, detached houses 9 daily trips

each, medium density houses 6 daily trips each and that approximately 20% of the above trips would be contained within the subject site. Based on this they concluded that as then proposed:
...the development would generate approximately 14,160 vehicles per day on the external road network (ie. Ewingsdale Road). Obviously this is significantly higher than VLC's estimate of 6,000 vehicles per day.

CRG Traffic and Transport Engineering Consultants conclude:

The traffic generation estimates produced by VCL's model appear to be substantially lower than those derived manually using trip generation rates recommended by the RTA. In accordance with the Director General's requirements a Traffic Impact Assessment should be carried out in accordance with the RTA Guide to Traffic Generating Developments ...

By applying the NSW RTA Guide to Traffic Generating Developments traffic multipliers to the development as now proposed, assuming the maximum of 1,100 houses now identified by the DPI, the proposed development could generate in the order of 21,412 vehicle trips per day. This is over 3 times as much traffic as considered by Veitch Lister.

ZONE	Area (ha)	Assumption	Daily traffic generation based on RTA	Total Traffic (vpd)
R2	44.204	705 dwellings	9trips/dwelling	6345
R3	11.042	395 dwellings	6 trips/dwelling	2370
B1	1.100	8,000m ² GFA	121trips/100m ² GFA	9680
IN2	7.449	45% of area = 33,520m ² GFA	9 trips/100m ² GFA	3017
TOTAL				21,412

Note that the biggest single contributor to traffic generation is the proposed shopping centre, this is thus the most significant variable to obtain a reliable estimate for. It is very apparent that in only considering the traffic generated by employees working in shops that Veitch Lister has grossly understated the traffic impacts of the shopping centre.

Changes to the Level of Service due to traffic generated by West Byron needs to be assessed for each stage, and no stages approved until sufficient infrastructure is in place to ensure there is no deterioration in the Level of Service on Ewingsdale Road, Shirley Street and town roundabouts.

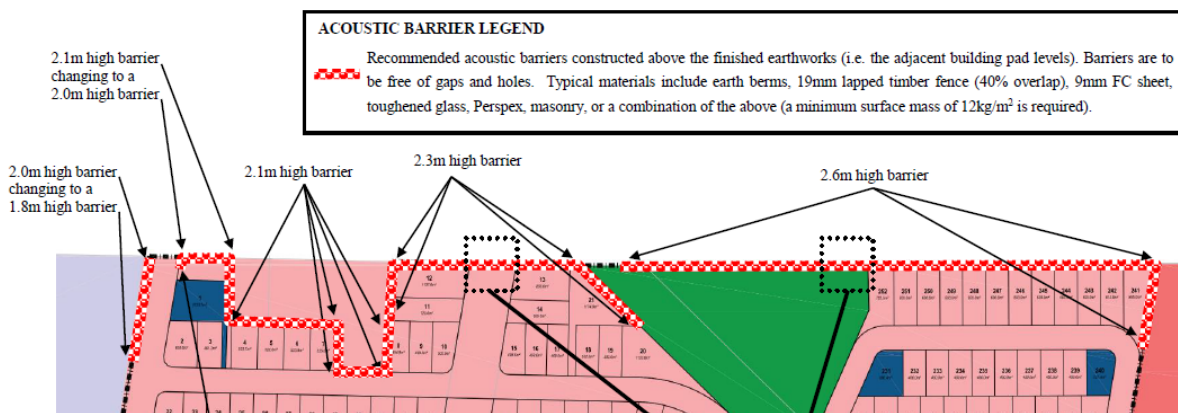
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3. Acoustic barrier and visual obscenity

Ewingsdale Road is the principal entry to town and thus provides visitors with their first impression of Byron Bay. The current rural landscape is an important contributor to the perception that Byron Bay is a small coastal town, which is an important aspect of its tourism appeal. A vegetated buffer to Ewingsdale Road is required to obscure the proposed massive and dense housing estates to help maintain Byron's tourism appeal. With increasing gridlock of traffic as a result of West Byron, visitors will have ample opportunity to take in the view.

Villa World are proposing an acoustic barrier along their boundary with the Ewingsdale Road reserve, which under the preferred scenario 1 is 1.8-2.6m high "above the finished surface level of the Harvest Estate development". Scenario 2, which is still a possibility if greater noise attenuation to residents is considered warranted has the walls 2.4-4m high.

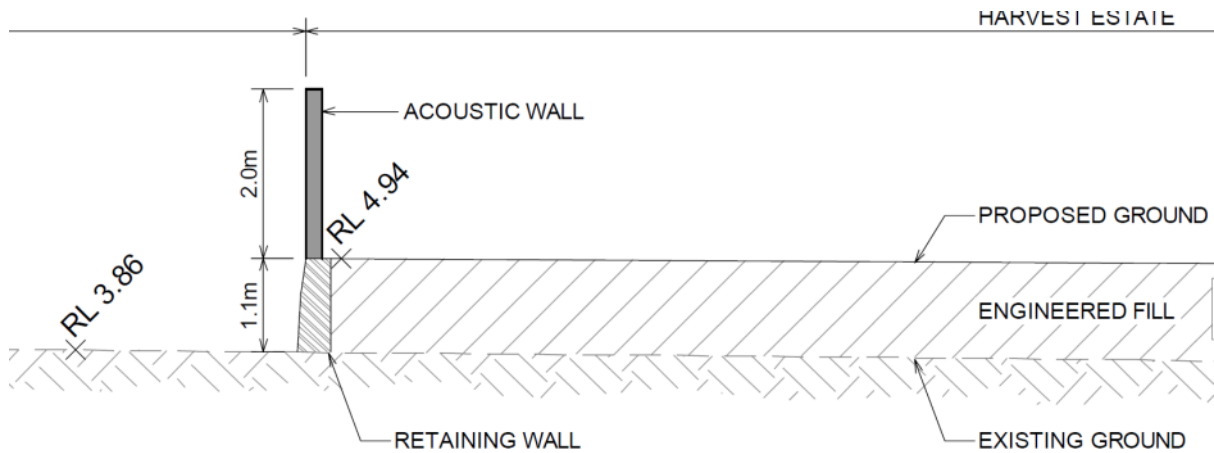
Sketch No.1: Development Site Layout and Barrier Scenario 1 Sketch (Not Scale).



The entire frontage with Ewingsdale is to be filled with a depth of 0-2m of fill, mostly 1-2m. This means that if Scenario 1 is adopted the wall will be 2.3-4.6m tall fronting the road (with walls up to 6m tall not ruled out).



Detail from Villa World showing part of acoustic wall, with 2.3m high Acoustic Wall above 2.1m Fill Batter. (note that the acoustic wall is actually identified as 2.6m at this location, and the fill as only 1-1.5m deep on the fill map, so it is hard to know what is actually being proposed)



Example of proposed construction of Acoustic Wall on top of fill retaining wall. These structures maybe up to almost 5m tall along Ewingsdale Road, framing the entry into Byron Bay.

Villa World's acoustic report identifies:

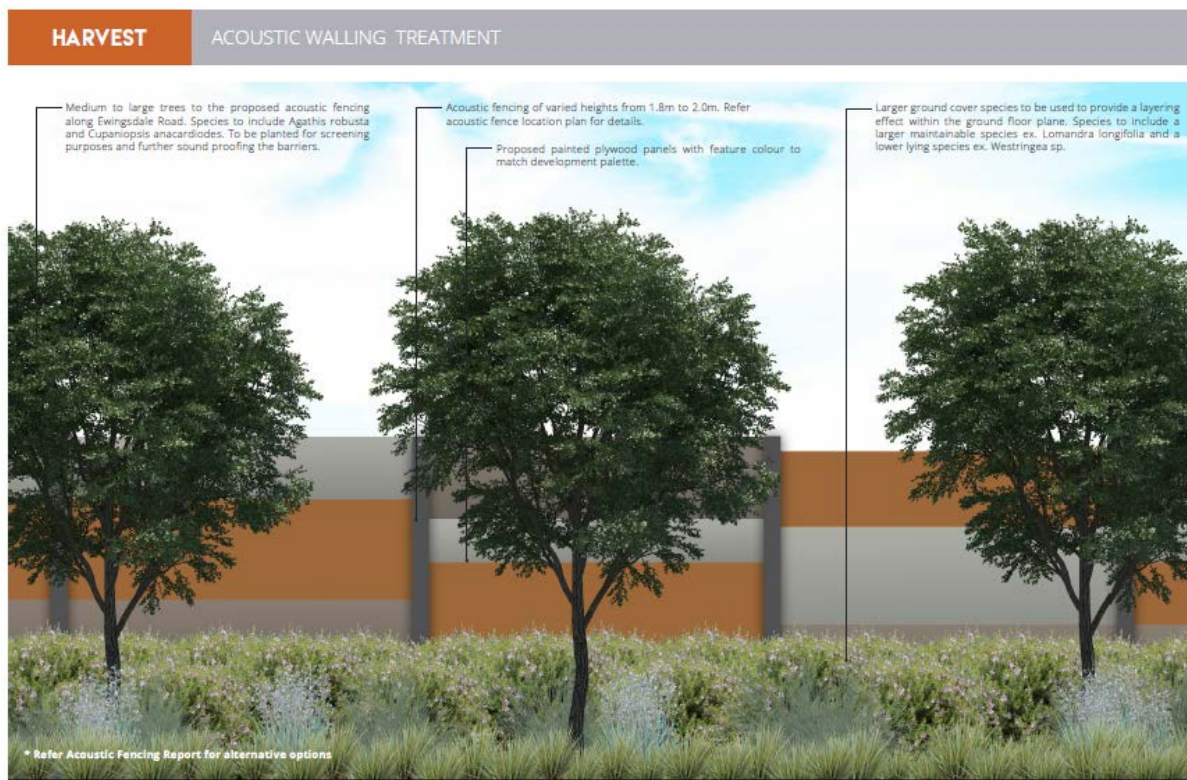
Further consideration should also be given to the cost effectiveness of the noise mitigation strategy, community views, social implications (i.e. passive surveillance), environmental effects and visual impact of acoustic barriers given that the site is along the main entry roads in Byron Bay. However, it is noted that landscaping is proposed to screen / soften the dominance of any acoustic fence.

Council's DCPs general buffer design for Ewingsdale Road is for a 13m wide mound, with almost half this within the road reserve. It is truly outrageous that Council is proposing that most of the noise barrier be within the road reserve, with only 7 metres of the developer's noise attenuation barrier actually situated on their land.



Council's Proposed buffer on Ewingsdale Road

Council's proposed contribution towards buffering the development is 6m of the mound, a 1m mown strip, a 2.5m bicycle track, a 3m wide swale and 2.5m wide road shoulder. A total of 15 metres on just one side of the road reserve.



Villa World's proposed acoustic barrier with trees and plantings within the road reserve on public land. In keeping with the approach taken the wall is claimed to be only 1.8-2m tall (rather than the intended 2.6m), with no mention of its being positioned atop up to 2-2.1m (or more) of fill.

The Ewingsdale Road reserve must be fully retained as a public transport route, it is unacceptable that 6m of this vital artery is used as a visual buffer to a development. This is an irresponsible proposal that Council should be ashamed to promote. All of the development buffer, including the bicycle track, should be situated on the developer's land.

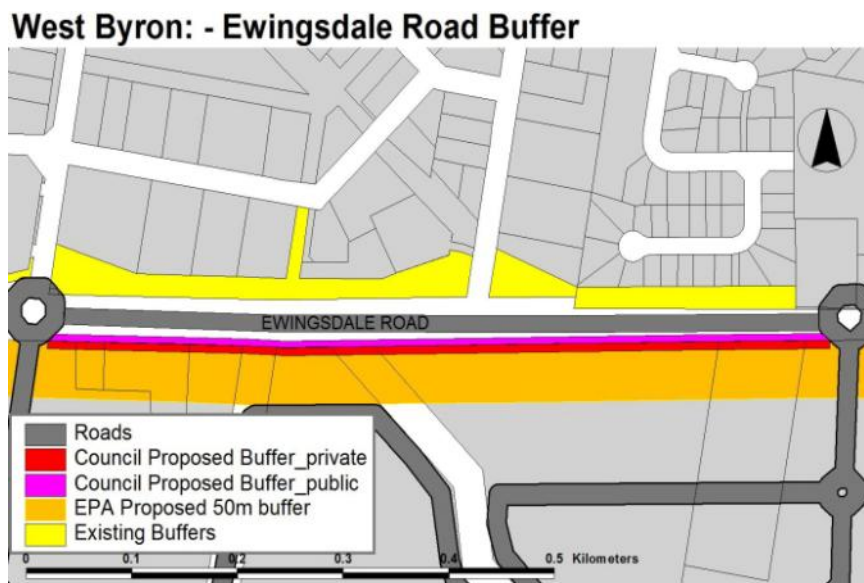


Council's map of the need to extend the road reserve onto West Byron, this includes that part of Villa World where the wall is to be the highest. There is obviously insufficient room for Council's proposed visual buffer on Council's land.

Even if the Council-Developer buffer was sought to be applied there is not the room for it. The Ewingsdale Road Reserve is 28-40m wide. The proposal is to turn Ewingsdale Road into 4 lanes, if the standard lane width of 3.5m is applied, with 2.5m shoulders, 3m wide swales and 2.5m bicycle tracks on each side, this represents 30m, without allowing for traffic separation or other infrastructure needs into the future. It is unreasonable and unacceptable for Council to propose using the public road reserve to buffer the development.

Council's DCP Appendix G identifies the future requirements for the widening of Ewingsdale Road. It is evident that the road reserve needs to extend into the development and that there is no room for the development to extend into the road reserve.

There is a need to reconsider the acoustic and visual buffering of the development. Any mounds and concrete barriers needed for noise management need to be well set back from Ewingsdale Road on Villa World's property.



Across Ewingsdale Road from this development setbacks from the road reserve of 20-40m have been applied to both industrial and residential areas. These do help obscure development where densely planted, though need to be expanded to effectively shield West Byron. The EPA recommended a 50m buffer to Ewingsdale Road to attenuate noise impacts on residents. A 50m buffer, on the developer's land is supported.

The proposals to construct a concrete barrier up to 4.6m high along the boundary with Ewingsdale Road, and to construct earth mounds and undertake plantings within the road reserve to obscure it, are strongly opposed. This is the principal access into Byron Bay and an essential component of the feeling and attractiveness of Byron Bay for both residents and tourists. Any degradation of Byron's attractiveness to tourists will have significant local and regional economic impacts. The acoustic barrier needs to be set well back from the road and well screened with plantings of native species to preserve a semblance of Byron Bay's ambience. The bicycle track should be incorporated into this setback.

4. Estuary Processes and Flooding Risk

It needs to be recognised that West Byron was under the sea during the last interglacial period. This has left a legacy of underlying Acid Sulfate Soils formed as the estuary moved around, though most significantly it shows the direction the coast is trending as it moves inland in response to rising sea-levels due to the accelerating climate changes now underway. As sea-levels rise and storms intensify this also raises the sea-levels at the mouth of the estuary and backs up floodwaters swollen by increasing storm rainfalls.

Around 120 thousand years ago temperatures were about 1 degree warmer, sea-levels were 6-9 metres higher than now and the industrial estate and Sunrise were in the sea. The sand dunes in Tyagarah Nature Reserve are markers of these ancient shorelines, left behind as the coast retreated. Most of the sand dunes around Byron have since been flattened or washed away by the Belongil Creek.



The coastline (blue line) was further inland when the sea was 6-9m higher 120,000 years ago, as it retreated sand dunes (orange lines) were left behind to indicate ancient coastlines.

To understand West Byron it also needs to be recognised that the Belongil Estuary is naturally an Intermittently Closed and Open Lake and Lagoon (ICOLL). The natural height to which water would rise behind the sand bar at Belongil before it breached has been variously claimed as being 1.8, 2.3 and 2.6m, whatever height it reached it which would have resulted in a very extensive wetland system upstream covering a significant part of West Byron. For the past two decades the mouth of the Belongil Estuary has been artificially manipulated, initially to open the estuary mouth when the water level behind reached a height of 1.2 m above MSL, which was recently reduced to 1.0 m above MSL. This will have had major and profound effects on the estuary and greatly reduced the habitat available for waterbirds.

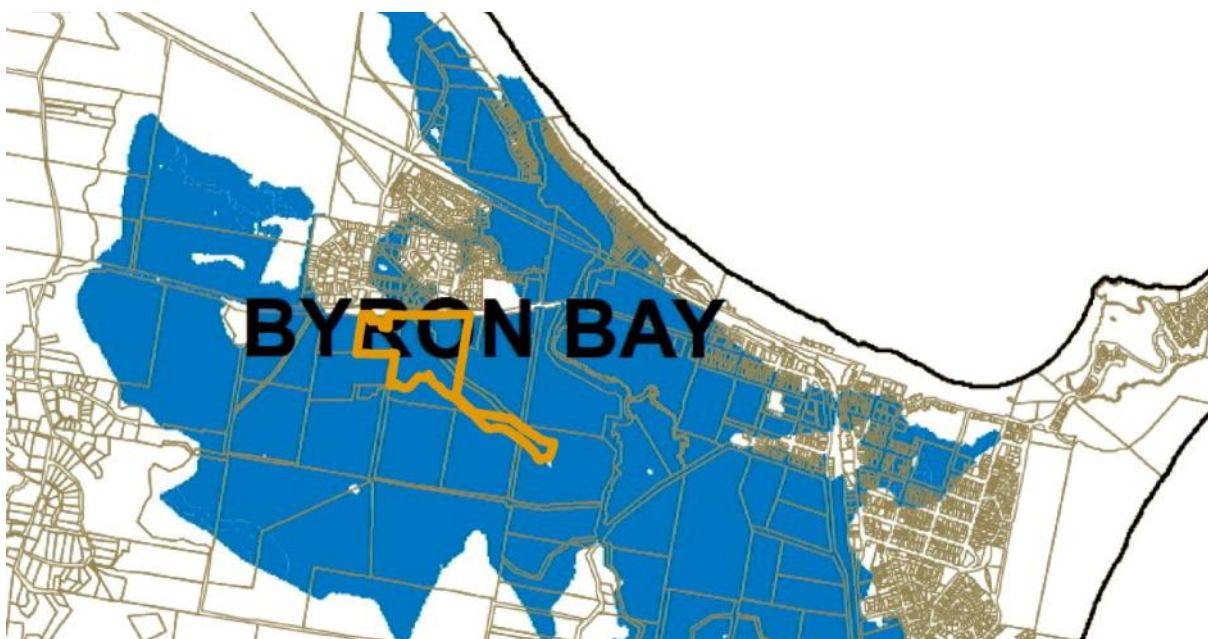
Tulau (1999) notes:

The Belongil - Cumbebin wetlands formerly occupied approximately 1 400 ha, or 5 times larger than at present (BEACON 1981; Bennett 1997; ASSAY 1998). ...



As sea-levels rise it will become increasingly difficult to maintain the estuary at its reduced height. The above map is provided for illustrative purposes. It shows what would currently be a median height for the estuary if it was allowed to function as an ICOLL (ie 1.5m above current Mean High Water –MHW - level) and what will be the MHW level later this century even if the estuary is able to be kept open as sea-levels rise. Modelling is required to assess how the estuary will react to the complex interactions resulting from a rising sea-level. Flood levels will of course be far greater than this, and are likely to be significantly affected by the choke-point of the railway crossing. As sea-levels rise any closing of the estuary mouth will result in widespread inundation of the development.

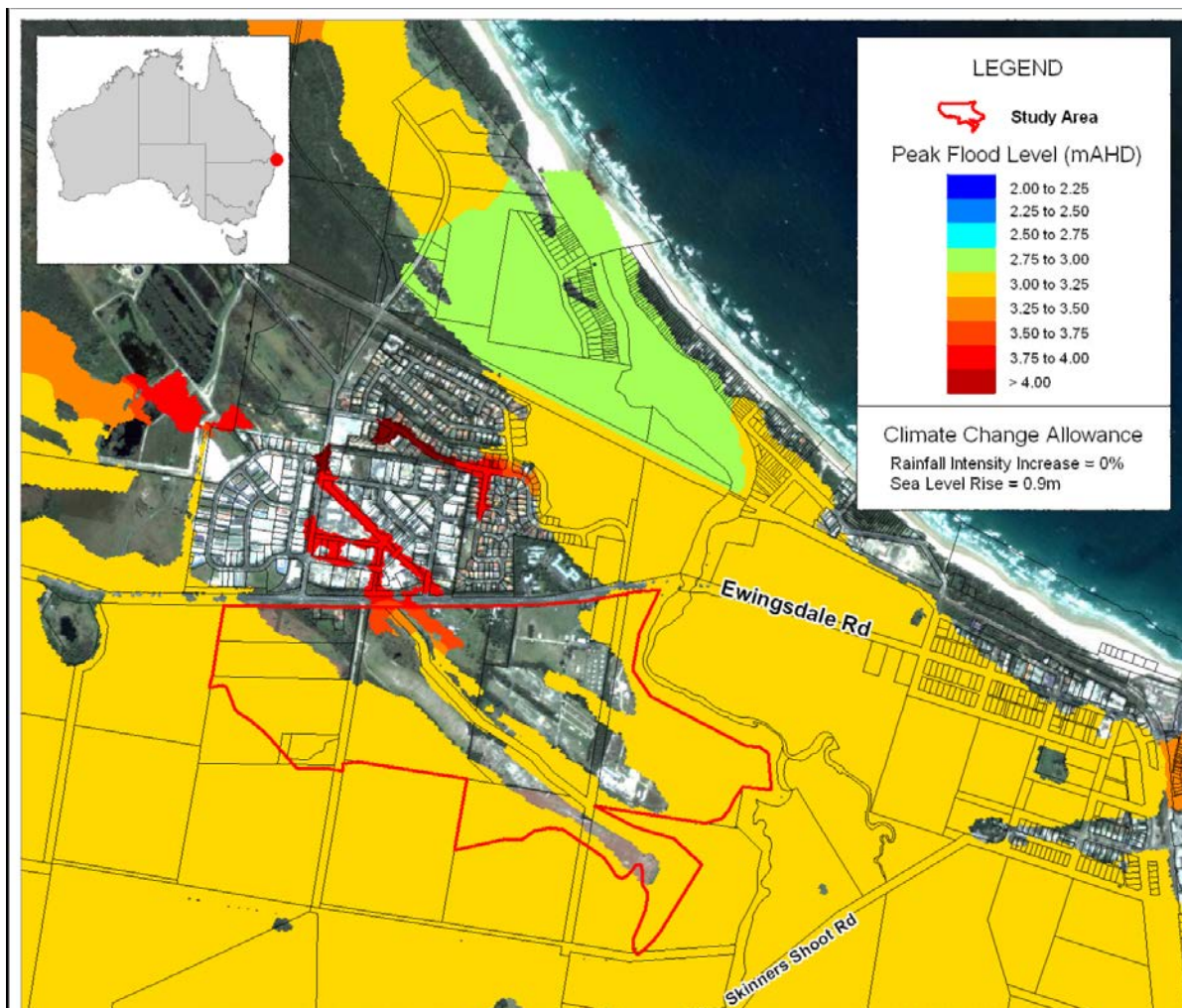
The site is floodprone and at extreme risk from rising sea levels.



Extract from Council's Rural Land Use Strategy "CONSTRAINED LAND: '1:100yr Flood or Climate Change risk'", showing the Villa World development overlain.

The design flood levels for West Byron are determined by the 2100 climate change 100 year average recurrent interval (ARI) flood level contours based on the revised BMT WBM (2010) Flood Study which gives a DFL of 3.1mAHD. A freeboard of 0.5m has been added to the DFL to determine the minimum habitable floor level of 3.6mAHD for the development.

BSC's *Climate Change Strategic Planning Policy* (BSC, 2009) included guidelines on increases in rainfall intensity to be adopted for Flood Studies and Floodplain Management Plans of 10% and 30% for the 2050 and 2100 planning horizons. BMT WBM (2010) 100 year ARI design peak flood level is based "on a 10% increase in rainfall intensity, 0.90m sea level rise and a 0.5m freeboard allowance", with "no rainfall intensity increases ... accounted for during the PMF modelling".



Probable Maximum Flood from BMT WBM (2010), based on sea-level rise of 0.9m and no increase in rainfall intensity.

During a severe storm the combination of storm surges (water elevation due to reduced barometric pressure and winds) and wave setup (water elevation due to breaking waves) can result in sea-levels rising by 1.1 to 2.1 metres (NSW 1990) for several hours. Wave uprush can reach 3-6m higher. When this coincides with a high tide it forms an effective barrier for floodwaters and cause them to back-up, significantly raising flood levels. The sea-level at the mouth of the estuary is referred to as the tailwater level, the height of which depends on the intensity of the storm.

BMT WBM (2013) consider:

For the purpose of assessing the inundation hazard within the lower estuary areas of creeks within Byron Shire, the design elevated water level within the lower estuary is based on Council's policy for the 100 year design elevated ocean levels at estuary mouths for flood planning scenarios with storm surge events and climate change. This incorporates provisions for:

- A tide level of 0.94m (AHD);
- Total surge currently of 0.9m, increasing to 1.1m and 1.2m at 2050 and 2100 respectively due to projected climate change; and
- Wave setup of 0.45m.

Levels at 2050 and 2100 are increased by the sea level rise provisions in Council's adopted sea level rise policy for planning purposes that provides for an increase in mean sea level above 1990 levels of 0.4m by 2050 and 0.9m by 2100. Thus, Council's policy design levels for estuary flooding are adopted herein as the basis for estuary inundation, corresponding to RL+2.29m under current conditions and RL+2.89m and RL+3.49m at 2050 and 2100 respectively

BMT WBM (2013) comment:

While the adopted current storm tide level of 1.84m is considered conservatively high, it could correspondingly be regarded as a more moderate ocean storm tide plus a provision (0.4m) for the hydraulic gradient of flood flow through the lower estuary and mouth for assessing the inundation levels along the lower estuary. The adopted policy levels are thus reasonable for the purposes of this study.

Our understanding of future climate changes resulting from increases in greenhouse gasses is rapidly evolving as more information is collected on current trends and likely future scenarios. Council's provision for sea-level rise by 2100 is 0.9m. The more recent assessments conclude that sea-level rises could be significantly greater than those used by Council. For example the [National Ocean Service \(NOS\) Center for Operational Oceanographic Products and Services \(CO-OPS\) \(2017\)](#) consider:

The projections and results presented in several peer-reviewed publications provide evidence to support a physically plausible GMSL rise in the range of 2.0 meters (m) to 2.7 m, and recent results regarding Antarctic ice-sheet instability indicate that such outcomes may be more likely than previously thought. To ensure consistency with these recent updates to the peer-reviewed scientific literature, we recommend a revised 'extreme' upper-bound scenario for GMSL rise of 2.5 m by the year 2100, which is 0.5 m higher than the upper bound scenario from Parris et al. (2012) employed by the Third NCA (NCA3). In addition, after consideration of tide gauge and altimeter-based estimates of the rates of GMSL change over the past quarter-century and of recent modeling of future low-end projections of GMSL rise, we revise Parris et al. (2012)'s estimate of the lower bound upward by 0.1 m to 0.3 m by the year 2100.

With a freeboard allowance of only 0.5m there is no room for error when the risk of inundation is dependent on numerous conservative assumptions that are already proving to be under-estimated and under-stated.

It is not accepted that the WBM 2010 Flood Study relied upon adequately considered flood risk and climate change increases in sea level rise and rainfall intensity. Therefore the

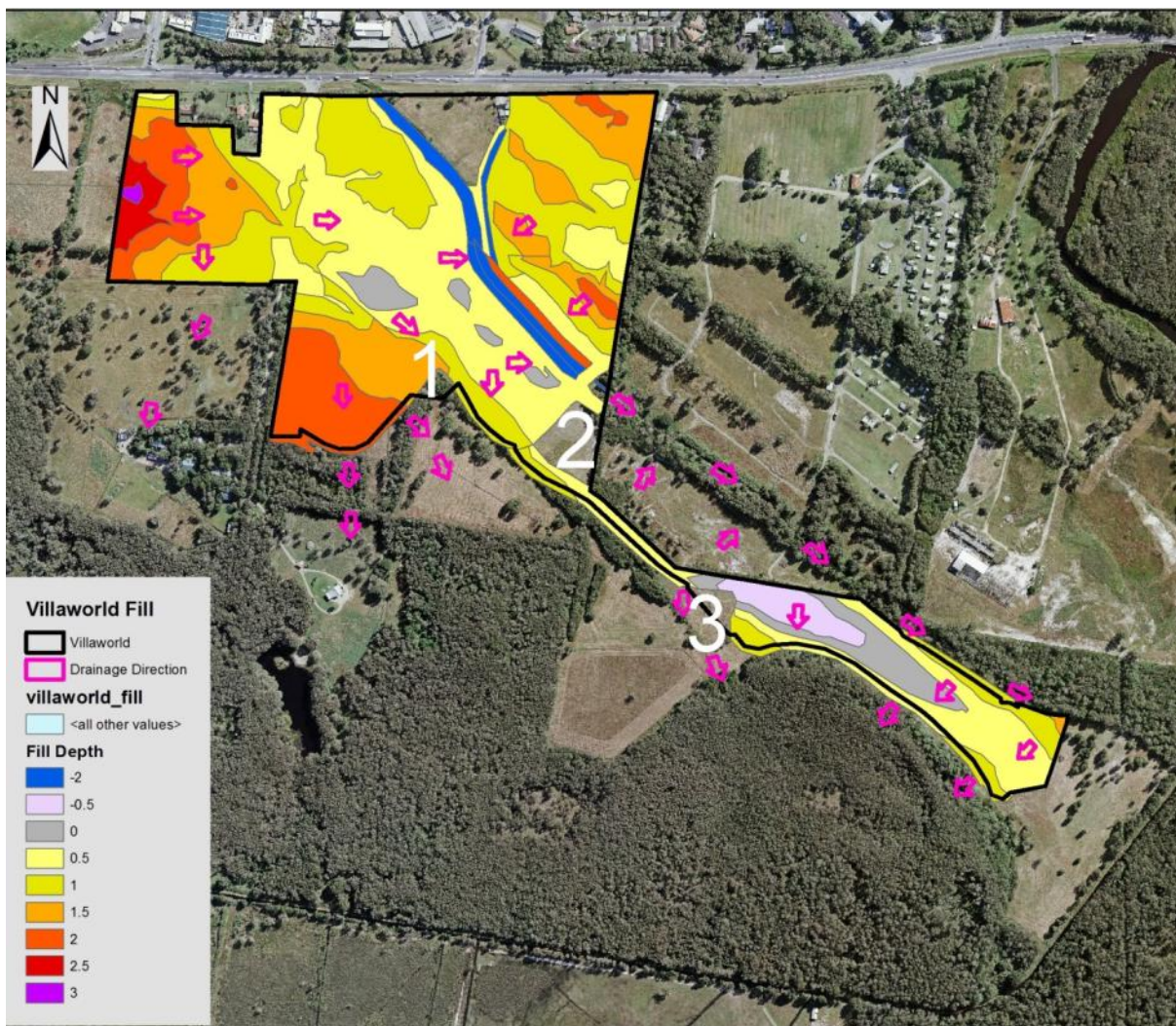
design does not adequately consider 1:100 year flood events or Probable Maximum Floods. Aside from the inadequacies at the time the study was undertaken, there is a lot more known about the likely consequences of sea-level rise, increasing storm intensities, storm tides, tailwater levels and likely rainfall intensities now than at the time the study was done. Given the extremely high vulnerability of West Byron to climate change, and the associated risks of development of the site, there needs to be a new flood study done that accounts for new information and adopts a precautionary approach in assessing future flood risk.

5. Fill and excavation

The intent is to undertake extensive filling of most of the site, such that "each of the lots has been designed to a minimum pad height of RL3.6mAHD", with fill up to 3m deep. The proponents claim they intend to import 168,800m³ of fill to cover an area of 266,283m². This will be supplemented by a cut volume of 12,800m³ from within the site, giving a total fill volume of 181,600m³. There is no identification of the volumes of fill required for the whole site and the consequences of other fill works occurring concurrently.

No information is provided to indicate the availability of fill, where the fill will come from, the haulage routes, or the number and frequency of truck movements involved so no assessment can be made of the impacts, particularly of truck movements on both the level of service on Ewingsdale Road and on the road pavement.

For example sand normally will be about 1.8t/m³ up to 2.2t/m³ (wet can be up to 2.7t/m³). The number of trucks involved depends on a range of issues from the weight of the fill to the size of the trucks, though 10m³ per truck is a realistic assumption, meaning that the import of the stated fill will require in the order of 16,900 trips, meaning 33,800 truck movements along Ewingsdale Road. This will be in addition to the rest of West Byron.



3 areas that would have to be filled to attain the stated intent for a *minimum pad height of RL3..6mAHD* for all dwellings are not shown as such on the fill maps, given that the filling of these sites is apparently required it appears the volumes of fill will be greater than claimed.

It is claimed that it is intend to import 168,800m³ of fill, yet there are significant areas missing from the fill map so the volume may be intended to be higher. The import of the stated fill will require in the order of 16,900 trips. No information is provided to indicate the availability of fill, where the fill will come from, the haulage routes, or the number and frequency of truck movements involved so no assessment can be made of the impacts, particularly of truck movements, on both the level of service on Ewingsdale Road and on the road pavement. It is essential that this be undertaken in the context of the whole site as it is all being intended for filling and multiple fill operations may be happening at the one time.

6. Controlling Runoff

The depth of the water table ranges from the surface down around a metre, meaning parts of the site easily becomes waterlogged and are proposed to be drained. For Villa World HMC confirmed groundwater at depths of 0-0.85m, This groundwater is acidic and is contaminated with aluminium, copper, iron, lead, zinc and petroleum hydrocarbons. At depth there are potential Acid Sulfate Soils (ASS) which will generate Sulphuric Acid if drained and mobilise even more pollutants into the groundwater when wetted.

The proposal is to only construct a stormwater system designed to cope with up to 1:10 year events, with runoff from events above this threshold directed as overland flows into swales associated with a central drain or to a series of outlets on the southern side of the development. It is doubtful that the swales will cope with runoff in heavy events and thus it is likely that polluted storm runoff from roads and houses will directly enter the drains, SEPP wetlands and estuary. The Existing western drainage line is to be buried under a couple of metres of fill. roads and houses.

The development is predicated upon constructing a huge drain up to 30m wide and 4m deep through the centre of the site to lower the water table and drain the majority of the sites into the Belongil estuary. As noted by Villa World

Disturbance of the existing natural surface would generally be less than one metre, except along the alignment of the existing stormwater drain. It is proposed to widen and deepen the drain to achieve stormwater management capacities.

It has been astounding throughout the whole process that there has been no attempt to assess the effects that this drain will have on the surrounding watertable and the quality of water that drains into the Belongil estuary.

The Villa World lands encompass the majority of this drain, both its start and its finish. For the western section the intent is to move and reform the drain through the site, with swales constructed along each side, and directing runoff from most of the development into it. The identified intent is not to undertake any additional works downstream of these works, meaning the intent is to direct increase water volumes from a deepened and widened drain into the same drainage line as at present. This is an absurd proposal, and clearly not what is intended.

Maintenance of groundwater has important ecological functions which will be affected by changed drainage patterns. In relation to groundwater, the developer's fauna report (Australian Wetlands Consulting Pty Ltd 2010) states:

Two threatened species (Wallum Froglet, Olongburra Frog) and three vegetation communities (swamp sclerophyll forest, freshwater wetland, fernland) at the site are considered groundwater dependent.

6.1. Acid Sulfate Soils

Most of the site will be subject to filling, which should avoid the need to excavate below 2m AHD, except for the swales and drains which will apparently entail extensive works below 2m AHD.

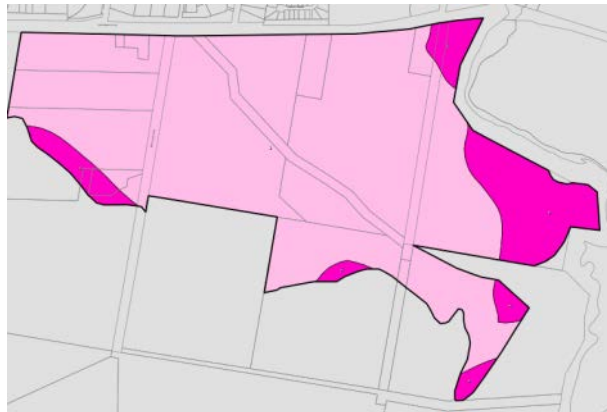
The proposal is predicated upon reconstructing the central drainage line into a huge drain up to 30m wide and 4m deep through the centre of the site to lower the water table and drain the surrounding soils into the Belongil estuary. As well as 77% of the site having Actual and Potential ASS, the

depth of the water table ranges from the surface down to around a metre and the groundwater is already contaminated with aluminium, copper, iron, lead, zinc and petroleum hydrocarbons.

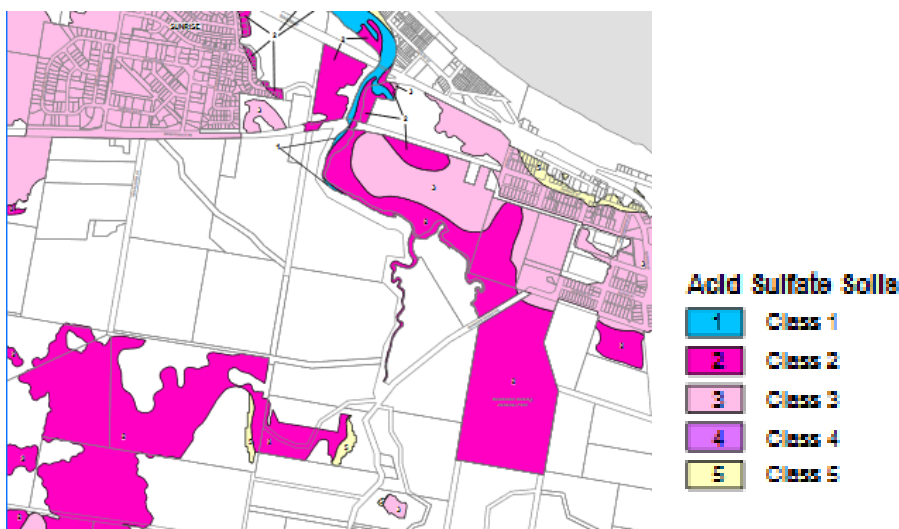
The drain will have the effect of exposing large areas of Potential Acid Sulfate Soils (PASS) and Actual Acid Sulfate Soils (AASS) to the air, which will result in oxidation of the ASS, the consequent generation of sulphuric acid, and the mobilisation of toxic concentrations of aluminium, iron, and heavy metals into Belongil Creek. Dewatering and drains associated with the development, excavations of soils, along with changes to surface and subsurface flows due to hard surfaces and vegetation changes, will also significantly affect the Acid Sulfate Soils on site.

There are a variety of different maps of Acid Sulfate Soils applying to the site. The Byron LES utilises the State Governments mapping which identifies the Villa World site as Class 3 with the risk being *"Works beyond 1m below the natural ground surface. Works by which the watertable is likely to be lowered beyond 1m below the natural ground surface"*.

The West Byron clause inserted into the 2014 LEP relies upon the Acid Sulfate Soils mapping from the 1988 LEP. identifying the bulk of the site as Class 3, with patches of Class 2 ASS around the margins.

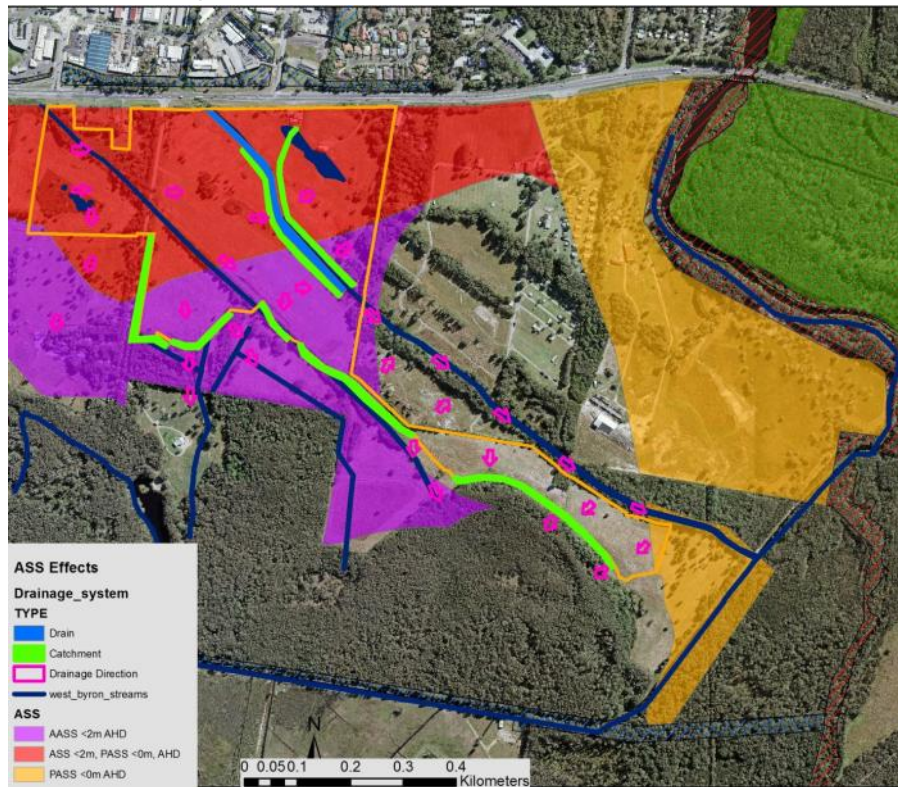


Mapping of ASS relied upon for West Byron in accordance with Minister for Planning's insertion into the Byron LEP. This mapping belongs to a world of its own, and doesn't even cover the whole of the Villa World lands.



Byron Shire Council's 2014 LEP has its own regulatory maps. These simply don't make sense as they have used cadastre boundaries as boundaries of ASS soils, such as the boundaries of the Cumbebin Swamp Nature Reserve and the boundary of West Byron to the north. These are clearly a fabrication, though are the regulatory mechanism relied upon by the LEP.

Different Mapping of ASS was prepared by the *Preliminary Acid Sulfate Soil Assessment*, though is not included in Villa World's reports.



Mapping of Acid Sulfate Soils undertaken for the *Preliminary Acid Sulfate Soil Assessment* is excluded from Villa World's report, despite being totally different from the outdated map relied upon. The existing and proposed drainage system have been overlaid.

The *Preliminary Acid Sulfate Soil Assessment* identified potential ASS at depths ranging from 0.5m AHD to 1.75m AHD, noting:

The presence of localised occurrences of potential and actual acid sulphate soils within the study area has been confirmed during this preliminary assessment. ... predominantly located within the low-lying interbarrier flats, sporadically overlain by alluvial and fluvial sediment layers.

The soils of the site are naturally acidic, which is consistent with Morand (1996) descriptions. The analysis effort detected high levels of actual acidity throughout the soil profile, and in association with the low levels of potential sulfidic acidity, the majority of soils analysed recorded a net acidity (as per the Acid Base Accounting method) in excess of the relevant trigger criteria as defined by soil texture.

Nevertheless, as defined in Stone et al (1998), the acid trail values of the preliminary ASS assessment conducted across the NBP Parklands site characterises the soils of the site as Actual ASS and shall require specific treatment measures during construction of necessary infrastructure and services.


The provision of utilities (mains water and reticulated sewer, power, telecommunications etc.) and earthworks (for site won fill) is in all likelihood, a certainty, and such activities will require excavation to cater for both subsurface and aboveground infrastructure. In such cases where the likelihood of ASS disturbance is high, implications arise in terms of ASS oxidation as a result of these works. In association with acidic discharges to nearby sensitive

environments (during and following construction efforts), the potential for damage to constructed services and structures (due to acidic corrosion) may also occur. An associated danger of ASS oxidation is the effect of soil (and pore water) acidification upon the chemical composition of the soil and its components. **The mobilisation of dissolved metals such as aluminium, iron, manganese and cadmium may have serious toxicological impacts upon aquatic and terrestrial biota exposed to suitably high concentrations of such substances. Elevated levels of mobilised trace heavy metals in soil and water can be toxic to aquatic life if released into the drainage system during high flow events or a rise in the local groundwater table.**


For Villa World HMC undertook 8 additional soil samples, identifying widespread acidity, though this is downplayed as not being significant. Seven of the 8 sites have readings "indicative of ASS/PASS or exceed action criteria", though they claim most readings are not representative of ASS. They identify that in a borehole "located near proposed earthworks associated with the widening and deepening of the existing stormwater drain" "actual acidity" was found and that "this work may intercept both actual and potential ASS".

Table 8 Results

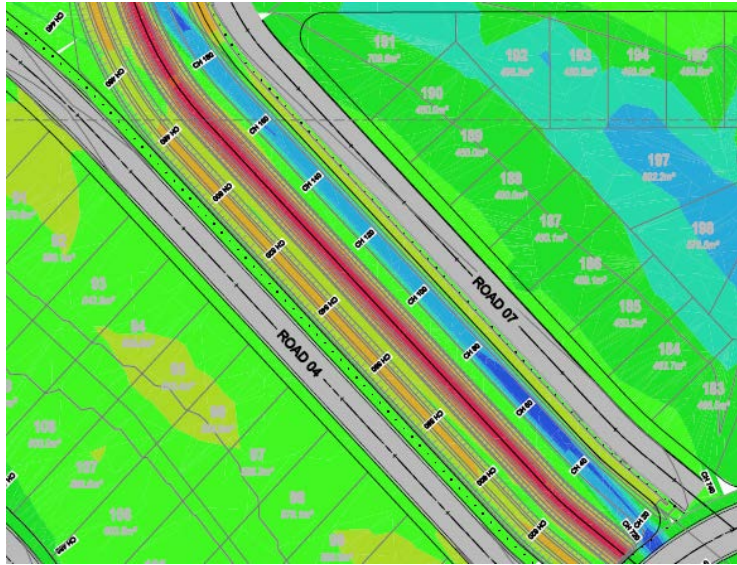
Depth (m)	Borehole ID															
	(BH3A)				(BH3B)				(BH4A)				(BH6A)			
	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T
0.4-0.5	4.5	3.6	<0.01%	-	4.5	3.1	<0.01%	2	4.0	3.0	<0.01%	2	4.6	3.1	<0.01%	85
0.9-1.0	4.5	3.3	<0.01%	-	4.9	3.9			4.0	3.2			4.8	3.0	<0.01%	3
1.4-1.5	4.7	3.2			4.6	3.4			4.4	2.9	0.01%	53	5.3	3.1		
1.9-2.0	4.6	2.9			4.3	3.0	<0.01%	8	4.4	3.0			4.8	3.1		
2.4-2.5	4.5	2.1	<0.01%	5	4.4	2.8	<0.01%	15	4.4	2.2	0.01%	30	4.6	3.2		
2.9-3.0	4.5	1.9			4.3	2.8			4.3	2.2			4.7	3.3	<0.01%	12

 Indicative of AASS/PASS or exceed action criteria

Depth (m)	Borehole ID															
	(BH6B)				(BH7A)				(BH7B)				(BH11A)			
	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T	pH _F	pH _{FOX}	%S _{CR}	TAA mol H ⁺ /T
0.4-0.5					3.9	2.3	<0.01%	38	4.3	3.0	<0.01%	3	4.0	3.3	<0.01%	3
0.9-1.0					4.3	2.6			4.0	2.9	<0.01%	10	4.0	3.0	<0.01%	-
1.4-1.5					5.2	3.0	0.01%	69	4.5	3.0			4.0	3.0	<0.01%	3
1.9-2.0					5.2	2.6			4.5	3.3			3.9	3.0		
2.4-2.5					4.8	2.3	0.04%	30	4.6	2.5			3.8	3.3		
2.9-3.0					4.6	2.4			4.5	2.3	<0.01%	10	3.9	3.4		
3.4-3.5	4.2	2.2	0.03%	8	4.5	2.5			4.2	2.4						
3.9-4.0	4.8	2.4			4.7	2.9	0.01%	20	4.6	2.5						
4.4-4.5	4.9	2.6			5.2	3.2	0.01%	22	4.5	2.5	0.03%	56				

 Indicative of AASS/PASS or exceed action criteria

Sites BH7A, BH7B and BH6B were all located near the central drain and indicate significant acidity problems, that should warrant more detailed investigations.



Extract from fill plan showing excavation of swale to -1m and drain to -2m below current levels.

Excavation of the main drain is proposed below 2m AHD which will result in the excavation of significant volumes of PASS and AASS. Villa World's proposed solution is to treat the estimated 1,400m³ of soil excavated below RL2.0m AHD with lime. It is not known if this includes the likely volumes from the swales and drainage works along the southern boundary which are also likely to intersect PASS and AASS.

There has been no attempt to consider how the deepening of the drain will affect the depth of groundwater, the dewatering of surrounding soils, the generation of Actual ASS soils, or the quality of runoff of both polluted groundwater and acidic runoff. As noted by The NSW Acid Sulfate Soils Assessment Guidelines (1998):

Changes in drainage have implications for the likely generation of acid. When acid sulfate soils are drained, the sulfide can become exposed to oxygen producing sulfuric acid. The sulfuric acid can dissolve clay and release toxic concentrations of aluminium and iron into estuarine and groundwater systems leading to poor water quality and the death or disease of vegetation and aquatic organisms. Changes in hydrology can also result in the drying out of unripened potential acid sulfate soils causing shrinkage, surface subsidence and sulfide oxidation. Impacts can result if the proposal involves the modification of the drainage pattern and surface runoff yield and hydrologic flow regimes.

Tulau (1999) prepared a report 'Acid Sulfate Soil Management Priority Areas in the Byron – Brunswick Floodplains' for the Department of Land and Water Conservation. Tulau (1999) notes:

As long as ASS are not disturbed or drained, these materials are relatively harmless and are termed potential ASS. However, if the sediments are exposed to air, the pyrite is oxidised, and sulfuric acid is generated. When the rate of acid production exceeds the neutralising capacity of the parent material, actual ASS are formed. As a result, soil pH may fall to below 4.

...

Iron and aluminium may become soluble in toxic quantities, with their precipitates affecting water quality and coating stream banks and benthos. ...

...

... The following impacts (Sammut and Lines-Kelly 1996) may be associated with ASS runoff: habitat degradation; fish kills; fish disease outbreaks; reduced aquatic food

resources; reduced migration potential of fish; reduced fish recruitment; altered waterplant communities; weed invasion by acid-tolerant plants; secondary water quality changes; and reduced potability of water (see also Sammut et al. 1996).

The *Preliminary Acid Sulfate Soil Assessment* recommended that "maintenance of existing water table heights is recommended during both construction phase and operational phase of any proposed development of the investigation area". Though this is clearly unattainable if the drain is to be deepened to lower the watertable.

It is important to recognise that only the western part of the drain has been subject to soil testing and identified for works within the Villa World assessment. Yet the whole of the drain is required to facilitate the proposed works, and the deepening and widening of the upper reaches cannot be undertaken in isolation of the other works required further downstream to accommodate the increased runoff being directed into the drain and the runoff from the upstream works. It is absurd to only consider one part of the works, particularly as the works on the lower section of the drain are within the Villa World site.

It is ridiculous to only undertake and consider part of the West Byron site and part of the drain when considering Acid Sulfate Soils. As noted by the NSW Acid Sulfate Soils Assessment Guidelines:

Where a property is likely to involve a number of works (eg a number of drains, laser levelling, dams, roads) over a period of time, rather than seeking approval for each individual work or activity, it is recommended that the proponent prepares a strategy for managing the property as a whole and submit a single application for the whole property ...

This approach is recommended as it promotes better overall management of the property and provides council with a more complete overview of the likely cumulative impacts with other drains and works as well as the ongoing maintenance and management.

The Guidelines also make it clear that "the approval authority has to consider the likelihood of the works resulting in the oxidation of acid sulfate soils and the adequacy of any management strategy" stating:

When designing an acid sulfate soil management plan, the precautionary principle should be considered. Where there are doubts, be conservative. Always follow best practice. Where there are uncertainties, undertake trials or pilot studies to increase knowledge and the predictability of outcomes. There is a responsibility on those proposing to undertake the works, the consultants advising them and any approval authority in making a decision, to ensure that if there are uncertainties, both the short and long term implications of the worst case scenarios are considered.

The depth of current water table ranges from the surface down around a metre, and this groundwater is contaminated with aluminium, copper, iron, lead, zinc and petroleum hydrocarbons. Underlying the groundwater are Actual and Potential Acid Sulfate Soils, which will generate sulfuric acid if drained and increase the contamination of groundwater. The proposal is to construct a large drain through the site, as well as a variety of swales, which will likely activate Potential Acid Sulfate Soils and drain polluted groundwater into the estuary. There must be further assessments to identify the extent of AASS and PASS and quantify the extent of soils to be drained and the likely consequences for pollution of the estuary.

6.2. Protecting Riparian Habitats

The intent is to allow stormwater to flow down streets, through the swales and directly into the SEPP wetlands and the Belongil Estuary. More substantial and effective riparian buffers are required, including to maintain aquatic ecosystems.

The Belongil Estuary Study and Management Plan focuses on the issue of water quality, making numerous recommendations regarding source controls for new developments, including implementing riparian buffers. Riparian buffers are considered essential, particularly so close to the Cape Byron Marine Park.

The health of streams is directly related to the health and functioning of riparian vegetation. Riparian buffers serve several functions:

- shading of streams and minimising fluctuations in water temperatures
- reducing the volumes of overland flows entering streams
- trapping sediments and associated pollutants moving from upslope towards streams
- maintenance of stable stream banks and channels;
- providing wood, leaf litter, fruits, flowers, insects and other resource inputs to streams;
- maintenance of habitat requirements for many aquatic and terrestrial species; and,
- provide corridors for the movement of a suite of terrestrial species.

The key threatening process declaration under the *Fisheries Management Act 1994* for 'degradation of native riparian vegetation along New South Wales water courses' states:

1. Riparian vegetation refers to the vegetation fringing water courses and can be defined as any vegetation on land which adjoins, directly influences, or is influenced by a body of water. Riparian habitats thus include land immediately alongside large and small creeks and rivers, including the river bank itself; gullies and dips that sometimes run with surface water; areas around lakes; wetlands on river floodplains that interact with the river in times of flood.

...

- 4. Degradation of riparian vegetation has a major influence on stream ecosystems by;*
- *Increasing the amount of sediment and nutrients reaching streams as runoff, and increasing light penetration of the water body. These inputs have the combined effect of smothering benthic communities and increasing harmful algal growth.*
 - *Reducing the inputs of organic carbon, via leaves, twigs, and branches. Terrestrially derived carbon inputs are the major energy source in most stream ecosystems.*
 - *Reducing the amount of large woody debris entering the aquatic ecosystem and thereby negatively impacting on habitat and spawning sites of several vulnerable and endangered species listed under the Fisheries Management Act, 1994.*
 - *Destabilising river banks.*
 - *Reducing the amount of overhanging riparian vegetation resulting in a loss of shade and shelter for fish.*

Vegetation growing along streams does physically affect streams by binding streambanks and stabilising channels, while providing shade to cool the streams and regulate in-stream primary productivity. While limited buffers can directly protect stream bank vegetation, wider buffers are needed to limit pollution of waterways by nutrients and sediments.

Direction of runoff onto undisturbed vegetation and the maintenance of undisturbed filter strips along streams are the principal means of slowing runoff and trapping mobilised sediments and nutrients before they reach a stream. They are thus the principal means of mitigating the unavoidable impacts of surrounding land uses on water quality. Outside of saturated areas the

undisturbed soil allows increased infiltration of water and thus sediment deposition and the roughness of the ground litter and vegetation slows surface-flows and act as sediment traps. The vegetation can uptake, assimilate and remove many of the nutrients.

Hansen *et al.* (2010) undertook a meta-analysis of >200 riparian studies and recommended riparian buffer widths of between 30 and 200 m dependant on land use intensity and the management objective. Hansen *et al.* (2010) state "As a general rule, the greater the land use intensity, the wider the riparian zone needs to be to buffer against catchment modifications and disturbances" and "In Australia, modifications to the catchment landscape through agriculture (especially grazing) and urbanisation have had the most significant negative impacts upon waterways (Norris *et al.*, 2001)".

Hansen B., Reich P., Lake P. S. and Cavagnaro T. (2010) Minimum width requirements for riparian zones to protect flowing waters and to conserve biodiversity: a review and recommendations. With application to the State of Victoria. Report to the Office of Water, Department of Sustainability and Environment.

http://www.ccmaknowledgebase.vic.gov.au/resources/RiparianBuffers_Report_Hansenetal2010.pdf

Hansen *et al.* (2010) Minimum width recommendations for Victorian riparian zones based upon available scientific literature and adjusted using expert opinion, where appropriate, to account for known differences between Victorian and international systems. All widths are in metres.

Landscape context /Management Objective	Land Use Intensity High	Land Use Intensity Moderate	Land Use Intensity Low	Wetland/lowland floodplain/off-stream water bodies	Steep catchments/cleared hillslopes/low order streams
Improve water quality	60	45	30	120	40
Moderate stream temperatures	95	65	35	40	35
Provide food and resources	95	65	35	40	35
Improve in-stream biodiversity	100	70	40	Variable*	40
Improve terrestrial biodiversity	200	150	100	Variable*	200

* Variability in width is related to the lateral extent of hydrological connectivity and thus, any recommendation will be site specific.

The proposed swales are inadequate to protect water quality and do not have the full suite of ecological benefits provided by treed buffers.

7. Wetlands and Estuaries

The site adjoins State significant SEPP wetlands to the south and east. The drains in and around the site are tidal and thus part of the Belongil estuary, which is a Special Purpose Zone of the Cape Byron Marine Park. The proposal is to direct runoff from the site directly into a central drain which is part of the Belongil estuary, and to the south directly into SEPP wetlands.

Outrageously, the future for the western drainage line appears to be in limbo, with nobody committing to protecting it and the proposal being to bury it in fill, roads and houses, with the lower reaches, within the main habitat area for Wallum Froglets made into swales and drains.

Villa World identifies that the proposal is "*to have no on-site detention and utilise infiltration and dispersion methods for storm events*". When groundwater is near the surface it is hard to fathom how infiltration into waterlogged soils can be relied upon, while dispersal through the proposed swales is unlikely to be able to cope with high rainfall events.

In their SEPP 71 assessment DoPE state:

Assessments in relation to the impact on Belongil Creek's water quality identified the need for sedimentation and erosion controls, the management of acid sulphate soils and implementation of water sensitive urban design measures.

This is obviously correct, though is not what is proposed. The proponents claim they have met the requirements of SEPP71, including:

-The proposed water quality measures as outlined in the engineering design (see **Appendix B Stormwater Management Plan**) which ensures the quality of stormwater leaving the site & reaching the downstream receptors, with this in mind the downstream impact on fish and crustacean species is not considered to be affected by this development.

It is hard to fathom how without retention basins and measures capable of capturing pollutants during periods of high flow, coupled with likely draining of Acid Sulfate Soils and polluted groundwater, they can pretend this is the case.

Contrary to DoPE's claims, without retention basins and measures to slow flows within the central drain, and with direction of the western drain into the central drain, there will be no prospects of "*the proposal providing an opportunity to improve the quality of water draining from the industrial estate north of Ewingsdale Road into Belongil Creek*". Instead through flows will be increased and accelerated.

Despite extensive SEPP wetlands being on the property, and the draft "Coastal Wetlands Proximity Area" encompassing significant portions of the development area, Villa World claim:

Further detailed assessment of Wetlands SEPP is not considered warranted as they are well beyond the scope of the WBURA project area, extensive buffers have been provided during the establishment of the release area, and this proposal does not impose any detrimental impact to nearby wetlands nor Belongil Creek. The proposal is therefore not considered relevant for Concurrence referral in relation to matters pertaining to this policy.

Clause 8 of SEPP 71 requires an assessment of:

(m) likely impacts of development on the water quality of coastal waterbodies

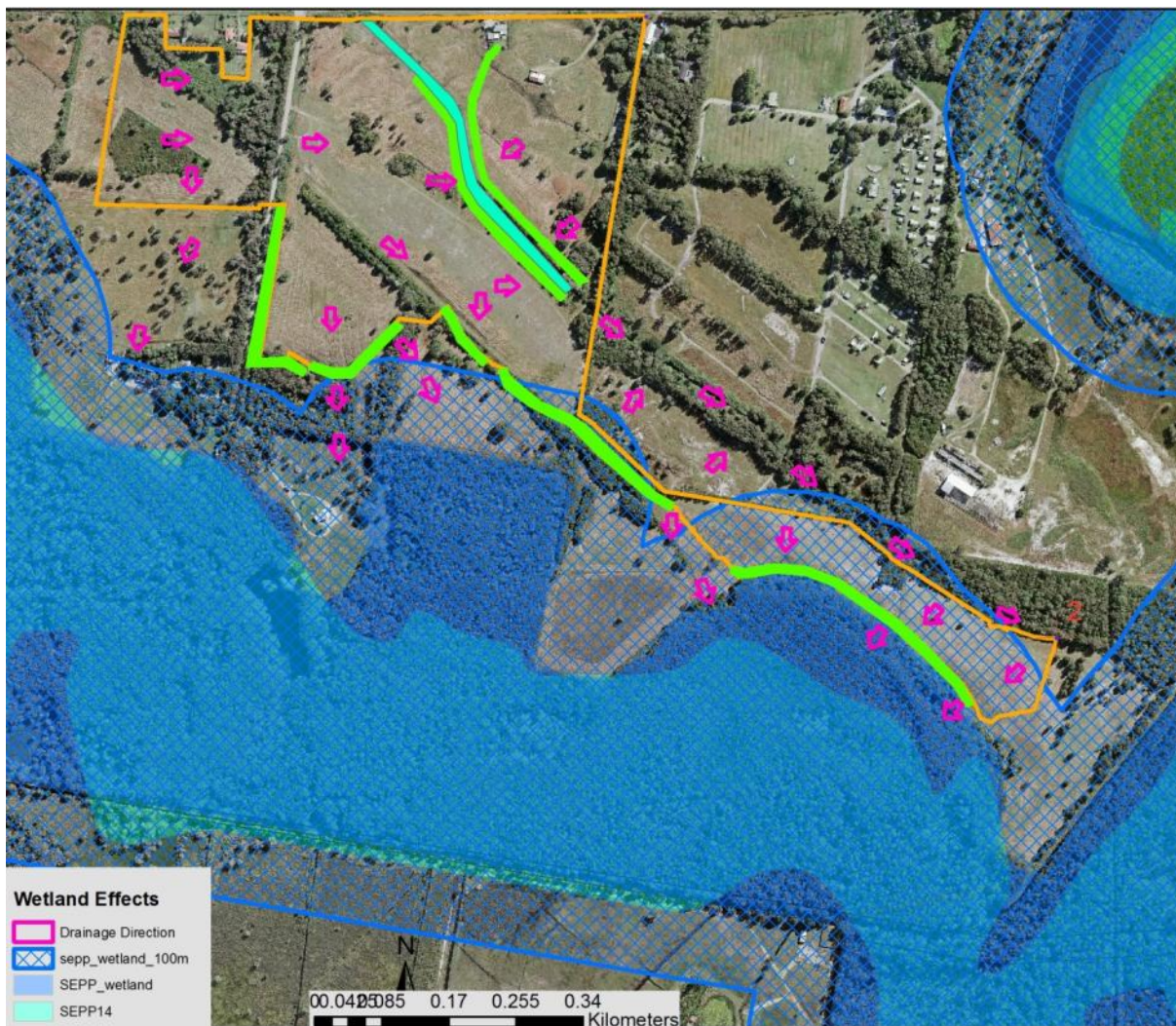
Contrary to Villa World's pretence, there is a need to assess how the redistribution of drainage from the site, and the increases in water runoff resulting from residential use, affects existing hydrological

regimes, and the effects such changes will have on endangered ecological communities, habitat of acid frogs, the habitat values of environmental zones, SEPP 14/Coastal wetlands, and the Belongil estuary.

Villa World claim that the layout has been designed "*to grade the site away towards the central drain and treatment facilities. This ensures that the stormwater is contained within the Harvest Estate and will not have an adverse impact on the stormwater quality of the adjoining properties*". Though the proposal is to drain significant portions of the site to the south towards existing houses. They also propose constructing a wall along their western boundary and to require industrial and residential development to the west of this to direct their drainage into properties to the south.

7.1. SEPP Wetlands

The wetlands on and to the south of the Villa World property have long been designated as wetlands of State significance, firstly as State Environmental Planning Policy (SEPP) 14 coastal wetlands, and more recently as 'Coastal Management Area 1: Coastal Wetlands and Littoral Rainforests Area in the 2016 Draft Coastal Management State Environmental Planning Policy.



Map showing : Coastal Wetlands and Littoral Rainforests Area from the draft Coastal Management SEPP, existing SEPP 14 and proposed drainage works. It is evident that there will be direct significant impacts on Coastal Management Area 1: Coastal Wetlands and Littoral Rainforests Area that should have been considered.

The 2016 Draft Coastal Management State Environmental Planning Policy (SEPP) has been publicly exhibited and thus should have been considered in accordance with **S79C** (c). The draft SEPP proposes to establish a new, strategic land use planning framework for coastal management. The site falls within the coastal use area.

The site contains land identified as "Coastal Wetlands Area" and "Coastal Wetlands Proximity Area" which falls within "Coastal Management Area 1: Coastal Wetlands and Littoral Rainforests Area". The 100 metre Coastal Wetlands Proximity Area is not intended to affect land uses but "to allow for natural fluctuations in these areas and to afford protections from the effects of any close-proximity development", though it does not apply to "land that is zoned for residential use". The discussion paper states:

Development consent must not be granted to development on land within the 100 metre perimeter area of a coastal wetland unless the consent authority is satisfied that the development will not significantly impact on:

- *the biophysical, hydrological or ecological integrity of the adjacent coastal wetland, or*
- *the quantity and quality of surface and ground water flows to the coastal wetland if the development is on land within the catchment of the coastal wetland.*

It is wrong for Villa World not to have considered the impacts the will have on the mapped Coastal wetlands and littoral rainforest area as the south-eastern part of the development is mostly within the Coastal Wetlands Proximity Area and this area will be directly impacted by fill and associated works and by the construction of drains and catchment areas outside the "Low Density Residential Zone". Similarly it appears that the intent is to construct drainage works, and potentially undertake some fill works, within the mapped Coastal wetlands. There will also be significant effects resultant from urban and flood runoff being discharged directly into the Coastal Wetlands and Coastal Wetlands Proximity Area that must be considered.

7.2. Belongil Estuary

The Belongil estuary is a Special Purpose Zone for environmental rehabilitation in the Cape Byron Marine Park. and a Coastal environment area under the 2016 Draft Coastal Management SEPP. It is thus recognised as being particularly significant.

The Belongil Creek estuary is already significantly degraded by major pollutants from the West Byron Sewerage Treatment Plant, stormwater runoff from the urban areas of Byron Bay and Sunrise Beach, and the Byron Bay industrial estate, point sources such as Sunnybrand Chicken Factory, leachate from the old Byron Bay tip, and runoff from acid sulphate soils and agricultural lands. It is in need of environmental repair, and is in such a perilous state that it cannot cope with further degradation.

The proposal is to undertake extensive works over a large area of actual and potential Acid Sulfate Soils, create hard surfaces and stormwater drainage systems that will significantly alter overland flows and transport a large variety of urban pollutants, and significantly enlarge an existing drain and undertake other drainage works that will lower water tables and generate acidic runoff.

To satisfy this requirement there is a need to undertake detailed assessments of the current health of the Belongil estuary and all waterbodies and groundwater on the site, to identify the potential extent of disturbances to, and drainage of, Acid Sulfate Soils, and to estimate the likely impact various development scenarios will have on the Belongil estuary.

The Belongil Estuary Study and Management Plan (Parker and Pont 2001) focuses on the issue of water quality, making numerous recommendations regarding source controls for new developments, investigating and remediating potential point sources of pollution, instigating stormwater management, managing drainage and runoff from Acid Sulfate Soils, and implementing riparian buffers. The Belongil Estuary Study and Management Plan note:

The Belongil Estuary is impacted by poor quality stormwater originating from urban and rural precincts, by acid runoff from rural areas during adverse seasonal conditions and by potential point sources of pollution ...

...

... a comparison of volumes, loads and flow durations suggests that acidic iron-saturated runoff has dominated estuarine processes in recent years. Drain water with a low pH (approximately 2) and which contained iron hydroxide flocs and low levels of dissolved oxygen levels has been recorded ... Extensive fish kills have been observed in conjunction with poor water quality ...

...

The PPK Draft Final Plan recommended that Council adopt stormwater management objectives for new development such as the minimisation of impervious areas, sediment controls, use of stormwater infiltration strategies to reduce surface runoff, avoidance of alteration of natural flow-paths and adequate riparian buffers. ...

...

... Suggested practical options include: onsite detention of stormwater in tanks or basins; sediment basins and gross pollutant trap (GPTs); litter baskets and nets of various types; and pollution control ponds and wetlands.

Tulau (1999) notes:

Fish kills in the creek (Schnierer 1988) have been attributed to high levels of dissolved aluminium and high acidity (BEC n.d.). A large fish kill occurred in February 1992, and again in January 1997, which was accompanied by extensive precipitation of iron (Byron News 1997). The most recent fish kill occurred in January 1999 (Echo 1999). On that occasion about 3000 fish were killed (Echo 1999), although it appears that the kill was caused by low dissolved oxygen (Wood, M., pers. comm.). ...

The Byron State of the Environment Report is prepared annually by Byron Shire Council. A comprehensive report was prepared in November 2001, with updates in 2002 and 2003. It provides background information on the environmental problems facing the Shire and monitoring of some environmental attributes. Of most relevance to West Byron are its assessments of the Belongil Creek catchment and the extremely poor quality of its waters. Amongst the issues identified in the 2001 Byron SOE are:

- *The Belongil Creek fails to meet all ANZECC water quality parameters most of the time, with average faecal coliform levels at one site over 300 times acceptable levels*
- *Studies have recommended nutrient levels in the Belongil should not increase above their current levels.*
- *Stormwater runoff from urban areas is a major source of estuary pollution;*
- *There are significant areas of Potential Acid Sulfate Soils in the Belongil Creek catchment and they are a major environmental hazard and source of water pollution when disturbed.*

- *Acid Sulfate Soils can release toxic concentrations of aluminium and iron, and heavy metals, into waterbodies.*

In relation to water quality in Belongil Creek the 2001 Byron SOE states:

... The compliance indices indicate very significant failures in all parameters, but particularly nutrients and bacterial contamination in the case of Belongil Creek. Individual site results from the Union Drain (site 10), Ewingsdale Road (site 11) and Butler Street stormwater sites (site 14) indicate unsustainable chemical and bacteriological inputs that cannot support a healthy ecosystem.

... Studies have recommended nutrient levels in the Belongil should not increase above their current levels. Belongil Creek is also impacted by acid sulphate soil conditions and partial opening to the sea.

For Belongil Creek Catchment the 2001 Byron SOE reviews the performance of water monthly quality tests at 5 sites from 1/7/2000 to 30/6/2001 compared to the ANZECC water quality guidelines and found that there was non-compliance 75% of the time:

	ANZECC Acceptable Limits	Average records at sites	Average non- compliance at sites	Mean Non- compliance (all sites)
pH	7.0 - 8.5	6.4 - 7.1	33%-90%	64%
Turbidity (NTU)	0.5 - 10	13.8 - 68	42%-80%	58%
Total Nitrogen (mg/L)	<0.3	0.98 - 1.5	100%	100%
Total Phosphorus (mg/L)	<0.03	0.09 – 0.26	67% - 100%	82%
Dissolved Oxygen (mg/L)	>6.0	4.3 – 5.8	50% - 80%	64%
Faecal Coliforms (cfu/100ml)	<150	1140 - 46160	64% - 100%	83%

For the Belongil Creek Catchment the 2009 Byron SOE identifies that % of non-compliance with ANZECC water quality guidelines increased from 63% in 2004 to 85% in 2008.

Regrettably the Council has stopped monitoring the health of the Belongil Creek and estuary, so there is no current data relating to its health. The current health of the estuary and the potential impacts of the development upon it is a key issue.

The Belongil Estuary Study and Management Plan notes:

The PPK Draft Final Plan recommended that Council adopt stormwater management objectives for new development such as the minimisation of impervious areas, sediment controls, use of stormwater infiltration strategies to reduce surface runoff, avoidance of alteration of natural flow-paths and adequate riparian buffers. The plan identified the main

stormwater drain as a major source of pollutants, including point source discharge from the old town dump near the Butler Street Reserve.

In relation to stormwater the 2001 Byron SOE states:

Runoff of stormwater transporting materials from developing and developed urban areas is a significant source of pollution entering estuaries and coastal lakes....

Materials that become contaminants include litter, coarse sediment, fine suspended material (silt), oil and tar, nutrients, pesticides and oxygen depleting materials such as grass clippings. Phosphorus is a major ingredient of many lawn, garden and crop fertilisers and can also present in effluent from urban and industrial areas in levels well above normal background levels.

Urban litter washed down stormwater systems and as well as being visually polluting is identified as a significant contributor to marine and estuarine pollution and considered a threat to marine life. Urban litter includes plastic bottles, plastic bags, tangled fishing lines, nets and other rubbish.

Any runoff above a 1:10 year event (which will become more frequent into the future) is proposed to be dealt with by overland flow, quickly overwhelming the capacity of the swales and running straight into the streams and estuary. The Belongil Estuary is already heavily degraded, cannot accommodate any increase in pollutants and has been identified as in need of environmental repair. The proposed drainage works will significantly increase the discharge of pollutants into the estuary and thus should not be acceptable. The drainage works need to be re-visioned to slow the movement of water through the site, improve infiltration, remove the need to deepen drains, increase the ability to trap pollutants, sediments and rubbish during periods of high flow, and expand riparian buffers to improve their capture of pollutants while providing ecological benefits to stream biota (ie shade, food inputs). The impacts and solutions need to be considered on a whole of site basis and not in a piecemeal manner.

8. Fauna

There are a large variety of threatened animals known to inhabit West Byron, including the Black Bittern, Black-necked Stork, Masked Owl, Grass Owl, Osprey, Koala, Grey-headed Flying Fox, Common Blossum Bat, Little Bentwing-bat, Eastern Bentwing Bat, Eastern Long-eared Bat, Southern Myotis, Greater Broad-nosed Bat, Wallum Froglet, and Wallum Sedge (Olongburra) Frog,

Most of these animals will be affected to varying extent by the development. On the Villa world site alone, the proposal is to clear and fill 5.6ha of Paperbark Forests, Dry Heath, Fernland and Wetland. This will have significant effects on a variety of fauna species. Of most concern is the effects on Koala, Wallum Sedge Frog and Wallum Froglet.

The Koala, Grey-headed Flying Fox and Wallum Sedge Frog are listed as nationally vulnerable under the Environment Protection and Biodiversity Conservation Act 1999. West Byron satisfies the Commonwealth's criteria for "habitat critical to the survival of the koala" under the 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)' and for the Wallum Sedge Frog under the 'Draft referral guidelines for the vulnerable wallum sedge frog, *Litoria onlongburensis*' (2011). Despite the proposal being to clear and surround core habitat for the nationally vulnerable Koala in a vital wildlife corridor, and to totally clear a wetland inhabited by the nationally Vulnerable Wallum Sedge Frog, the approach to dealing with Commonwealth referral has been like everything else in this sham process, alternating between denial and delay.

When assessing their rezoning DoPE considered "*The proposal would be unlikely to have a significant impact on species listed under the EPBC Act*", so they refused to refer it to the Federal Environment Minister. Now Villa World (2017, Statement of Environmental Effects) are stating "*Matters relating to environmental interests on site have been identified as requiring referral to the Commonwealth*" under the EPBC Act and (2017, Terrestrial Flora and Fauna Assessment) claiming "*Commonwealth referral will be undertaken at a later date, prior to any site works commencing*". Sure, sure.

Villa World are proposing eliminating a population of the nationally vulnerable Wallum Sedge Frog and removing identified Koala habitat and feed trees in part of an area representing core habitat for the nationally vulnerable Koala, and so needs to be referred to the to the federal Minister in accordance with the Environment Protection and Biodiversity Conservation Act 1999.

8.1. Koala

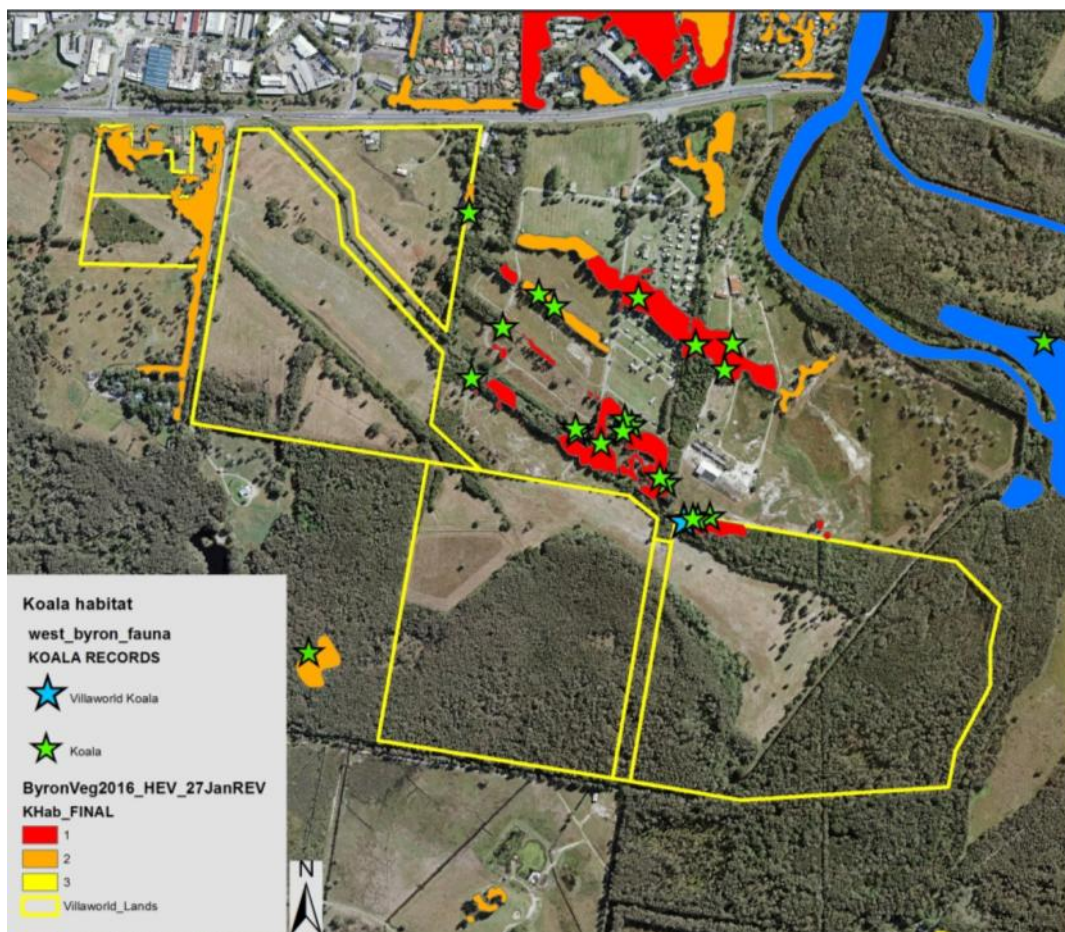
The evidence suggests that the Koalas on West Byron are part of a fragmented coastal Koala population, relying on small isolated patches of core habitat, that depends upon dispersal amongst the population for their ongoing viability and persistence. The West Byron site is obviously core Koala habitat supporting at least 2 Koalas and is a vital link for maintaining connectivity between Kolas to the north and south.

DoPE did not bother to obtain independent advice on Koalas, and decided to ignore the Byron Coastal Koala Plan of Management, and instead zoned 42% of the 6.9 ha of the mapped core Koala habitat identified on West Byron for development, with a further 32% of the core Koala habitat included in an E3 zone, with allowable uses including clearing for drains and Asset Protection Zones and numerous other uses.

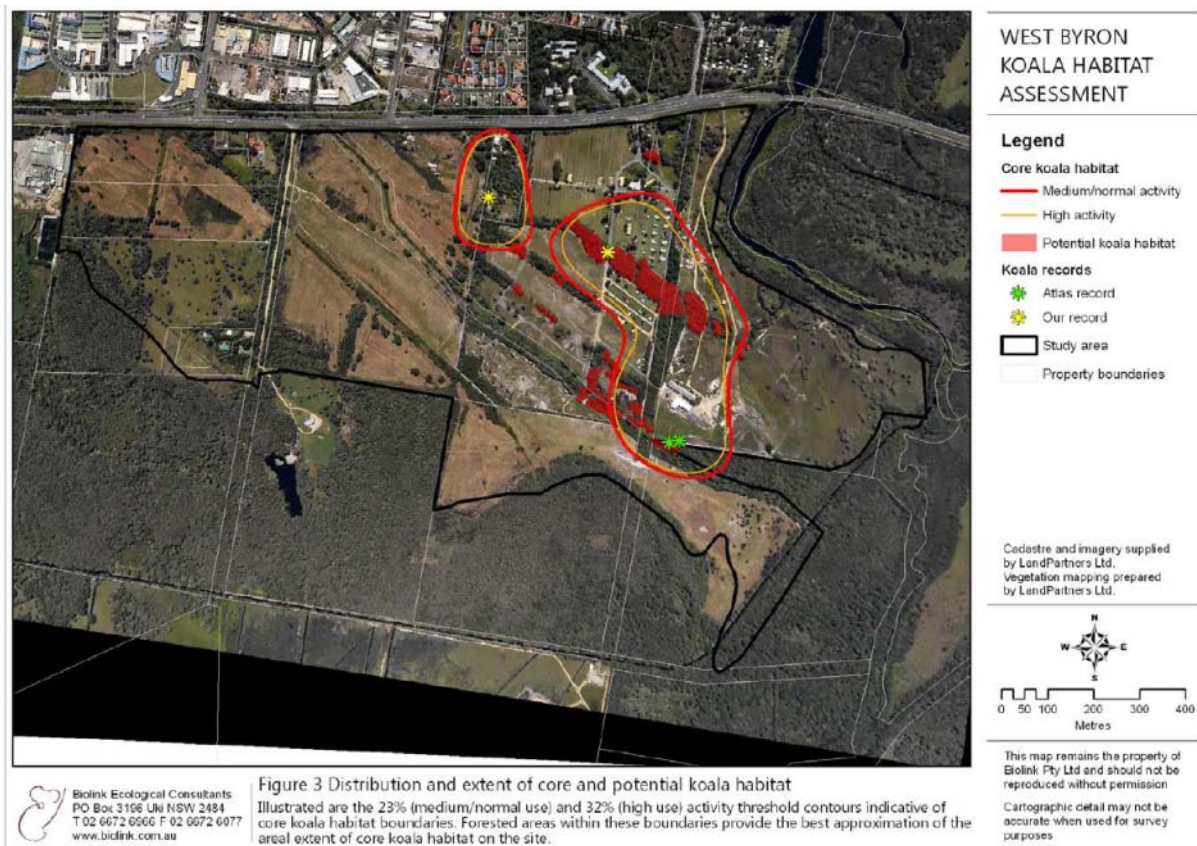
Koalas are listed as a vulnerable species under both the *NSW Threatened Species Conservation Act 1995* and *Federal Environmental Protection and Biodiversity Conservation Act 1999*. The draft Byron Coast Comprehensive Koala Plan of Management Plan (2015) identifies that recent studies of the Byron Coast has identified the presence of a relatively small population estimated to be approximately 240 koalas currently utilising about 1750ha of highly fragmented habitat. The Plan notes:

Based on a minimum viable population size of approximately 180 koalas, an average home range size of 5ha for each animal and an optimal occupancy rate of approximately 50% of available habitat, a minimum area of approximately 1,800ha of well-connected koala habitat is required in order to ensure a long-term sustainable future for koalas within the koala planning area south of the Brunswick River alone; unfortunately, existing knowledge indicates that only 1400ha of habitat is present in this area. Thus the establishment of additional areas of koala habitat, coupled with enhancement and/or creation of habitat linkages to better facilitate koala movements and gene flow between subpopulations are perceived to be the fundamental tools for increasing the probability of long-term persistence.

Council has identified that Koala habitat occurs on the site through its mapping of Class 1 and Class 2 habitat. Mapping criteria were consistent with SEPP 44 definitions of primary and secondary food trees and dominance/co-dominance. Council's mapping identifies 3.3 ha of Class One habitat, and 3.4 ha of Class 2 habitat, on West Byron. There are numerous records of Koalas within West Byron over a long period of time indicating permanent occupancy. West Byron clearly qualifies as core Koala habitat.



The Villa World site clearly encompasses part of a small stand of mapped Class 1 Koala habitat (mostly outside the "west Byron" footprint) which has multiple records and a long history of Koala occupation, thus qualifying as core Koala habitat. The proposal is to remove 1.22 ha of vegetation that is classed by Byron Shire Council as Class 2 Koala habitat, though there are no records of Koalas within this stand. The 2010 Biolink study identified two areas of core Koala habitat extending onto the Villa World lands.



In 2010 Biolink recorded Koala activity at 12 of 14 field sites, and observed two Koalas. Two areas of Koala activity identified and mapped as Core Koala Habitat. Areas dominated by Swamp Mahogany outside the two activity cells were identified as Potential Koala Habitat.

The proposal is also predicated on expanding and deepening the central drain through the site, which passes through significant stands of Class 1 Koala habitat, including the stand on the Villa World property. Despite being an integral component of the development, there has been no attempt to assess or consider the impacts that the restructure of this section of the drain will have on Koalas or their habitat.

It is evident that core Koala habitat within the meaning of SEPP 44 occurs on the Villa World property, but more importantly it needs to be recognised that it is part of a larger stand of core Koala habitat that occurs on the West Byron site and needs to be considered in the context of the whole site through a Koala Plan of Management.

SEPP 44 Koala Habitat Protection has as its objective *"the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat"*. **Core koala habitat** *"means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population"*.

SEPP 44 requires "Before a council may grant consent to an application for consent to carry out development on land to which this Part applies, it must satisfy itself whether or not the land is a potential koala habitat". **Potential koala habitat** "means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component". Council has assessed a large part of the site to be potential Koala habitat.

In their SEPP 71 assessment DoPE state:

To mitigate the proposal's impacts, parts of the site are proposed to be rehabilitated to reinforce existing vegetation and strategic koala linkages to the east and south of the site. Under SEPP 44, a Koala Plan of Management is required to be prepared prior to approval of any development application for land which is core koala habitat.

Biolink (2010) mention that:

Thus we conclude that core koala habitat is present within the study area and hence a Koala Plan of Management that effectively addresses the requirement to manage such areas for the conservation of koala population will be required ..

...

... Interpolation of koala activity data recorded during field assessments depicts the general distribution and extent of core koala habitat on the site as approximating 19ha, occupying the northeastern corner and eastern end of the study area (Fig. 3). In this instance however, modelling over-estimates the extent of core koala habitat due to the highly fragmented nature of the remnant vegetation within the study area. Thus the extent of core koala habitat is realistically restricted to the vegetated areas within these boundaries, although some use of the peripheral cleared areas can reasonably be expected to occur over time as koalas move through and/or make use of the site

...

The two 2007 records from the site along with our observations of two koalas during the course of fieldwork clearly establish the presence of the species on the site. Additionally, and more importantly perhaps, activity levels recorded at the majority of our field sites clearly exceed those thresholds specified as being indicative of the presence of core koala habitat and representative of occupancy by a resident population. Thus we conclude that core koala habitat is present within the study area and hence a Koala Plan of Management that effectively addresses the requirement to manage such areas for the conservation of koala population will be required to accompany any Development Application for this site.

...

To refute Biolink's results the proponents engaged another company Australian Wetlands Consultancy Group (AWCG) to prepare an Ecological Study. They spent 3 nights spotlighting in Nov 2010, observing 2 Koalas one night and one on the third night, which they considered could be a repeat. They also undertook scat searches at 36 survey plots, recording Koalas at 11 plots.

Meanwhile Byron Shire Council were in the process of preparing their Byron Coastal Plan of Management, the first step of which was to undertake a habitat study. In 2012 the Byron Coast Koala Habitat Study (Biolink 2012) identified significant patches of primary Koala habitat as occurring at West Byron, and recognise this habitat as part of an isolated population of around 240 Koalas extending from the Brunswick River south to Broken Head. Within this range 5 "cells" of high activity were identified, with two major koala population centres identified; Myocum – Tyagarah, and West Byron. West Byron extends through Cumbebin Swamp in the east to the West Byron Urban Release Area. Biolink note:

The presence of a resident population cell at West Byron was also alluded to by the analysis of historical records, confirmed by field sampling and supported by previous work in the area (Phillips and Hopkins 2010b).

...

While transient koalas ultimately contribute to overall population size, the primary focus of conservation and management efforts must be to maintain and ultimately increase those areas currently occupied by the main resident (source) populations of the area. Thus it remains that the bulk of the BCSA's koala population is contained within the Myocum – Tyagarah, West Byron and Mullumbimby localities.

Biolink recommend:

... there is a need to not only recognise currently occupied areas as core koala habitat and implement management accordingly, but also for areas of high quality koala habitat to be afforded the highest level of importance and protection.

There will be a need for adoption of a standard Development Control Plan to ensure that all future developments in the vicinity of the remaining areas of koala habitat and/or any resulting KMA consistently result in implementation of 'best-practice' koala-friendly planning measures.

In a supplementary submission to DoPI Council identified the need for significant changes to the zoning and DCP for them to comply with Council's draft Coastal Koala PoM, noting:

... Council is concerned about likely impacts on the local koala population that would result from the proposed rezoning and development of the West Byron Urban Release Area. The release area is within the area covered by the CKPoM, is currently occupied by koalas and is core koala habitat.

... Significant north-south koala habitat linkages have been identified at the eastern edge of the release area (alongside Belongil Creek) and its western edge, which are required to be maintained and restored to retain and improve connectivity between currently isolated populations throughout the coastal area.

The Office of Environment and Heritage (OEH) Submission of 16 October 2012, Attachment 1: OEH detailed comments – proposal to list West Byron Bay as a State Significant Site

Koalas

The West Byron area is part of a Koala Management Area (KMA) in the Byron Coast Koala Habitat Study (Biolink 2012). Primary koala habitat in the West Byron KMA comprises forests and remnant trees dominated primarily by Swamp Mahogany. Both older records and recent survey evidence show historical koala usage of these areas. Accordingly, this habitat meets the definition of Core Koala Habitat within the meaning of State Environmental Planning Policy No. 44 – Koala Habitat Protection.

The koala population in this locality is of a genetic makeup already known to be more sensitive to disturbance than other populations. The subject land is therefore proposed to be encapsulated in the West Byron Koala Management Precinct within the Byron Coast Comprehensive Koala Plan of Management. The West Byron koala population will also be identified as an important population for the purposes of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999.

The Environmental Assessment (Planning Report) prepared by Landpartners (June 2011) states that the koala population recorded on the site is most probably migratory rather than resident. This statement appears misleading and may lack scientific credibility given the historical and current use of the site by a number of koala individuals. The Planning Report

also states that the area and number of koalas is too small for a viable population, even though this area is part of a wider population cell and an area of habitat.

The subject site should not be assessed in isolation from the surrounding area. Additionally, the Planning Report states that koalas should be encouraged away from the site and that compensatory habitat can be established nearby. Such an approach, however, does not take into consideration that the Swamp Mahogany remnants within the site are part of the core habitat presently used by koalas and that any compensatory habitat establishment has at least a ten year time lag. The statements in the Planning Report are therefore inconsistent with respect to maintaining the Swamp Mahogany forest remnants whilst encouraging exclusion of koalas that presently utilise the trees.

Further, the statement that revegetation along Belongil Creek and other areas will mitigate the impacts of infilling the site with urban development does not take into account the current pattern of use of the area by individual koalas that will be displaced. Revegetation, whilst encouraged, will be of no use to existing koalas for at least ten years.

The developer's (2012) 'Response to submissions received during public exhibition period – ecological matters', states:

Habitat for Koalas and the Wallum Froglet would be retained in various areas and further detailed mitigation strategies are required for both (and other threatened species). A KPOM will be the template to guide Koala conservation strategies, while there is also potential to include Koala protection measures. Master planning of urban development and preparation of detailed DCP control should consider KPOM principles and provide clear guidance for future development applications and Koala management.

...

Other mitigation measures (fencing, road speeds, signage etc) are noted in ecological reports and can also be included within the DCP and/or prescribed within a dedicated KPOM.

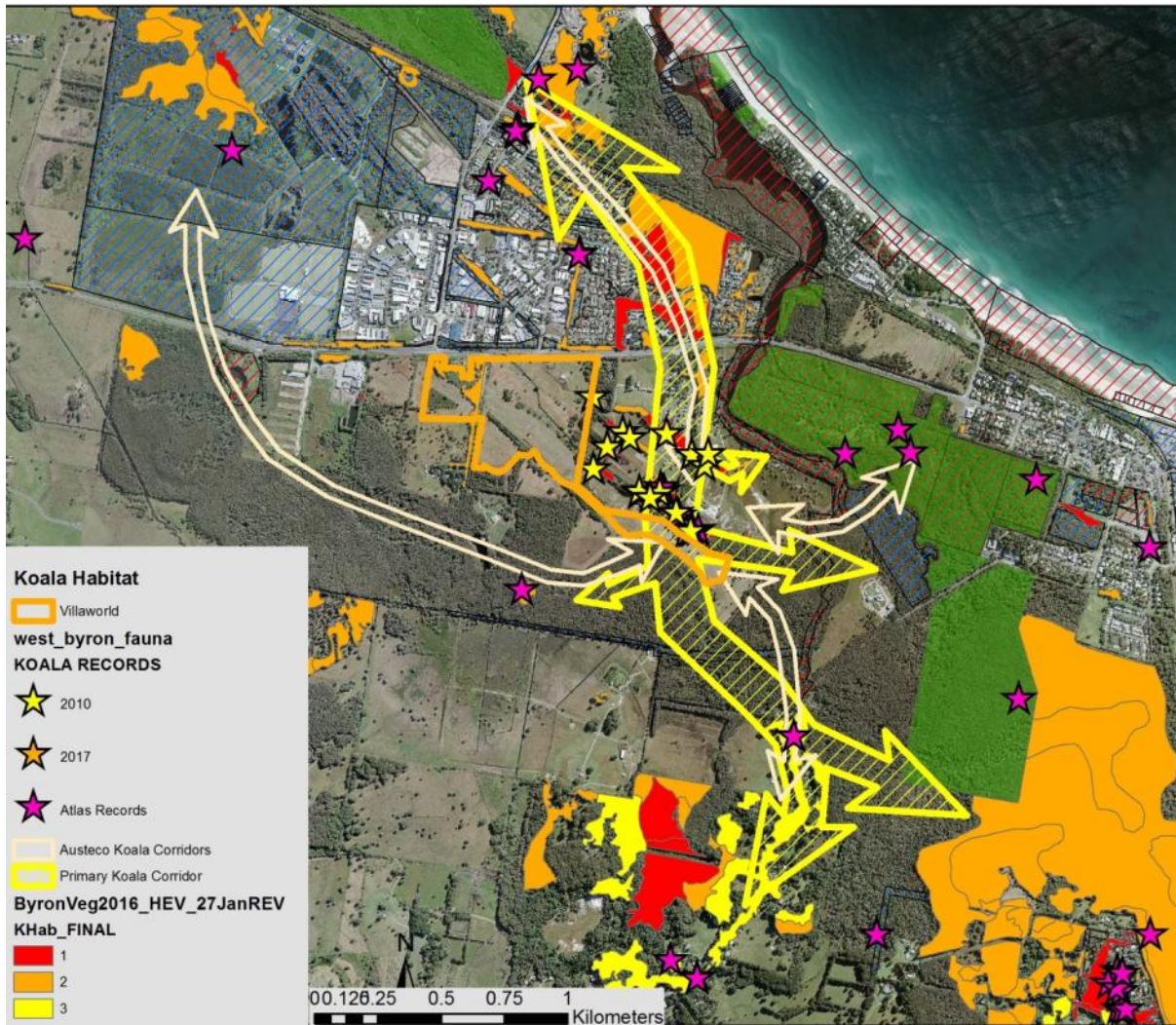
Villa World identified one location within their property for Koala scats where "scats were recorded beneath several Swamp Mahogany". This site has evidence of long term usage for at least 7 years. Villa World have not undertaken a SEPP 44 assessment, claiming "Whilst it is recognised that a Koala Plan of Management is required for the WBURA development, this is more relevant to lots containing core koala habitat"

As well as encompassing core Koala habitat, West Byron and the Villa World site, are part of the major corridor for the movement of Koalas from Tyagarah Nature Reserve to the north-west through West Byron to the Cumbebin Nature Reserve and beyond. If movement through this corridor is stopped it will have significant ramifications for the viability and persistence of Koalas around Byron Bay.

Depictions of likely Koala movement through the site using patches of suitable habitat as stepping stones. The fawn arrows are dispersal routes identified by Austeco for the developer, while the yellow arrows is the primary dispersal route proposed in this submission.

The Preliminary Ecological Assessment Proposed rezoning of land at West Byron identified the likely movement of Koalas across Ewingsdale Road as being significant:

The one exception to this may be Koalas moving north from Belongil Fields across Ewingsdale Road to the Byron SAE (and adjacent land) which both contain Swamp Mahogany habitat.



Given the small patches of primary habitat south of Ewingsdale Road and the low numbers of records, the likely scenario is that unless every effort is made to mitigate impacts on Koalas the proposed the West Byron suburb will isolate Koalas to the south of Ewingsdale Road, making them unviable and leading to their extinction.

Council's DCP identifies corridors through the site that bear no semblance to reality and actively avoid the most significant Koala habitat on the site. Available information has been ignored in identifying Council's sham corridors.

It is considered that for a Koala corridor to be effective it needs to:

- encompass the largest areas of core Koala habitat on the site;
- include the shortest routes between habitat patches;
- minimise the inclusion of unsuitable habitat (such as sedge wetlands);
- avoid land subject to increasing inundation as sea-levels rise.

Council's original draft Koala Plan of Management included an action to identify key 200m wide linkage areas (Koala corridors) to most effectively facilitate the movement of Koalas within and between *Koala Management Precincts*. The proposed constraint was that Council cannot approve any development application within a Koala corridor unless it is satisfied that the proposal will not sever or otherwise interfere with the movement of koalas within a SLA, or between SLAs.

Villa World propose removing 13 Swamp Mahogany Trees though nowhere are these and their sizes identified. Swamp Mahogany is the key Koala feed on site and Council's draft KPOM identifies it as essential that *there shall be no removal of any preferred koala food trees > 200mm dbh* as a principal requirement. The proposal to replace these presumably key feed trees at a rate of 10 to 1 with seedlings that will take decades to grow large enough to function as feed trees is a nonsense. Such a proposal needs to be clearly identified and considered within the context of a Koala PoM. It is to retain all Swamp Mahogany to be removed, replaced 10 to 1

In a supplementary submission to DoPI Council identified the need for significant changes to the zoning and DCP for them to comply with Council's draft Coastal Koala PoM, noting

The CKPoM will aim to ensure that development within a Precinct must be 'koala friendly;' not only to ensure no adverse impact on existing koala communities but also to enable the long-term persistence of resident koala populations. To that end any application to amend the Byron LEP must address all of the requirements of the Plan, which includes the following specific planning controls:

- *Any rezoning proposal which includes preferred koala habitat must include a Vegetation Assessment Report to ensure that koala habitat is correctly identified*
- *Any rezoning proposal within Preferred Koala Habitat, a Linkage area, or a KMP must include a Koala Habitat Assessment to ensure that the extent of any habitat occupied by koalas is correctly assessed and any potential for negative impact can be identified.*
- *Within a KMP, inter alia:*
 - *There shall be no removal of any preferred koala food trees > 200mm dbh.*
 - *The keeping of domestic dogs on any new residential lots arising from the subdivision of land shall be prohibited by Covenant and/or Community Title Management Statement.*
 - *Road design standards and/or approved vehicle calming devices must be incorporated such that motor vehicles are restricted to a maximum speed of 40km/hour within a development area.*
 - *Any Asset Protection Zone (APZ) must be provided within the development area and must not result in the removal of koala food trees.*

The 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)', Commonwealth of Australia (2014) were considered in order to determine the national significance of this development on Koalas and whether it should have been referred to the Commonwealth.

The evidence suggests that there is likely to be Koalas resident on site and that these are potentially breeding, though at the very least there can be no doubt that the site is important to "Maintain corridors and connective habitat that allow movement of koalas between large areas of habitat". The site is definitely Koala habitat within the context of the EPBC Act. It is also apparent that the development may constitute a primary threat, as it is likely that the proposed development (houses, roads, noise), being situated in mapped Koala habitat and an important wildlife corridor, will result in *"Loss, fragmentation and degradation of habitat, including dispersal habitat"*.

It is also evident that the retention and enhancement of the Koala habitat on the site would constitute *"Interim recovery objectives"* for protection and conservation of large, connected areas of koala habitat and maintenance of corridors and connective habitat that allow movement of koalas between large areas of habitat. From a national recovery perspective, this is koala habitat that is important for the long-term survival and recovery of the koala.

The next requirement is to apply the habitat assessment tool for the koala to assess whether the site is likely to contain habitat critical to the survival of the koala. This is determined by whether the impact area achieves a score of five or more by application of the Referral Guidelines.

From application of the scoring system detailed in Table 4: Koala habitat assessment tool, the site attains a score of 9, meaning that there can be no doubt that the site contains habitat critical to the survival of the koala:

1. Evidence of one or more Koalas within the last 2 years: The last survey reported was in 2016 and found Koala "scats were recorded beneath several Swamp Mahogany". Koalas, given the frequent sightings it is evident that the impact area would attain a score of 2 if any contemporary assessment was undertaken.
2. The primary Koala food tree on the site is Swamp Mahogany, it is not known if there are areas where Swamp Mahogany forms more than 50% of the canopy. It scores at least 1 on the basis that *"Has forest or woodland with 1 species of known koala food tree present"*.
3. The site is part of the Cumbebin Swamp and is clearly part of a contiguous landscape ≥ 500 ha, and thus achieves a score of 2 for this criterion.
4. There is little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, so on this basis the site attains a score of 2 for this criterion.
5. As identified above, this Koala habitat is likely to be important for achieving the interim recovery objectives for protection and conservation of large, connected areas of koala habitat and maintenance of corridors and connective habitat that allow movement of koalas between large areas of habitat, so on this criterion the site also scores a 2.

Villa World maintain they intend to remove 13 Koala feed trees. 1.23 hectares of "Mid to tall open dry heath/Broad-leaved paperbark" and 2.61ha of "Mid-high to Tall Open Forest". Though the Villa World proposal only directly requires the removal of 1.22 ha of vegetation that is classed by Byron Shire Council as Class 2 Koala habitat. Though the future upgrades (widening) of the main drain to cope with the discharge from this development will affect significant areas of Class 1 Koala habitat.

Though as this is only one stage of a multi-stage development where some 3ha of mapped Koala habitat has been zoned for clearing, along with dozens of Koala feed trees, with a further 2 ha of the mapped habitat included in E3 zones where a proportion is likely to be cleared or degraded for roads, drainage and a broad range of other works. Even the small area remaining in E2 is likely to be subject to roading and drainage works. While the quantum of habitat proposed for removal is not large its pivotal location in a significant wildlife corridor, and the additional impacts of medium density residential development adjacent to retained habitat, make the impacts significant within the parameters of Section 7.

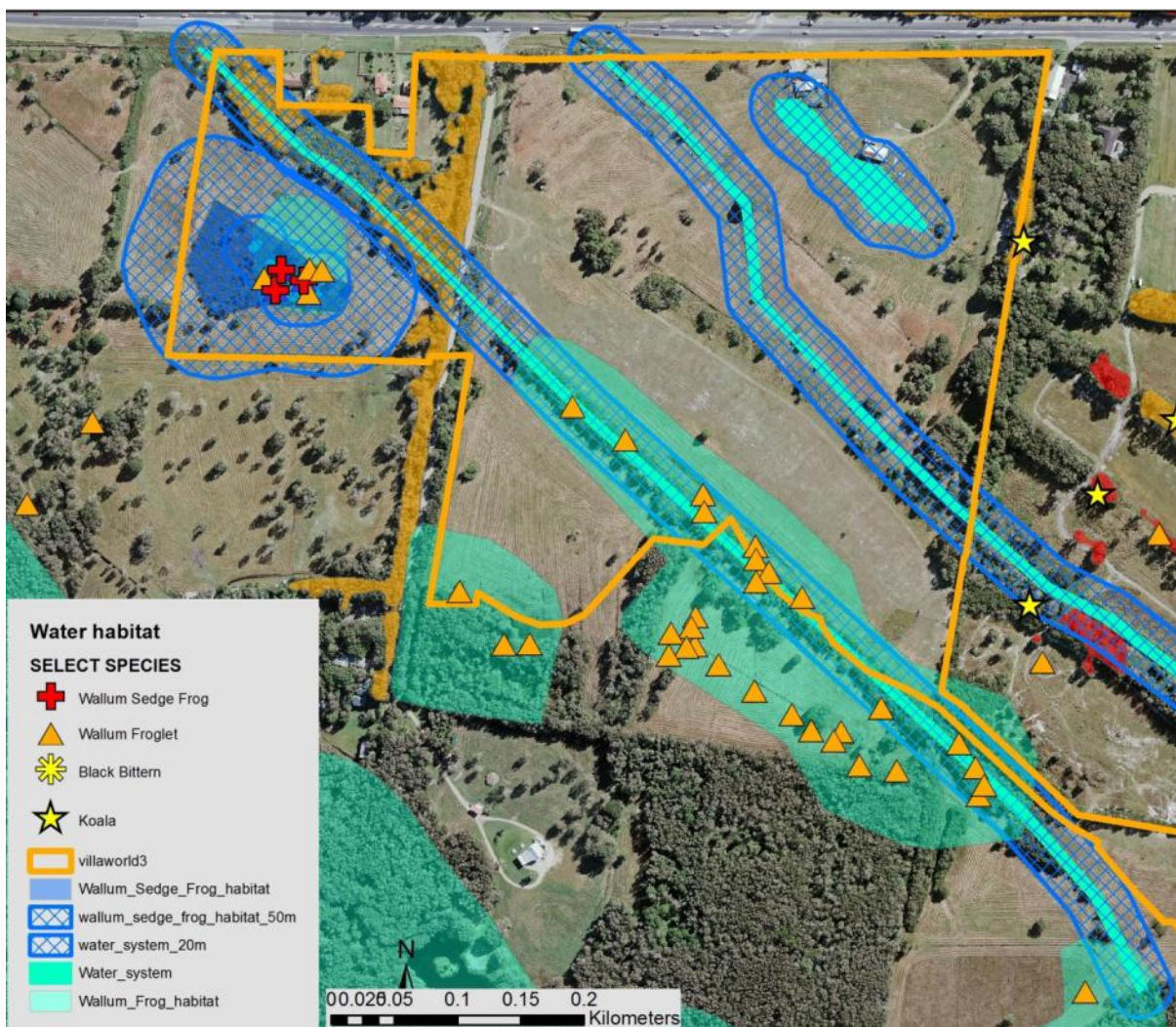
Section 8 recognises that in addition to considering adverse affects on habitat critical to the survival of the koala, there is a need to consider the potential for the actions to interfere substantially with the recovery of the koala. Impacts identified include increased Koala deaths due to dogs and cars, disease, creating barriers to movement, and changing hydrology. Tables 5–9 provide guidance on the mitigation of these impacts and whether residual impacts are likely to be significant and therefore require referral to the Department. It is noted *"Without one or some of the standards, mitigation measure may not be considered effective"*, and *"If proponents wish to apply mitigation measures other than those identified here, evidence that they are equally effective in achieving the mitigation objectives should be provided"*.

Irrespective of the identifies measures applied to reduce impacts of the development on Koalas, there can be no doubt that " A barrier is created to, from or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala".

West Byron contains core Koala habitat and is a pivotal link in a corridor for movement of Koalas within the larger population between north and south. There needs to be a Koala Plan of Management prepared for the whole site that identifies stands of Koala habitat, location of all feed trees >20 cm dbh, and actual Koala movement corridors through the site, Impacts of clearing, fill, drainage, roads, tracks and development on Koala habitat, Koala feed trees, Koala movements and Koala mortality need to be detailed and specific protection and mitigation measures identified. The establishment of a 200m wide Koala corridor through the site that maximises the inclusion of core Koala habitat and avoids unsuitable habitat and lands subject to inundation due to climate change is considered a vital requirement for the persistence of Byron's Koalas.

8.2. Wallum Frogs

The nationally vulnerable Wallum Sedge (Olongburra) Frog has been recorded in a small wetland on Lot 6 in the west of the approved development and the State Vulnerable Wallum Froglet is common around drainage lines and swamps in the west of the site. .



There are two mapped drainage lines that occur within the zoned residential areas. Both these appear to have originally been inter-dunal streams that have since been straightened and modified. Both are likely to be corridors for the dispersal of frogs between Cumbebin and Tyagarah, though the western drainage line is obviously most significant for both Wallum Sedge Frog and the Wallum Froglet. The main drainage line appears to have been significantly degraded as habitat.

There is a record of Wallum Sedge Frog on the adjacent land dating back to 1994, though its habitat appears to have been eliminated. There is another record to the east of West Byron, though its current status is unknown. Wallum Sedge Frog has persisted in the small wetland in the Villawood lands for at least 8 years.

The Villa World proposal is to place some 2-3metres of fill, roads and houses over the top of the only known Wallum Sedge Frog population on the property. They appear to be uncertain about the amount of habitat they intend to destroy, variously stating it as 0.57ha or 0.65ha. I assess the remnant patch of Wetland and fernland as 0.68ha, though the frogs may use a larger area when it hasn't been slashed.

The state vulnerable Wallum Froglet occurs extensively to the south west of the site, with some of its habitat protected in E2 and E3 zones, though much of its habitat exists in residential zones, with extensive filling, roading and housing proposed over known records and identified habitat. Within the Villa World development the principal threat is to the stream linking the SEPP wetland to the Wallum Sedge Frog wetland and thence through the industrial estate.

The proposal provides grossly inadequate protection for these species and is contrary to the developer's promise to protect this species at the DCP stage. The wetland within which the Wallum Sedge Frog occurs, along with an adequate buffer, needs to be identified for protection, along with a corridor along the stream linking this wetland to other wetlands. At the very least no roading or development affecting this area should be undertaken until protection and mitigation measures are identified.

The "National recovery plan for the wallum sedgefrog and other wallum-dependent frog species" identifies that in northeast NSW *"habitat loss and fragmentation due to urban development remains one of the main threats to wallum frog species"*, identifying that populations in north-east NSW are particularly vulnerable, noting:

...habitat has become highly fragmented leaving many small isolated populations. These populations may be at greater risk of extinction because of limited gene flow, reduced likelihood of immigration, and greater vulnerability to stochastic demographic and genetic processes (i.e. chance fluctuations in population structure and size, and genetic drift)

...

It is the loss of wallum habitat on freehold land that is of most concern. With population growth in coastal areas on the increase, much of the remaining habitat on freehold land may be lost to residential development and associated infrastructure (i.e. roads and sewerage lines). In terms of habitat degradation, it is those areas adjacent or adjoining residential and resort developments (including golf courses) that are most under threat.

Until the Draft DCP was released, with roads and housing proposed over the western frog habitats, the assumption had been that the populations would be protected as identified in ecological reports. This was just an illusion, as apparently they never had any intent to retain or protect the Wallum Sedge Frog and just didn't want to admit or consider the impacts.

The “West Byron Project – Ecological Assessment” (Australian Wetlands Consulting Pty Ltd 2010) claims that for Wallum Sedge Frog (Olongburra Frog) all known habitat will be retained, stating “*The Structure Plan has not made any specific allowance for the retention of Olongburra Frog (and Wallum Froglet) habitat in the west of the site, west of Melaleuca Drive. This area would be too small to merit specific zoning, but core habitat (as identified in the habitat mapping) will be identified within the DCP for the site to ensure that this area is retained*”, and “*This wetland area could be retained with a buffer of fernland and included as part of a small park or landscape feature*”.

For the acid frogs, the developer's fauna report ” (Australian Wetlands Consulting Pty Ltd 2010) went on to state:

Two threatened species (Wallum Froglet, Olongburra Frog) and three vegetation communities (swamp sclerophyll forest, freshwater wetland, fernland) at the site are considered groundwater dependent.

A detailed habitat management plan will be prepared for both species ...

For the western Olongburra Frog habitat, monitoring of the population would be required to determine trends in recruitment and the maintenance of the existing population.

The watercourse in the east of the site, constructed (fenced) drain in the central part of the site and the small wetland area within Lot 6 would all be retained and buffered, and comprise habitat for both species (with the exception of the fenced drain).

The Olongburra Frog would similarly be able to utilise the eastern watercourse for dispersal, while it would remain largely restricted (as would the Wallum Froglet) to the western wetland area within Lot 6. This area is already fragmented and isolated and dispersal ability to areas of nearby suitable habitat is relatively limited. Constructed wetlands in the east of the site would aim to increase suitable habitat for the Olongburra Frog in proximity to habitat within the existing watercourse and enable dispersal between these environments

No reduction in habitat for the Olongburra Frog, loss of primary and secondary habitat for the Wallum Froglet ...

Primary habitat: ephemeral ponds with known records (Land Partners 2010) plus 40m buffer within adjacent fernland, freshwater wetland, grassland, and swamp forest ...

As well as isolation of the frog's habitat, the proposed development will result in numerous recognised threats including Changes in hydrology, Habitat eutrophication and pollution, Use of biocides in weed and mosquito control, and Vehicular traffic. Though the potential impacts of these on the frogs has not been considered. The Recovery Plan's guidelines for habitat protection and management have been ignored, there is no intent to establish minimum 50m buffers, provide vegetated links to other habitat, minimise soil disturbances in the vicinity (including the release of sub-soil aluminium from Acid Sulfate Soils), prevent nutrient enrichment from runoff, limit the use of biocides, manage recreational use, or undertake monitoring.

The Recovery Plan notes:

Proper management of wallum frog habitat is critical to the survival of wallum frog species. Guidelines for habitat management, based on current knowledge of the biology of wallum frog species, are outlined below. These guidelines may be modified as knowledge of the biology and threats to wallum frog species improves.

1. Minimising soil disturbance

Earthworks may adversely affect soil hydrology and water quality at breeding sites. Of particular concern in this regard are the breaching of organic hardpans holding water, increased water turbidity (due to runoff) and liberation of sub-soil aluminium. Soil disturbance should therefore be kept to a minimum near wallum swamps and lakes. Where earthworks are carried out in the vicinity of breeding habitat, runoff from earthworks must be appropriately contained.

2. Retention of vegetation

Natural vegetation surrounding water bodies may provide cover and foraging habitat for frogs and should be left intact. Bushland linking wetlands may also provide an important route for dispersal of animals and should, likewise, be retained. Thus, further clearing of vegetation within wallum swamp and lake catchments, especially in mainland areas where much vegetation has been cleared already, should be avoided. At a minimum, vegetation within 50m of breeding sites must be left intact.

3. Preventing nutrient enrichment

Habitat eutrophication may have a significant adverse impact on wallum frog species. It is therefore important that storm water runoff from golf courses, urban areas and agricultural land be directed away from breeding sites or treated to remove nutrients and other contaminants before being discharged into wetland areas. To further reduce the likelihood of habitat eutrophication, residents in wallum areas should be discouraged from fertilising lawns and encouraged to plant native species that tolerate nutrient-poor sandy soils.

...

5. Limiting use of biocides in wallum frog habitat

Until their impact on wallum frogs is ascertained, biocides should not be used in the immediate vicinity of wallum frog breeding sites.

6. Managing recreational use of coastal lakes

In a number of conservation parks and reserves with high visitation (e.g. Brown Lake Conservation Park and Great Sandy National Park), trampling of reed beds has led to significant loss of breeding habitat and cover for the wallum sedgefrog and Cooloola sedgefrog. To reduce the impact of human visitation at these sites, visitor numbers and access to lakes and swamps must be reduced or boardwalks constructed to allow visitors access to water without reed beds being trampled.

...

9. Monitoring

Habitat condition and frog numbers should be monitored to ensure threats to wallum frog species are properly managed. Monitoring should include tadpole surveys (to identify breeding sites) and must be undertaken with sufficient regularity (i.e. quarterly) to detect significant changes in recruitment success. Where the impact of development is to be assessed, monitoring must be carried out a year or preferably more, before development starts.

There has been no attempt to identify the status of the surrounding populations of wallum frogs, the relative importance of the Villa World populations, the importance of the site for dispersal, the suitability of alternative sites (soil structure, acidity, water permanence etc). For Wallum Sedge Frog it is just stated "A BioBanking Assessment report is currently being undertaken for the Wallum Sedgefrog".

For the Wallum Froglet it is variously claimed that the NPWS database has either 33 or 104 records within 10km, though there has been no attempt to assess the current status of the frog in the vicinity (as a lot of habitat has been developed) or the relative significance of the population intended to be buried. Runoff from the development is to be directed straight into the main remaining main population of Wallum Froglets yet there has been no attempt to consider or assess the impacts this runoff and associated pollutants will have on the remaining habitat and the ability of Wallum Froglets to persist.

Contrary to Villa World's pretence, there can be no doubt that both populations of Wallum Sedge Frogs and Wallum Froglets are regionally significant and that the development will result in the removal or modification of a significant area of habitat for both the Wallum Sedge Frog and Wallum Froglet. It is likely that the site is important for the dispersal of Wallum frogs, though this hasn't been assessed.

There needs to be a lot more information on the status and significance of the extant populations of both Wallum frogs, and their ability to disperse through the landscape, before the DA's proposal to eliminate one population of Wallum Sedge Frog, and part of a significant population of Wallum Sedge Frogs, can be considered.

This provides grossly inadequate protection for this species and is contrary to the developer's promise to protect this species at the DCP stage. The wetland within which the frog occurs, along with an adequate buffer, needs to be identified for protection, along with a corridor along the stream linking this wetland to other wetlands. At the very least no roading or development affecting this area should be undertaken until protection and mitigation measures are identified.

The Recovery Plan's guidelines for habitat protection and management have been ignored. There is no intent to establish minimum 50m buffers, provide vegetated links to other habitat, minimise soil disturbances in the vicinity (including the release of sub-soil aluminium from Acid Sulfate Soils), prevent nutrient enrichment from runoff, limit the use of biocides, manage recreational use, or undertake monitoring. In order to be consistent with the "National recovery plan for the wallum sedgefrog and other wallum-dependent frog species" the preference is for:

- the remnant patch of fernland within which the Wallum Sedge Frog resides to be retained and provided with a 50m buffer within which regeneration of wetland species is encouraged,
- establishment of a 20m buffer on the western drainage line encompassing Wallum Froglet habitat and fernlands.
- the drainage line to act as a link for the Wallum Sedge Frog back to the SEPP coastal wetland, and through to a road underpass through to the industrial estate and beyond,
- design of surrounding development to ensure maintenance of current watertables and water quality in retained habitat.

The Commonwealth's Draft referral guidelines for the vulnerable wallum sedge frog, *Litoria olongburensis* (2011) make it abundantly clear that this development should be referred to the federal Minister in accordance with the EPBC Act.

Villa World's proposals to eliminate the wetland comprising core habitat for the Wallum Sedge Frog, and the western drainage line representing core habitat for the Wallum Froglet, and bury them under metres of fill, roads and houses are strongly objected to. In accordance with the "National recovery plan for the wallum sedgefrog and other wallum-dependent frog

species” the wetland and fernland home of the Wallum Sedge Frog, along with at least a 50m buffer, needs to be protected and linked to the western drainage line with its significant population of Wallum Froglets, along with at least a 20m buffer, to facilitated movement to the SEPP wetlands and under Ewingsdale Road to wetlands to the north. Watertables within the vicinity of these habitat areas must be maintained in their natural state.