

Section

5

Environmental Interactions

This section of the report expands on the contextual description of the physical environment given in Section 2, and undertakes an analysis of environmental interactions (particularly those at aspects of S.79C (1) (b) and (c) relevant in the subject circumstances) applicable to the proposed development with specific reference to the site planning objectives specified in Section 3.1 of the report. Further, this section reviews a range of comprehensive environmental management measures, again aimed at specifically addressing adopted site planning objectives.

5.1 Design



Objective

To design affordable housing that is safe, secure and constructed for compatibility with physical environmental conditions and the character of the neighbourhood.

The subject site provides an opportunity to facilitate quality, affordable living environments.

The existing lowland subtropical rainforest remnant is a valuable environmental and aesthetic resource that will be retained and enhanced via regeneration. The dwellings have been designed so that they do not adversely impact on the rainforest remnant or regeneration areas.

The following design principles have been adopted in the landscape design strategy;

1. Provide a design which is consistent with the Greenwood Grove locality;
2. Provide landscape treatments which create privacy for proposed and existing dwellings;
3. Ensure each dwelling has adequate and useable private open space; and
4. Maintain affordability.

Overall, a mix of 1, 2 and 3 bedroom dwelling types are proposed which are to be flexible in design to meet the needs of various family structures over time.

Each dwelling is provided with its own external entry located so as to not compromise the privacy of other dwellings and their private open space.

All dwellings have been provided with functionally sized living areas located on the northern/north-eastern side of buildings to maximise solar access.

Building materials such as brick and colorbond, external finishes and fittings for each dwelling have been selected for cost-effectiveness, durability and aesthetics. The external design is in keeping with the 'coastal character' of Lennox Head. Energy efficient fittings, which satisfy BASIX requirements are included in an effort to reduce overall energy consumption cost to future residents.

Each dwelling has been designed with at least 6 sqm of landscaped garden in addition to grass and hardstand areas. Privacy to each dwelling is achieved through a combination of garden areas and timber batten screens.

5.2 Flora

Objective

To identify and protect site flora of local environmental planning significance and enhance the biological diversity of the land through landscape plantings.

A Flora and Fauna Assessment was undertaken by Peter Parker Environmental Consultant Pty Ltd and is contained in **Appendix B**. This report intends to supplement the various previous studies relating to flora and fauna

undertaken on the site in association with previous development applications.

The existing vegetation on the site consists of three vegetation communities, these being littoral rainforest, shrubland and grassland. The location of these vegetation communities is illustrated in **Plan 4.1**.

Two small clumps of littoral rainforest occur on the western and eastern portion of the site. Additional rainforest vegetation was recorded under a large Moreton Bay fig.

Understorey species and ground covers were found to consist of native ferns, climber and grasses, which can be attributed to over 2 years of active bush regeneration. Five threatened plant species were recorded within the rainforest remnants at the site. These included xylsoma, stinking laurel, arrow-head vine, white lace flower and rough-shelled bush nut. An individual white lace flower was recorded within an area of mowed grassland to the west of the proposed developed.

The Shrubland consists of small areas of regenerating wattles and rainforest pioneers located within and amongst mowed grassland. The Flora and Fauna Assessment suggests that these areas have little conservation value, with the wattles being planted less than 3 years ago.

Grasslands comprising a mix of exotic and native grasses dominate the majority of the subject site. Species found to occur include buffalo grass, broad-leaved carpet grass, kikuyu and parramatta grass which is a major invasive species of the north coast. This vegetation community is considered to have little conservation value and is regularly mowed.

It should be noted, previous studies have identified the presence of a vulnerable species of grass, the hairy-joint grass in a seepage area along the north-western fence line of the site. Later searches have failed to record the species. It is proposed to spray regenerating exotic grass species during winter to reduce their competitive effects on the summer growth of hairy-joint grass and an area of

suitable habitat has been identified for hairy-joint grass preservation and restoration.

Whilst the development footprint has been wholly located on grassland of little ecological value, the littoral rainforest is of high conservation significance and is located in close proximity to the development footprint.

The littoral rainforest has been restored over the past years in accordance with the requirements of Development Consent 2004/605. Accordingly, a planted buffer is now located around the perimeter of each rainforest remnant which separates the development from the core littoral rainforest remnant. Additional managed buffers of variable widths are provided to accommodate APZ's and a buffer for mosquito management.

The report shows the proposed development footprint by reference to site vegetation stands.

The proposed development will require the removal of the shrubland remnant and some buffer species that were over planted during the restoration works. A lemon-scented gum will also require removal. However, this species is considered inappropriate in an urban context. Tree removal will be compensated with substantial landscape plantings around the proposed development.

The *Threaten Species Conservation Act 1995* must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats. Of the 5 threatened species recorded in the littoral rainforest remnant, it is considered unlikely that the proposal will have '*an adverse effect on the lifecycle of the species such that a viable local population of the species is likely to be placed at risk of extinction*' due to the already existing planted buffers and the further 7m spatial buffer separating proposed dwellings from the existing plantings. An assessment of Section 5A is detailed in the Flora and Fauna Assessment (**Appendix B**).

The assessment concludes that there would be no significant effect on threatened species, populations or ecological communities or their habitats. The proposed

development is confined to areas of the site with minimal ecological significance (i.e. Grassland) and an area comprising of rainforest buffer plantings and open space has been provided between the rainforest and the proposed development.

5.3 Fauna



Objective

Ensure that the development does not interfere with the environment or habitat of endangered fauna.

A comprehensive fauna survey of the site was undertaken by Environmental Consultant Pty Ltd (refer to **Appendix C**).

A number of threatened species may potentially occur on or near the site. These species include the rose-crowned fruit dove, the barred cuckoo-shrike, the grey-headed flying fox, little bent wing bat, the common blossom bat and eastern long-eared bat.

The report concludes that no impacts on these species or other threatened fauna species is anticipated as the proposed development is located within vegetation of little ecological significance (i.e. Grassland) and requires no removal of potential habitat for these species. The proposed development is unlikely to *'have an adverse effect on the life cycle of the (threatened) species such that a viable local population of the species is likely to be placed at risk of extinction'* in accordance with the assessment undertaken pursuant to Section 5A of the *Threatened Species Conservation Act 1995* (refer to **Appendix B**).

5.4 Soils

Objective

Ensure that construction works are appropriately managed to minimise site erosion and maintain the current quality of water exiting the site.

The soils of the site are described as being brownish red krasnozems of basalt origins. Earthworks undertaken in association with the original Greenwood Grove subdivision confirmed this soil profile and identified the presence of occasional boulders at depth.

It is proposed that construction works will be guided by a comprehensive soil and water management plan to prevent soil erosion or degradation of water quality within the catchment.

A detailed soil and water management plan is proposed to be prepared for the site at engineering design stage. Further details relating to water quality management at both construction and operational stage of the proposed development are contained in the Conceptual Stormwater Management Plan (refer to **Appendix C**).

5.5 Services

Objective

To provide all necessary public utilities to all dwellings within the proposed development.

An Engineering Report was prepared by Newton Denny Chappelle which addresses requirements relating to earth works, retaining walls, driveways, sewage, water reticulation and servicing associated with telecommunications and electrical supply for the proposed development. A copy of the report is contained in **Appendix D**. The following provides a brief summary of the findings of this report.

5.5.1 Water Supply

Potable water is to be provided via a conventional water reticulation system from the existing watermains within Greenwood Grove, which will require the extension of a 100mm diameter main into Precincts 1 and 2, complete with fire hydrants.

It should be noted; Council's dual reticulation supply is not available to the site, however the development proposes to incorporate rainwater tanks for alternative re-use opportunities.

Future details relating to the proposed water reticulation supply are contained in **Appendix D**.

5.5.2 Sewerage

The subject site will connect to the existing reticulated sewer system. Based on the sewer servicing loads outlined in Council's Development Servicing Plan (2004), the development generates an additional demand of 47 ETs.

The development proposes the private installation of conventional sewer gravity mains where sufficient fall permits connection to the existing Greenwood Grove sewer system. A pressure pump system is required for building footprints located lower than the existing mains ground level.

Design investigations were undertaken in the Engineering Report (refer to **Appendix D**) into the serviceability of the existing pump station, which was designed for the Greenwood Grove Estate. The report indicates that the existing pump station can cater for the extra demand generated by the proposed development that no additional works are required to be undertaken. Further details are contained in **Appendix D**.

5.5.3 Electricity

Preliminary consultation with Country Energy indicated that further augmentation works are required to service Precinct 1. Precinct 2 and 3 can be satisfactorily serviced through the existing capacity of the existing residential electrical reticulation provided for the Greenwood Grove Estate.

As noted in the Engineering Report (**Appendix D**), electrical supply to Precinct 2 and 3 is available to be provided via direct connection to the existing underground supply in the street system. Precinct 1 proposes the

installation of an additional high voltage pad mount substation upon the site. The preferred location of this is identified on the 'Engineering Services Drawings' contained in the Engineering Report (**Appendix D**).

5.5.4 Telephone

Telstra advises that telecommunications are required to be provided by Telstra in accordance with the Universal Servicing Obligation and Digital Data Servicing Obligation requirements of the telecommunications regulations. Once the demand is approved, Telstra is required to ensure the network makes due provision for servicing of the full development. It should be noted, no concerns were raised in relation to the proposed development being able to be provided with services in a timely manner.

5.6 Access

Objective

To ensure that the existing road network has sufficient capacity support the additional vehicles generated by the proposal.

A Traffic Impact Assessment was undertaken by CRG Traffic and Acoustic Consultants (refer to **Appendix H**). The following section provides a summary of the findings of this assessment.

5.6.1 Network Considerations

Vehicular access to Precinct 1 and Precinct 2 (west) will be via Tallow Wood Place, while access to Precinct 2 (East) and Precinct 3 will be via Satinwood Place.

Rosewood Place and Satinwood Place have an access function with a pavement width of 6m and 600mm wide flush pavement edge treatments, allowing vehicles to park off the road carriageway.

Access to the wider road network is provided via Greenfield Road, which is a residential collector road providing connectivity to The Coast Road to the east. It has a posted speed limit of 50 km/hr.

The Coast Road has an arterial function and provides connectivity to coastal suburbs between Byron Bay to the north and Ballina to the south. It has a posted speed limit of 80 km/hr in the vicinity of Greenfield Road.

The intersection of The Coast Road and Greenfield Road is a priority controlled tee junction. Dedicated left and right turn lanes are provided on The Coast Road at the intersection.

Based on the trip generation rates outlined in the NSW RTA's 'Guide to Traffic Generating Developments', it is estimated that the proposed development will generate 370 vehicle trips per day, including 37 vehicle trips during morning and afternoon peak periods. Accordingly, this will not adversely impact on the environmental capacity of the local road network.

SIDRA modelling undertaken in the Traffic Impact Assessment also indicates that the Coast Road/Greenfield Road intersection will operate satisfactorily into the future with the anticipated additional traffic volumes generated by the proposed development (refer to **Appendix H**).



5.6.2 Site Access Considerations

Vehicular access to Precinct 1 will be via a 6.5m wide driveway and a 3m wide exit only driveway on Tallow Wood Place.

The eastern portion of Precinct 2 will be accessed via a 6m wide driveway into Satinwood Place, whilst the western portion of Precinct 2 will be accessed via a 3m wide driveway into Tallow Wood Place. As this driveway will only service 6 resident parking bays, it is considered acceptable given that there is visibility between both ends of the driveway and the driveway is located on a low order access road.

The parking bays associated with Precinct 3 have direct access to Satinwood Place. Direct access to Satinwood Place is considered acceptable in this instance given that it is a low order access road with no through-traffic function and carries very low traffic volumes.

As noted in the Traffic Impact Assessment (**Appendix H**), the proposed access arrangements are generally in accordance with relevant requirements specified in AS/NZS 2890.1:2004.

5.7 Stormwater Drainage

Objective

Ensure that the quality and quantity of stormwater exiting the site is not adversely affected by the proposed subdivision and that existing drainage patterns are not materially altered.

A Conceptual Stormwater Management Plan was prepared by Cardno and is contained in **Appendix C, which** provides an analysis of stormwater quality and quantity for the subject site.

The subject site generally falls towards to northern boundary of the site. The existing site grades are relatively steep with slopes of around 10%. Existing surface levels of the site range from RL 16m AHD to RL 2m AHD.

Investigations were conducted to assess the impact of the proposed development on peak flows discharging from the site. The increase in impervious areas as a result of the development is expected to increase the runoff generated for each development precinct. To maintain peak flows equivalent to the existing conditions, the Conceptual SMP recommends on-site detention storage into the various precincts to the 1 in 100 year ARI storm event capacity. On-site detention proposed for the development includes;

- Incorporating bio-retention basins located throughout the precincts. The detention volume will be provided as additional storage above the extended detention depth required for stormwater treatment purposes;
- Incorporating the remaining detention volume as additional storage within the rainwater tanks proposed for each dwelling.

The objectives for the stormwater quality analysis were to meet the operational performance criteria outlined in the

Ballina Council *Combined DCP Chapter 13 – Stormwater Management*. As summarised in the Conceptual SMP, to reduce the expectant pollutant export loads discharging from site, 'best practice techniques' are proposed to be incorporated into the development. To achieve Council's performance criteria, the inclusion of stormwater quality management measures is as follows;

- Rainwater storage tanks,
- Vegetated buffer strips and vegetated swales,
- Bio-retention basins, and
- Porous pavement.

A MUSIC model was developed to determine the optimal preliminary sizing/conceptual design of the proposed stormwater treatment devices incorporated into the development (refer to **Appendix D**).



Where possible best management practices have been adopted, giving consideration to space restrictions. The results of the stormwater quality modelling have indicated that through the incorporation of the above devices, the modelled reduction rates to TSS, TP and TN all meet the reduction criteria outlined in DCP Chapter 13 – Stormwater Management.

The abovementioned proposals, required at engineered documentation stage by detailed calculations and design, will ensure that water quality and the local hydrology is managed in a fashion consistent with the stated site planning objective for stormwater drainage.

5.8 Hazards

Objective

Review potential site planning hazards with respect to Mosquito breeding areas, bushfire protection and flooding to ensure the development is not likely to present an unreasonable hazard.

5.8.1 Site Contamination

A preliminary land contamination assessment was undertaken for the Greenwood Grove Subdivision in association with DA 2004/605, which evaluated the risk of chemical residue contamination from previous land practices.

A 'deferred commencement' conditions of development consent DA 2004/605 required that a Site Audit Statement be prepared and endorsed by DEC in accordance with Section 55B of the Contaminated Land Management Act 1997 prior to commencement of the Notice of Consent. This condition has been complied with, therefore there are no outstanding contamination issues relating to the subject site.

5.8.2 Bush Fire Hazard

A Bushfire Threat Assessment was prepared by BCA Check and is contained in **Appendix E**. The assessment was undertaken in accordance with the requirements of Clause 44 of the *Rural Fires Regulation 2008* for an application for a Bushfire Safety Authority and takes into consideration the requirements of s.100B of the *Rural Fires Act 1997*.

The assessment also demonstrates compliance with Planning for Bushfire Protection 2006 (PBP 2006) and the recent addendum to appendix 3 of PBP 2006. As outlined in the addendum to appendix 3, there are two separate processes and methodologies for the determination of asset protection zones (appendix 2) and construction standards (appendix 3). The assessment recommends solutions to establish compliance with the performance

criteria and to establish adequate defensible space for each building adjacent to a bushfire hazard.

The subject site is located on bushfire prone land, with the primary hazards being two areas of remnant rainforest vegetation that have been enhanced by recent rainforest regeneration and planting. It is also noted that the vegetation to the west of the site (and the remnant located in the north western precinct of the site) is mapped as category 1 vegetation and is also remnant rainforest which should therefore be identified as category 2 vegetation. Vegetation to the north of the site is considered to be forested wetland as is mapped as category 1 vegetation.

The forested wetland to the north and north west of the subject site is located more than 100m from the proposed development. Grassland is located between the subject site and this vegetation. The adjoining property owner has agreed to provide a 10m wide easement adjacent to the north and part of the western boundary of the subject site to provide disconnection from the northwest remnant to the rainforest vegetation further to the west. This will comply with the 10m IPA requirements for grassland.

The other noted hazards are located in the northeast and southeast portions of the site, with a small remnant rainforest located in the southeast and grassland to the north. These hazard areas are considered minor in nature given their size, shape, minimal fire runs and grade.



For the purpose of Planning for Bushfire Protection 2006, the areas that are considered as a bushfire hazards are;

- Remnant rainforest vegetation in the northwest precinct of the site,
- Remnant rainforest vegetation in the north eastern precinct of the site,
- Remnant rainforest vegetation in the south east precinct of the site, and
- Grassland adjacent to the north of the site.

The report identifies deemed-to-satisfy construction standards based on appendix 3 of PBP 2006 and provides alternative solutions in establishing distances between

buildings and hazards, which are measured from the vegetation interface at surface level. The following table provides a summary of the recommendations within the assessment and the method of assessment.

Table 5.1 Summary of recommendations

Measure	Recommendation	Assessment
APZ Required	See table 5.2 below. APZs measured from the vegetation interface at surface level.	Alternative solution
Water Supply	To comply with AS 2419.1-2005 (additional hydrant required to northeast precinct)	Acceptable solution
Electricity Supply	Electricity supply to be located below ground level	Acceptable solution
Gas supply	Gas supply to comply with PBP 2006 is proposed	Acceptable solution
Construction Standards AS 3959-2009	Bushfire attack levels in accordance with AS 3959-2009 together with the construction requirements of Planning for Bushfire Protection (amended appendix 3)	Alternative solution
Landscape	Landscaping is to comply with Appendix 5 of PBP 2006	Acceptable solution
Access	Standard driveway access acceptable based on compliant hydrant water supply	Acceptable solution

The following table summarises the required asset protection zones for each dwelling. Each dwelling is to be constructed in accordance with the nominated Bushfire Attack Levels pursuant to AS 3959-2009 and the construction variations contained in *Planning for Bushfire Protection 2006*.

Table 5.2 Asset Protection Zones and Construction Standards

Building No.	Inner Protection Area	Construction Standards (AS 3959-2009 & PBP 2006)
Building G – Units 32/34, 33/35	7.3m	Entire building BAL 40 with exception to the north and east elevation which can be BAL 29.
Building G – Units 36/38, 37/39	19m	Entire building BAL 12.5.
Building G – Unit 31	7.2	Entire building BAL 40 with exception to north and east elevation, which can be BAL 29.
Building B – Units 8/10	12.2m	Entire units to be BAL 19 with exception to the east elevation which can be BAL 12.5
Building B – Units 7/9	19m	Entire BAL 12.5
Building F – Units 28/30, 27/29	14.1m	Entire building BAL 40 with exception to the east and south elevation, which can be BAL 19.
Building E – Units 24/26, 23/25	19m	Entire building to be BAL 29 with exception to the east and south elevation, which can be BAL 19.
Building D – Units 20/22, 19/21	36m	Entire building BAL 12.5.
Building H – Units 40/45, 41/46, 42/47, 43/48, 44	40m	Entire building BAL 12.5.
Building A – Units 3/6, 2/5, 1/4	40m	Entire building BAL 12.5.
Building C – Units 14/18, 11/15, 13/17, 12/16	40m	Entire building BAL 12.5.
Building I – Units 49/50	7.6m	Entire building BAL 40 with exception to the west elevation, which can be BAL 29.
Building J – Units 51/53, 52/54	11.4m (NE) 7m (E)	Entire building BAL 40 with exception to the west elevation, which can be BAL 29.
Building M – Units 69/70, 74	11.9m (N) 6m (E)	Entire building BAL 40.
Building M - Units 71/72	26m 13m	Entire building BAL 19.
Building L – Units 66, 65,	12.2m 24m+	Entire unit 66 to be BAL 29. Units 65, 64/68, 63/67 to be BAL

64/68, 63/67	(exposed section)	12.5
Building K – Units 55/59, 56/60, 57/61, 58/62	7.5m 19m+	Entire Unit 55/59 to be BAL 40. Units 56/60, 57/61, 58/62 to be BAL 12.5

An emergency evacuation procedure and detailed plans of all Emergency Assembly Areas (onsite and offsite) are to be prepared in accordance with the RFS guidelines for the Preparation of Emergency/Evacuation Plan and AS 3745-2002. A copy of the emergency evacuation plan is to provide to the local Bush Fire Management Committee for their information prior to occupation of dwellings.

The assessment also recommends the water supply and location of the fire hydrants are to comply with AS 2419.1-2005. Where street hydrants do not provide full coverage, a fire hydrant will need to be installed on site.

As previously mentioned, an easement is to be provided on the adjoining property adjacent to the north and west boundary of the subject site. The easement width is proposed to be 10m and will be maintained in accordance with the Inner Protection Area requirements of PBP 2006. An 88b instrument is to be created on the title for this easement prior to the issue of a construction certificate.



5.8.3 Mosquito Management

A Mosquito Impact Assessment was undertaken by Mosquito Consulting Services which assessed the mosquito risk to future residents of the proposed development through the collection of data both from the site and at off site reference locations. (Refer to **Appendix F**).

Mosquito studies were undertaken in March and April 2010. Of the 20 mosquito species collected on site, 6 are considered 'threat' species as known potential vectors of arbovirus disease of humans.

The report suggests that high seasonal abundance of a number of species was recorded most notably of which was *Aedes procax*. This species, along with *Aedes vigilax*, *Culex annulirostris* and *Coquillettidia linealis* have medium to long-range dispersal potential. Short-range buffer

zones are not considered an appropriate control for these species. These species have a more generalised and regionally significant impact.

The second most abundant species recorded at the site was *Verrallina funereal*. This species is considered to be more locally specific. Whilst not breeding in the site itself, adjoining lands do provide suitable habitat for this species. To manage the potential risk from this species, in particular its relationship to the rehabilitation vegetation zones within the subject site, it is recommended that a clear buffer separation between the vegetation lines of these areas and proposed dwellings be created. The recommended width of the managed buffer is 7m and should contain mowed grass only. The mosquito buffer is contained wholly within the proposed APZs required for bushfire protection (refer to Section 5.13.3).

For all other mosquito species identified as being a ‘threat’ to future residents of the proposed development, it is recommended that adequate risk management can be achieved through the specification of insect screening to be fitted to external doors and windows of proposed dwellings.

The findings of the report indicate, with proper management and the implementation of the above recommendations, future residents of the development should not be exposed to any greater impacts than those already experienced in the wider community.

5.9 Social and Economic Considerations

Objective

To provide an affordable housing solution to Ballina Shire.

The zoning objectives applicable to the residential zoned part of the subject land seek to encourage ‘a range of housing types in appropriate locations’.

As noted in Council’s new Affordable Housing Strategy, the extent and severity of the housing affordability challenge in Ballina Shire (refer to **Section 4.3**) is severe. This highlights the need for more affordable housing options in the Ballina Shire.

The Australian Bureau of Statistics identified 'access to shelter, security and privacy, through housing' as being one of the eight aspects of life that contribute to wellbeing.

Therefore the social benefits as a result of increasing the level and access to quality affordable rental housing in Ballina Shire, in particular for its residents, will not only bring improved 'wellbeing', but will also have the following flow on effects;

- Improvements to physical and mental health,
- Improved education opportunities for children by providing stability and security,
- Improved employment, and
- Creating connectedness to local communities.

However, the benefits extend beyond the residents themselves, for the broader community, this can lead to stronger long term economic growth through higher employment levels resulting in stronger productivity for Ballina Shire.

The introduction of affordable housing options not only achieves the aims of the 2(a) Residential Zone through the provision of increase housing options, it also has positive social benefits to its residents and economic benefits for the broader community.