



2 background studies

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2.1 BIODIVERSITY

The definition of that part of the site that is proposed for urban development was based on detailed surveys and analysis carried out by Gunninah Environmental Consultants (see Volume 2.). The subject site supports a mosaic of vegetation and plant communities including:

- sedgelands and estuarine wetlands in the eastern and northern parts of the land;
- swamp forest communities in low-lying portions of the land;
- moist forest and riparian communities on the lower slopes and in some drainage lines; and
- dry forest and woodland communities on the plateaus and upper slopes.

The subject land is essentially fully vegetated, with the exception of the cleared electricity transmission line. Most of the vegetation on the subject site is in relatively good condition, although there has been some formation of tracks, disturbance by mining, vehicular access, the dumping of urban refuse, and long-term timber harvesting. Nevertheless, weed infestations are generally low (except along tracks on, some previously mined areas near the dunes and adjacent to the Pacific Highway).

Several of the plant communities on the subject site (the wetlands and swamp forest communities) have recently been listed as “endangered ecological communities” on the Threatened Species Conservation Act 1995 (TSC Act). Whilst other vegetation on the site is regarded as having regional conservation value, none is particularly restricted in distribution or regarded as of high conservation value.

Only two threatened plant species have been recorded on the subject site, despite intensive surveys over a substantial period. The Rusty Plum was recorded as scattered individuals in the northern part of the subject site, in areas of Blackbutt Forest. The Moonee Quassia is present along the banks of the tributary Sugar Mill Creek, along and adjacent to the western boundary of the site.

A number of threatened fauna species have been recorded on the site, including:

- the Osprey, the Square-tailed Kite and Glossy Black Cockatoo;
- the Grey-headed Flying Fox, Regent Honeyeater and Common Blossom Bat;
- the Eastern Freetail Bat, Little Bent-wing Bat, Common Bent-wing Bat and Large-footed Myotis;
- the Yellow-bellied Glider, and
- the Green-thighed Frog.

As the majority of threatened fauna species recorded on the subject site are highly mobile and wide-ranging (ie. the microchiropteran bats, megachiropteran bats and birds), the site only constitutes a part of the available habitat for these species within their substantial home ranges and in this location generally.

The site represents only moderate value habitat for the Yellow-bellied

Glider (if present), and most of the suitable habitat for this species is to be retained.

Whilst the Green-thighed Frog was recorded within the northern precinct, significant areas of similar habitat will be retained on the site.

The proposed residential and tourism development of the subject site (as documented in the Concept Plan) has been considered with respect to Section 5A of the Environmental Planning Assessment Act 1979 (EP&A Act). With regard to those threatened flora and fauna species which have been recorded on the subject site, there is not likely to be a “significant effect” imposed as a consequence of the development, because of:

- the retention of substantial areas of habitat and resources both on the subject site and in the general locality;
- the extent of suitable resources and habitats in the locality and region;
- the mobility and distributional range of most of those species; and
- the impact amelioration and environmental management measures proposed.

Similarly, the proposed development is not likely to impose a “significant effect” upon any of the swamp forest, estuarine or wetland communities, which have been listed as “endangered ecological communities” on the TSC Act. The overwhelming majority of those plant communities are to be retained, and the development has been designed (particularly in terms of stormwater management measures) to protect the areas of those retained plant communities on the subject site.

Given the foregoing, there is no requirement for the preparation of a Species Impact Statement (SIS) for the proposed development at Moonee Beach.

Consideration of the proposed development leads to the conclusion that the proposed development is both appropriate and reasonable with respect to impacts generally on the natural environment. Whilst the proposal requires the removal of approximately 25ha of vegetation there is also a commitment to a regime which provides a nett environmental benefit in perpetuity, at no public cost for the permanent enjoyment of the public.

The proposed Concept Plan involves development of those portions of the subject site which are of relatively lower biodiversity conservation value (involving only 22.5% of the total site) and the retention and protection of about 75ha of the total site (73%) for biodiversity conservation purposes. The development provides for the permanent and active conservation and management of the majority of the subject site, incorporating the overwhelming majority of the features of highest conservation value. This result represents an appropriate, reasonable and sustainable outcome on the subject site in terms of biodiversity, economic and social values.

The site and proposal have also been assessed in terms of SEPP No. 44 – Koala Habitat and SEPP No. 14 – Coastal Wetlands, and The Draft Moonee Creek Estuary Management Plan. None of these policies are incompatible with the general thrust of the Concept Plan.

With respect to the “Coffs Harbour City Vegetation Strategy”, it is noted that the majority of the subject site is mapped as High Value Vegetation or Very High Value Vegetation. However, the proposed development retains most of the vegetation on the subject site, and constitutes an appropriate compromise between development opportunities

and conservation goals whilst proposing a realistic mechanism for management of the substantial Conservation Area in perpetuity.

The background information for the project has been considered by Sainty. His approach is reviewed in section 3.6 and has resulted in a revised Concept Plan.

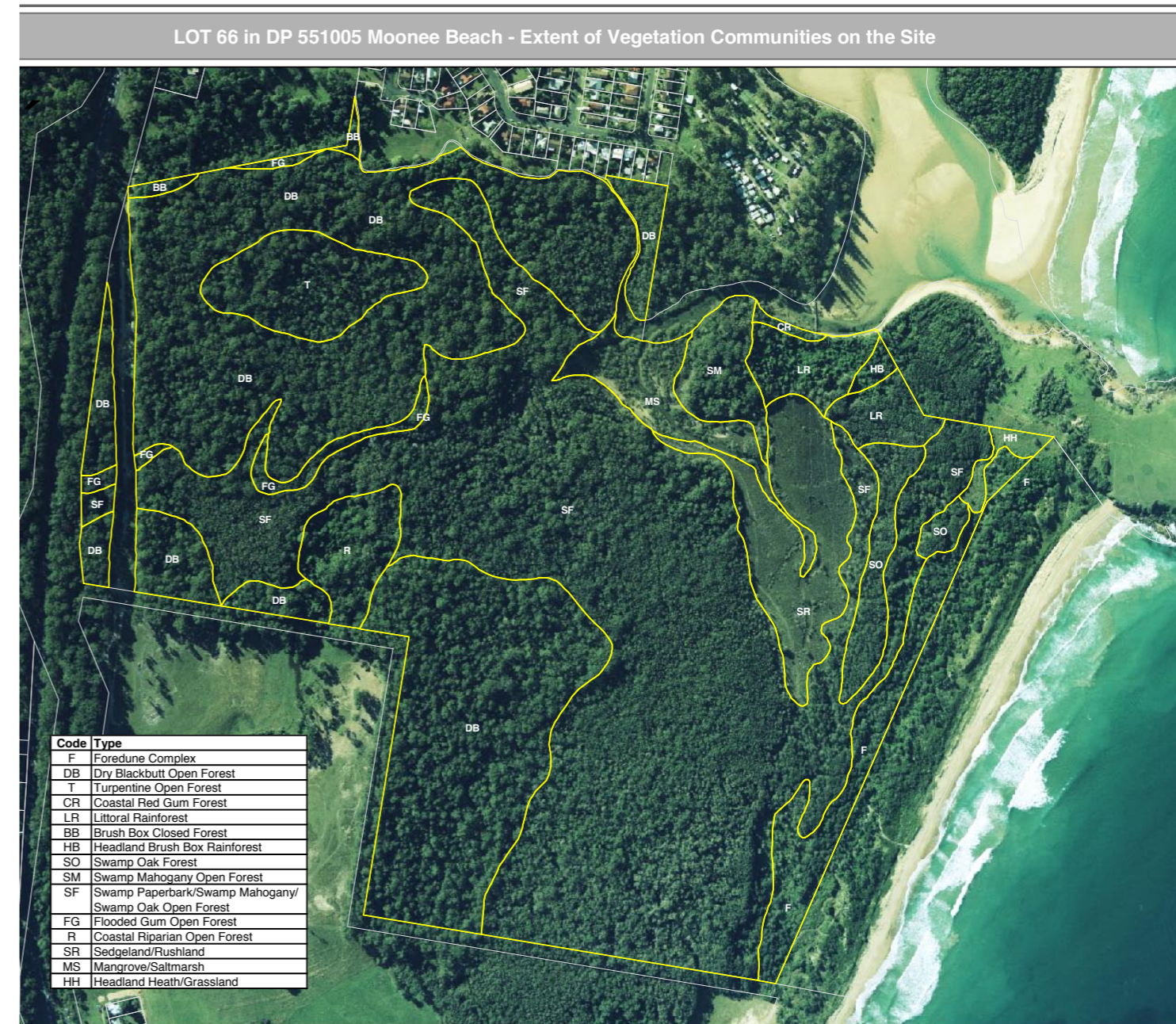


Fig 2-1: Extent of vegetation communities on the site.

2.2 COASTAL PROCESSES

Coastline hazards were determined by Patterson Britton & Partners (see Volume 2), based on the cumulative effects of the 100 year average recurrence interval (ARI) coastal storm erosion, long term recession due to net sediment loss, and long term recession due to sea level rise (over immediate, 50 year, and 100 year planning periods).

From a coastal engineering perspective, the proposed development would not be expected to adversely affect, or be adversely affected by, coastal processes. This is because the Coastline Hazard Line, representing the landward limit of the Zone of Slope Adjustment, is seaward of the subject property for all planning periods up to 100 years, that is at 2105.

In 2105, a Zone of Reduced Foundation Capacity (ZRFC) was predicted to be seaward of the subject property boundary. Therefore, there are no particular foundation requirements for the proposed development from a coastal engineering perspective.

There are no minimum habitable floor level requirements for the proposed development from a coastal engineering perspective, given that the coastal inundation hazard is expected to be negligible for the 100 year ARI coastal storm.

However, it is important that dune vegetation coverage and dune crest levels are maintained seaward of the subject property into the future, between formalised access areas.

Coastal hazard assessment revealed no constraints to the proposed development.



Fig 2-2: Hazard Lines

Fig 2-2 shows the coastline hazard lines at the subject property for immediate (2005), 50 year (2055) and 100 year (2105) planning periods. Given that the 2105 Coastline Hazard Line is seaward of the subject property, coastline hazards are not expected to directly impact on the property in the next 100 years.



Fig 2-3: 2105 Zone of Reduced Foundation Capacity (ZRFC)

Fig 2-3 shows the 2105 Zone of Reduced Foundation Capacity (ZRFC) at the subject property. Given that this line is just seaward of the property, there are no particular foundation requirements (from a coastal engineering perspective) for any structures built on the property in the next 100 years. However, there may be geotechnical issues to consider.

2.3 WATER MANAGEMENT

A detailed drainage and water management strategy for the site has been formulated by engineering consultants Patterson Britton, whose report is contained within Volume 2. Key proposals include:

Water Management Strategy

The proposed Water Management Strategy has been designed to meet the following objectives implementing the principles of Water Sensitive Urban Design (WSUD) and Ecologically Sustainable Development (ESD).

- integrated water cycle management;
- rainwater harvesting;
- minimise potable water use;
- manage run-off flow rates; and
- no net increase in pollutant load runoff.

Minimising Potable Water Demand

It is expected that a 43% reduction in potable water demand can be achieved through implementation of the following measures:

- Rainwater re-use tanks (3000 litres per lot)
- Flow restrictors in the kitchen and bathroom
- AAA rated washing machines; and
- AAA rated dual flush toilets; and
- AAA rated shower heads and dishwasher.

This exceeds the 40% reduction required by the State government (BASIX).

Minimising Impacts on Water Levels

Flooding

The topography of the site is such that the Moonee Waters development will not be affected by elevated water levels within Moonee Creek (see fig 2-4).

Detention

Because the Moonee Waters development discharges directly to Moonee Creek, it is not necessary to detain stormwater runoff to alleviate impacts on Council's downstream drainage system. In practice, however, the use of rainwater re-use tanks and bio-retention swales would reduce the peak flow rates from the site.

Volumetric Runoff Coefficient

The average annual runoff coefficient for the existing site was determined to be 0.28. It has been shown that the runoff coefficient for the developed site can be reduced from 0.61 to 0.53 (i.e. 13%) through implementations of the following measures:

- Installation of rainwater re-use tanks;
- Installation of bio-retention swales; and
- Maximisation of pervious area within the development.

Minimising Impacts on Water Quality

Runoff water quality is to be managed through a combination of treatment measures in a treatment train, with special emphasis on source control. The proposed stormwater treatment strategy will consist of rainwater re-use tanks, bio-retention swales in the road reserve, gross pollutant traps and a bio-retention swale around the whole perimeter of the development area. The swale area would occupy approximately 7% of the development area and include approximately 12 gross pollutant traps.

The implementation of the various treatment measures would ensure no net increase in the pollutant load runoff.

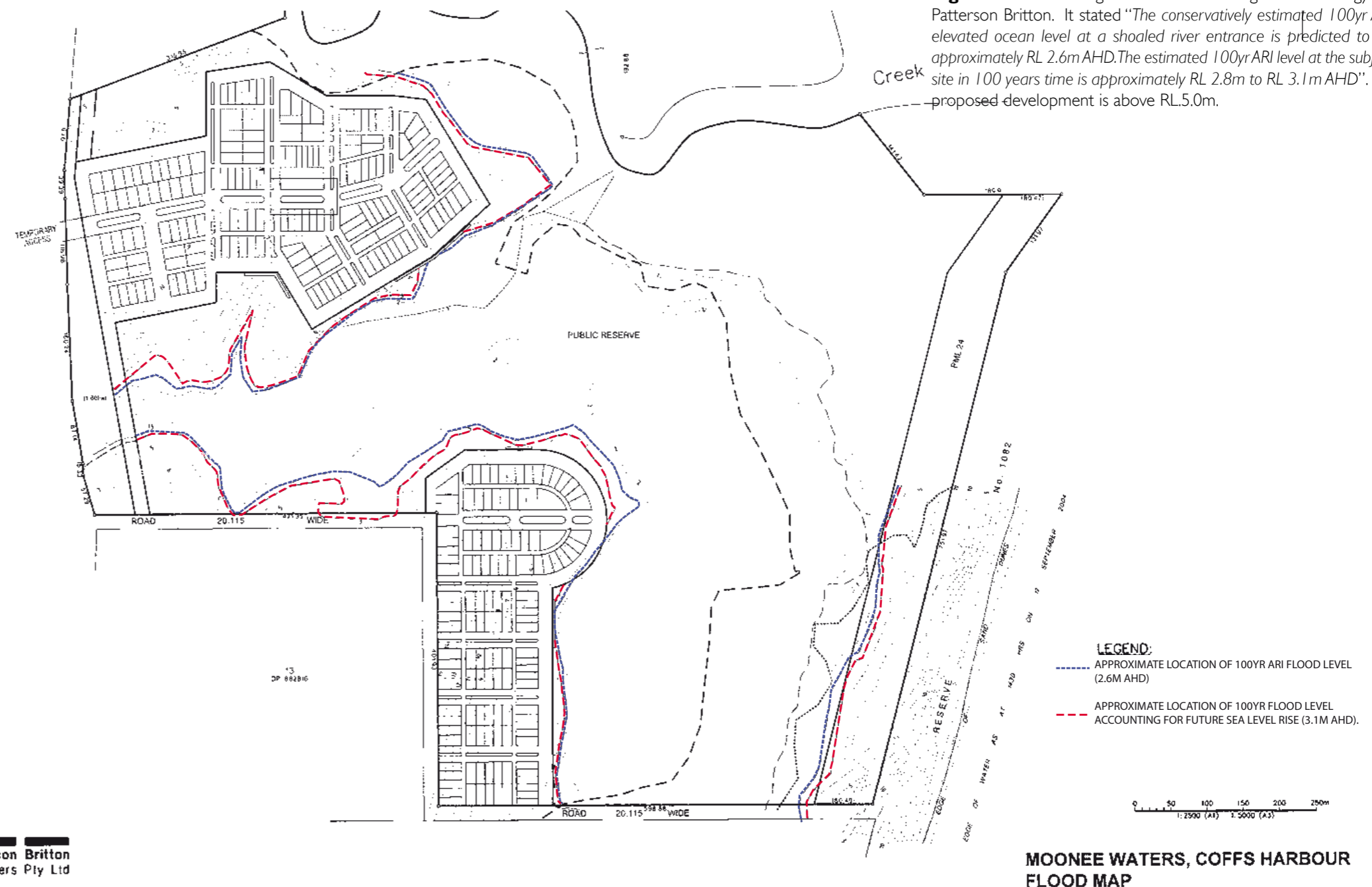
Stormwater Drainage Concept Plan

A major/minor drainage philosophy has been adopted. All flows generated as runoff are proposed to be directed to rainwater tanks and bio-retention swales. These will maximise the runoff treatment and minimise runoff volumes.

All piped drainage infrastructure would be designed to convey the 5yr ARI flows generated on site. Flows in excess of the 5yr ARI (up to the 100yr ARI) event would be conveyed within the internal roadways and swales.

Stormwater pipe outlets will be avoided where possible. Pipe outlets will discharge to the perimeter swale and discharge as a wide sheet flow to mimic existing conditions.

Water quality management issues have been incorporated into the design of the concept plan (see section 4.2).



2.4 ARCHAEOLOGY

An Aboriginal Archaeological Assessment of the project area was conducted by Umwelt (Australia) Pty Ltd and is provided in full in Volume 2. The Aboriginal and Archaeological Survey and Assessment of the project area was conducted in consultation with the Coffs Harbour and District Local Aboriginal Land Council and the Gumbula Julipi Elders.

During field survey and site inspections conducted as part of the assessment one previously unrecorded Artefact Scatter and two previously unrecorded Potential Archaeological Deposits (PADs) were located within the project area. Additional information was also recorded for two previously known Aboriginal sites which are listed on the Department of Environment and Conservation's Aboriginal Heritage Management System. One of these sites, Artefact Scatter 22-1-0198, is located within the project area. While the other site, Sugar Mill Creek 1 (22-1-0051) is located immediately adjacent to the north eastern boundary of the project area (refer to the **Fig 2-5**).

The sites contained within and adjacent to the project area were assessed by the Coffs Harbour and District Local Aboriginal Land Council and the Gumbula Julipi Elders as being of high cultural significance. It was further noted by the Aboriginal stakeholders that the general region, and particularly Green Bluff, are of high cultural importance.

The Aboriginal and Archaeological Assessment of Moonee Waters recommended that:

- The Aboriginal stakeholders (with the assistance of a suitably qualified person) conduct surface collection of artefacts at sites Sugar Mill Creek 2 and 22-1-0198 in advance of any ground disturbing works.
- The Aboriginal stakeholders (with the assistance of a suitably qualified person) are given the opportunity to re-visit Sugar Mill Creek 2 and 22-1-0198 after ground disturbing works are completed in these areas so that any artefacts uncovered by vegetation clearance can be collected.
- Subsurface investigation/salvage will be conducted in the 22-1-0198 PAD and PAD 2 areas (as shown in the inset Figure). The subsurface investigations/salvage should be undertaken in accordance with the methodology outlined in Appendix 1 of the Aboriginal and Archaeological Assessment (refer to Volume 2).
- The Coffs Harbour and District Local Aboriginal Land Council be given the opportunity to retain any artefacts collected/salvaged.
- Any trails/walking tracks should be clearly demarcated in order to limit the impact of pedestrian traffic. Should ground disturbing works be required for the construction of pedestrian access outside of the impact area assessed further consultation with the Aboriginal stakeholders will be required.

- Should the removal of lantana or any other vegetation be necessary inside the 7A zoned land adjacent to site 22-1-0051 (SMC1) this should be undertaken in consultation with the Aboriginal stakeholders and should be undertaken in a manner that minimises ground disturbance.
- In the event that skeletal material is uncovered during works within the project area, all work will cease immediately and the NSW Police Department, the Department of Environment and Conservation and the Aboriginal Stakeholder groups consulted and an appropriate management strategy designed and implemented.

At the request of the Aboriginal stakeholders it was also recommended that:

- The proponent engage in further consultation with the Coffs Harbour and District Local Aboriginal Land Council and the Gumbula Julipi Elders, the Coffs Harbour City Council and any other relevant statutory agencies in relation to the possibility of making a contribution towards the construction of a retaining wall on the north-western bank of site 22-1-0051 (SMC1) and the remediation and/or upgrading of an existing pedestrian track at the site.

The archaeological assessment revealed no sites or artifacts which would constrain the proposed development.

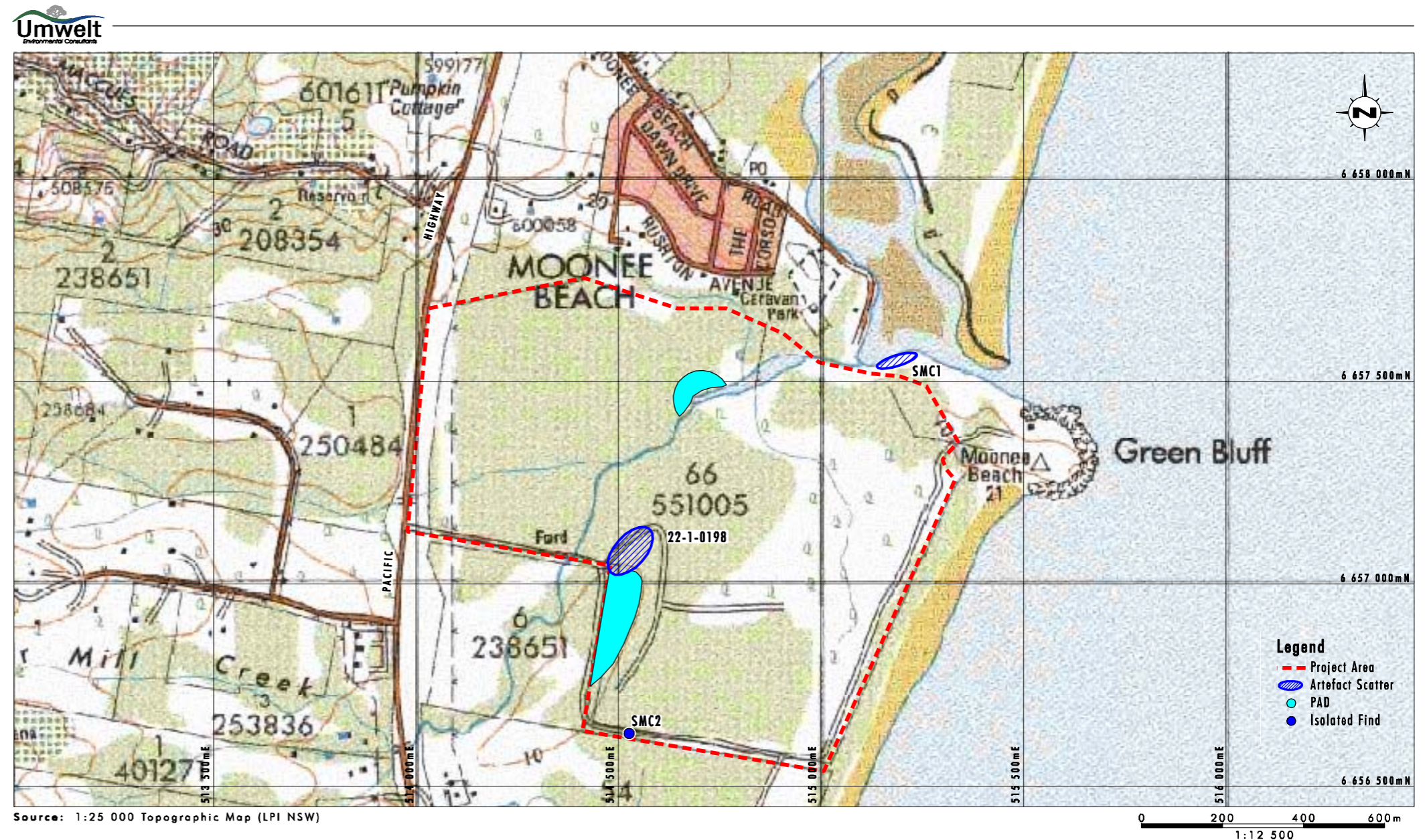


Fig 2-5: Combined Map showing 'Important Areas' and "Cultural Area of PAD", within project boundary. Resourced from Aboriginal Archaeology Report.

2.5 GEOTECHNICAL

The ground conditions of that part of the site that is proposed to be developed are addressed in the report by GHD (see Volume 2). That report concludes:

Topography Description

The site topography can be described as moderately undulating with slopes grading from flat areas to 5 to 10% or more. In the vicinity of the natural drainage gullies covering the site, the gradients become steeper over short lengths.

Reduced levels across the site range from RL 1.5 AHD in the drainage paths to RL 15.0 AHD on the hills. The majority of development is proposed to occur on the land that lies between RL 5.0 AHD and RL 10.0 AHD. The hills and their gentle side slope provide excellent opportunity for allotments that are well drained, and generally without the requirement of extensive site earthworks.

Soil Conditions

The Dorrigo / Coffs Harbour 1:250,000 geological map indicates that the site is on the boundary of the Coramba Beds comprising of mudstone, siltstone and greywacke with minor volcanic intervals and quaternary alluvium comprising of sands and clays.

In brief the site comprises residual sandy clay soils, clay soils and extremely weathered rock, and alluvial sandy soils in the low areas.

Soil strength testing has been undertaken and indicate that the site soils has a soaked CBR of between 2%(low strength) and 6%(moderate strength). It is recommended for preliminary pavement designs that a CBR of 2% be assumed for design of flexible pavements. However, upon final detailed design, it is recommended that further CBR tests be undertaken at the proposed location of the road pavements.

Guidelines for site works, trenching and excavation, and construction of road pavements on low CBR subgrade materials have also been provided.

Site Contamination Issues

A search of Council's register revealed no record of banana cultivations occurring within the site. Given the natural state of the site, it is considered unlikely that soils within the site have been contaminated.

GHD considers that there is no need for further investigation of the site. However, during development of the site, if soils appear to be significantly different to those described in this report or appear to be visually contaminated, it is recommended that an experienced environmental consultant be engaged to assess, validate and remediate (if necessary) suspected impacted soils.

Acid Sulphate Soils

Reference to the Moonee Beach Acid Sulphate Soils Risk Map published by the Department of Land and Water Conservation indicates that the proposed Concept Plan is located generally in an area which has no known occurrence of acid sulphate soils between 1m and 3m below the ground surface.

Samples from test pits were screened for the presence of actual potential Acid Sulphate Soils. On the basis of the screening results, it is considered that the soils to 3m depth are not actual acid sulphate soils, but may be potential acid sulphate soils.

On the basis of the preliminary assessment, it is recommended that further assessment be carried out prior to excavation of site soils once the location and depth of excavations are known in more detail. The assessment should target alluvial soil areas below about RL5m AHD.

Bulk Earthworks

It is considered that the proposed development will generally conform to the natural contours of the site, and that future bulk earthworks will be generally limited to the proposed road reserves.

All future bulk earthworks will be undertaken in accordance with an approved Soil and Water Management Plan. Any fill imported to the site will be approved by an engineer prior to the import of the fill to the site, and shall be of a sound clean, material, reasonable standard, and free from large rocks, stumps, organic matter and other debris. Where ever possible, material having similar properties to the in-situ site material shall be sourced.

Geotechnical investigations reveal no constraints to the proposed development.

2.6 SERVICES

Water Supply

Council have advised that a new water trunk main will be required to service the potable water requirements for the proposed development.

Reuse Water Main and Irrigation

A reuse water main used for irrigation purposes is currently aligned along the service road corridor and is sourced from the WWTP near Moonee. Council use this main generally for their own irrigation purposes, and there are no plans at this time to bring this service onto the development site.

Council may determine to extend a service from the existing main if the public open space areas planned for the site are to be irrigated and maintained by Council.

Trunk Service

Council have advised that the new trunk water main should connect into an existing 300 dia main located adjacent to the Moonee Beach Tavern to the north. This will require extension of the new trunk main along the service corridor to the east of, and running generally parallel to the Pacific Highway.

Council have advised that a second water reservoir adjacent to the Moonee Reservoir is planned for construction in 2007. The final route selection will depend upon Council's requirements, and Council's future program for the augmentation of the Moonee Reservoir and ancillary trunk services.

Internal Infrastructure

A preliminary water reticulation system to service the proposed development has been prepared, and analysed to determine that the proposed development can be provided a suitable water supply system.

The layout provides water service to all allotments and is looped for security of supply and optimisation of flows and pressure.

Final sizing of the internal water main network and trunk main will be undertaken during the detailed design and after confirmation from Council as to their preferred connection point to the reticulation system, and details of their proposed augmentation of the existing reticulation system.

Sewerage Reticulation: Existing Sewer Infrastructure

The development site is not serviced by Council's existing sewerage infrastructure.

Coffs Harbour City Council has advised that sewer is to be directed to an existing gravity sewer main located within the property of the Moonee Beach Tavern.

Planned Sewer Infrastructure: Trunk Service

Due to the undulating nature of the site, and the low lying watercourses within the site, a number of sewer pump stations will be required to service the full development.

A sewer rising main will be required from the development site to the Council connection point, a length of approximately 300m.

Internal Services and Development

The ultimate development has four distinct sewerage zones as dictated by the undulating topography. For this reason there will be required a system of gravity collection mains, sewer pump stations and rising mains to be connected either in series or delivering into a common trunk rising main to be constructed to the existing gravity sewer infrastructure 300m to the north of the site.

Electrical Infrastructure

There currently exists an 11kV overhead electricity supply line within the power easement adjacent to the eastern boundary of the site.

Country Energy is also planning the construction of an overhead 66kV supply line adjacent to the existing supply line.

The electrical services to be constructed as part of the development works will comprise electrical transformers, distribution pillars and underground cabling in conduits.

The detailed design, and construction timing will be required to be co-ordinated as the development evolves.

Telecommunications Infrastructure

The main Sydney to Brisbane optic fibre cable traverses the site, generally adjacent to the site's western boundary. A second traditional main line is also located at the western edge of the site.

Prior to any works on the site a Dial Before You Dig search will be undertaken to determine the current extent and location of services on the site. During construction works, care will be taken to ensure that these lines are not disturbed.

All headworks including conduits, cabling, pits and distribution pillars will be supplied and installed by Telstra at their cost, during the construction of the civil works.

All services are able to be provided to the proposed development.

2.7 BUSHFIRE

A Bushfire Risk Assessment report prepared by Graham Swain of Australian Bushfire Protection Planners Pty Ltd. is included in Volume 2. The Report concludes:

The Coffs Harbour Certified Bushfire Prone Land Map indicates that the development site contains Category 1 Bushfire Prone Vegetation.

The Bushfire Protection Assessment report uses the methodology provided by Planning for Bushfire Protection 2006 to validate the development's compliance with the Asset Protection Zone requirements of Table A2.4 of Planning for Bushfire Protection 2006 and assesses the requirements of Section 46(1)(g) of the Rural Fires Regulation necessary to provide compliance with Section 100B of the Rural Fires Act 1997 (Amended).

The northern development Precinct A will have direct access to the new slip road whilst access to the southern Development B precinct is provided by a new road constructed within the twenty [20] metre wide Crown Road Reserve along the northern boundary of the adjoining North Sapphire Beach development, connecting to the slip road to the west.

The vegetation within the property ranges from Swamp Forest and Sedgeland / Rushland / Mangroves / Saltmarsh in the eastern portion of the property; Swamp Forest and Coastal Riparian Open Forest in the central south-western portion to Open Forest which covers the land within the proposed residential development precincts and the land along the northern boundary of the property. This vegetation provides the bushfire hazard to the development.

The Concept Plan within the development precincts provides for a perimeter road between the future dwellings and the retained bushfire prone vegetation on the property which will be managed as part of the community property. The perimeter road connects to a series of internal roads, which in Precinct A, connects with a main access road that extends to the east from the slip road located to the west of the precinct.

The perimeter road to Precinct B also connects to internal roads which connect to a new road to be constructed within the existing Crown Road to the south and west of the precinct. The access to this precinct extends west to the slip road via a new road constructed within the existing Crown Road Reserve which is located along the northern boundary of the adjoining North Sapphire Beach development.

The development proposal includes for the management, within the Community Title provisions, of the vegetated corridor between the powerline easement/slip road and the Pacific Highway carriageway and a corridor along the northern aspect to the access road to Precinct B. This management is recommended to provide additional fire protection to the exit roads from the development precincts.

Furthermore, an emergency exit from Precinct A is available onto the Pacific Highway, via an existing gateway to the North Sapphire Beach site, using the emergency access provisions of the Rural Fires Act.

Recommendations are made and incorporated into the Concept Plan on the provision of fire fighting access and water supplies, management of the landscape within the Asset Protection Zones and building construction standards to future dwellings, so as to satisfy the requirements of satisfy the aim & objectives of Planning for Bushfire Protection 2006.



Fig 2-6: Bushfire protection measures



2.8 TRAFFIC AND TRANSPORT 2.9 ACOUSTICS/NOISE

A detailed assessment of the traffic implications of the proposed Concept Plan has been undertaken by traffic consultants John Coady Consulting Pty Ltd (previously Project Planning Associates) in association with Dobinson and Associates (see Volume II). The conclusions of that report are:

- the proposed road network is compatible with the RTA planning strategy for the future upgrading of this section of the Pacific Highway which assumes that access for the proposed Concept Plan will ultimately be provided via new Pacific Highway interchanges at Moonee Beach Road and Solitary Split Road, with a 'service road' to be constructed along the eastern side of Pacific Highway connecting those interchanges. The proposed Concept Plan makes provision for the section of that 'service road' which traverses the site
- if residential development of the proposed Concept Plan is commenced prior to the upgrading of Pacific Highway or access availability via North Sapphire Beach Link Road, then interim access could be provided via two possible temporary access intersections with Pacific Highway. Those temporary access intersections will be in the form of 'seagull' channelised intersections with left and right-turn movements permitted, constructed to comply with AUSTRROADS standards. Capacity analysis conducted as part of the preparation of the Traffic Assessment report revealed that the temporary access intersections would operate satisfactorily under projected 2007 and 2015 traffic demand.

In the circumstances, it is our opinion that the proposed Concept Plan will not have any unacceptable traffic implications. This will be verified by ongoing consultation with the RTA

A desktop assessment of the noise implications of the proposed Concept Plan has been undertaken by GHD (see Volume 2, Appendix I). The conclusions of that report are:

Results of the qualitative assessment suggest traffic noise onto the site has the potential to adversely affect the development site. The qualitative assessment was conducted based on the findings of the previously undertaken noise monitoring adjacent to the Pacific Highway between the 11th and 18th November 2004. Monitoring was undertaken at two properties along the Pacific Highway approximately 700m and 1.2km to the south of the proposed development site southern boundary. Based on these indicative results, it was found that:

- Traffic noise is likely to be a feature of the ambient environment in the area; and
- Current traffic noise levels may potentially exceed the Environmental Criteria for Road Traffic Noise (ECRTN) criteria at the nearest proposed building footprint for a new residential development affected by freeway / arterial road traffic noise.

There will likely be increased noise effects resulting from assumed future traffic growth along the Pacific Highway and future building footprints are proposed to be situated nearer to the roadway than the location of previous monitoring. It may therefore be expected that both the ECRTN external and internal residential criteria may potentially be exceeded.

Detailed noise modelling is required to determine exactly what mitigation measures will be required to achieve the ECRTN goals. GHD recommend that unattended noise monitoring be undertaken representative of the nearest potentially affected building footprint in the proposed development nearest to the Pacific Highway with levels used to establish site specific traffic noise intrusion criteria.

Due to the close proximity of adjacent approved developments and existing residential receivers, GHD recommend that a site specific Construction Noise and Vibration Management Plan be undertaken prior to construction activities commencing.

By using standard acoustic attenuation and vibration mitigation measures it can be reasonably expected that acceptable noise levels may be achieved for future proposed residences within the assessment site.

2.10 CONCLUSIONS

The background studies all provided valuable input into the design of the project. The final Concept Plan successfully avoids or ameliorates constraints which were revealed by the background studies.