9.15 TRAFFIC

The DG's requirement 8.2 under the key issues heading requires that road and traffic design issues comply with the provisions of the Northern Rivers Local Government Development and Design Manual – Version 2.

The proposed development complies with this manual. This is addressed in more detail in **Section 9.3**.

9.16 INFRASTRUCTURE

The infrastructure components of the development other than stormwater are addressed in detail in the PBP Infrastructure Strategy report dated September 2006. This report details existing capacity of infrastructure and augmentations required to service the proposed development. The conclusion is that the proposed development can be serviced.

This addresses the DG's requirement 14.1 under the key issues heading.

9.17 CONSTRUCTION MANAGEMENT PLAN

A construction management plan is detailed in the PBP report 'Construction Environmental and Waste Management Plan' dated September 2006.

It addresses measures to mitigate potential dust and noise impacts on adjoining residents during the subdivision construction. It also provides a description of the construction sequence.

This addresses the DG's requirement 15.1 under the key issues heading.

9.18 CONSULTATION

Consultation has been undertaken with Council and the relevant government agencies related to the water cycle and infrastructure. The local community and interested stakeholders were consulted at an information evening.

This is addressed in **Sections 1, 3.2, 3.3, 3.5, 6.4, 7** and **9**.

This addresses the DG's requirement under the heading of consultation.

9.19 POLICY DOCUMENTS

The proposed development complies with the policy and guideline documents listed in the DG's requirements.

The ANZECC guidelines are not relevant to stormwater *(wet weather)* water quality. DEC has formulated guidelines for stormwater pollutant load control which are presented well in the Council's DCP No. 13 – Stormwater Management. The proposed stormwater measures readily go beyond these targets to provide a positive contribution to the long term improvement in receiving water quality.

These aspects are addressed in **Sections 2, 4.1, 4.4, 4.6, 5.1, 5.2** and **8.3**.

10 CONCLUSIONS

The proposed Coastal Grove development would incorporate an integrated water cycle approach achieving a sustainable water outcome which responds to the constraints of the threatened vegetation and the practical requirements of Ballina Council for long term maintenance of the stormwater management system.

The stormwater management system would reduce peak flows below existing rates and substantially reduce pollutant loads compared with existing conditions. It will alleviate the erosion and deposition of sediment in downstream waterways caused by uncontrolled runoff from external areas. The development will therefore provide a significant contribution to the long term improvement in receiving water quality.

The stormwater management system has been formulated to mimic as closely as possible the existing runoff frequency, especially for light rainfall. In addition, the spring waters would continue to flow to the proposed riparian corridor via trench drains to further assist to maintain the existing hydrology of the site.

The establishment of a riparian corridor along the drainage corridor would provide important habitat and visual benefits as well as providing further stability to the corridor. It will assist in the protection of the threatened hairy-joint grass located in a small area of the riparian corridor.

An 'ecological polygon' buffer area has been established to provide a buffer area for the hairy-joint grass. In addition, no works are proposed in the corridor in the vicinity of the polygon, the stormwater measures would be located outside the corridor and special protection measures are proposed during the subdivision construction for the hairy-joint grass as well as the coastal fontainea in Amber Drive Reserve and the littoral rainforest on the southern boundary.

The proposed development would not be adversely affected by flood levels caused by the ultimate development of the external catchment. The stormwater drainage system would be designed to provide safe access for pedestrians and vehicles in the development during floods.

The use of recycled water and water saving devices in the proposed dwellings would reduce potable water use by 55%. This reduction could increase to 68% when recycled water is approved for use in washing machines. This readily exceeds the BASIX requirement for a 40% reduction in potable water use. This provides a significant contribution to the sustainability of the potable water supplies as well as to the improvement in the environmental flows in source rivers.

The reuse of effluent *(recycled water)* in the development would reduce the effluent load discharged from the Council's SPP to receiving waters from this development by 74%. This would increase to 93% when recycled water is approved for use in washing machines. This provides a considerable contribution to the long term improvement in receiving water quality and their sustainability.

Stormwater management measures have been formulated to conform to Council's DCP No. 13 – Stormwater Management, do not provide a mosquito risk in accord with DCP No. 11 and match Council's skills and existing equipment for maintenance of these measures.

Consultation with government authorities, stakeholders and residents has provided comments which have been considered during the formulation of the development concept and stormwater management strategy.

The water related components and infrastructure proposed in the development conform to the Director General's requirements, as well as the Council and government authority policies and guidelines.

This water cycle management and infrastructure strategy formulated for this development is considered a demonstration project for achieving water sustainable outcomes within a sensitive environment which will contribute to the long term improvements in receiving water conditions and protect the threatened species on and adjoining the site.

11 REFERENCES

- Tim Fletcher, Hugh Duncan, Peter Poelsma and Sara Lloyd, *Stormwater Flow and Quality and the Effectiveness of Non-Proprietary Stormwater Treatment Measures – A Review and Gap Analysis*: Technical Report 04/8; Cooperative Research Centre for Catchment Hydrology; December 2004.
- Institution of Engineers (*1987*), *'Australian Rainfall and Runoff – A Guide to Flood Estimation'*; edited by DH Pilgrim.
- NSW Department of Housing (*1998*), *'Managing Urban Stormwater – Soils and Construction'*; prepared by the New South Wales Government.
- Andre Taylor, *Structural Stormwater Quality BMP Cost – Size Relationship Information from Literature*, 23 January 2004, Version 1

FIGURES

FIGURE 1

AMBER DRIVE RESERVE

EXISTING STORMWATER OUTLET TO BE EXTENDED TO EXISTING WATER COURSE AND NEW OUTLET WITH ROCK SCOUR PROTECTION TO BE CONSTRUCTED

PROPOSED PEDESTRIAN/CYCLEWAY CROSSING

AMBER DRIVE

DRAINAGE CORRIDOR

ECOLOGICAL POLYGON CONTAINING THE HAIRY JOINT GRASS

EXISTING STORMWATER OUTLET TO BE MAINTAINED WITH THE ADDITION OF PLACED ROCK SCOUR PROTECTION

SURVEY STRET

BLUE SEA PARADE

LEGEND

- STREET DRAINAGE
- INTERALLOTMENT DRAINAGE
- BIO RETENTION SWALE
- RAINGARDEN
- GPT
- INFILTRATION TRENCH
- TRENCH DRAIN (MIN 0.5m WIDE, AS RECOMMENDED BY COFFEY)
- PLACED ROCK SCOUR PROTECTION

N

0 15 30 45 60 75m
1:750 (A1) 1:1500 (A3)

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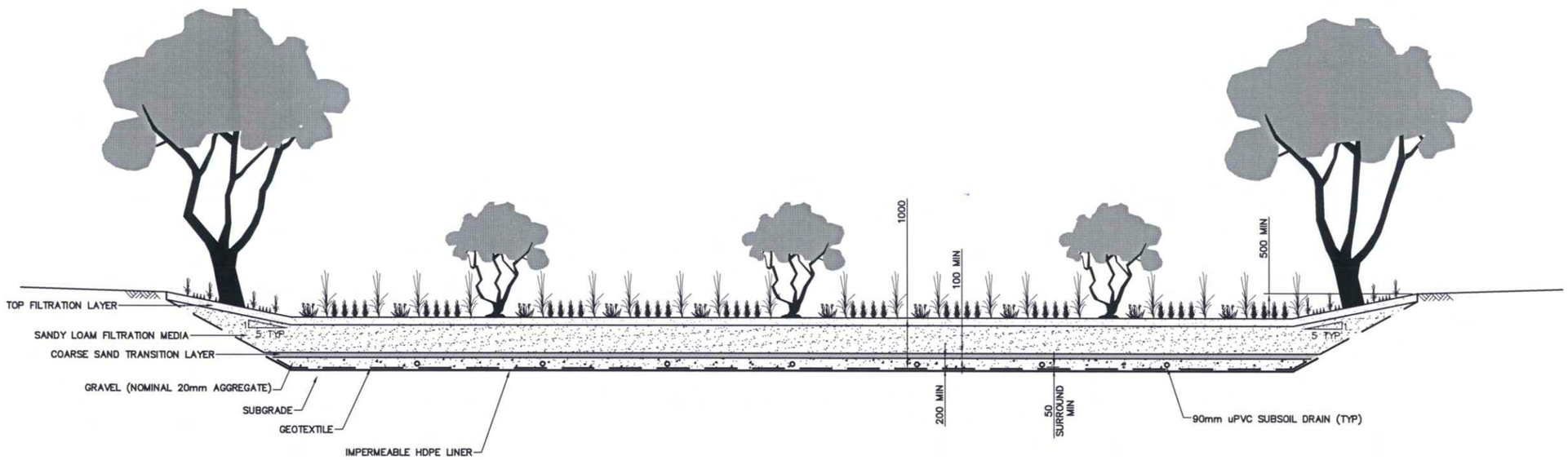
6324 COASTAL GROVE

N:\6324-01 Lennox Head\FIGURES\6324 Fig 1 Conceptual Stormwater.dwg, Fig 1, 11/09/2006 2:46:13 PM

COASTAL GROVE
CONCEPTUAL STORMWATER MANAGEMENT STRATEGY



RAINGARDEN

N:\6324-01 Lennox Head\FIGURES\6324 Fig 2 Raingarden.dwg, Fig 1, 28/08/2006 3:10:25 PM

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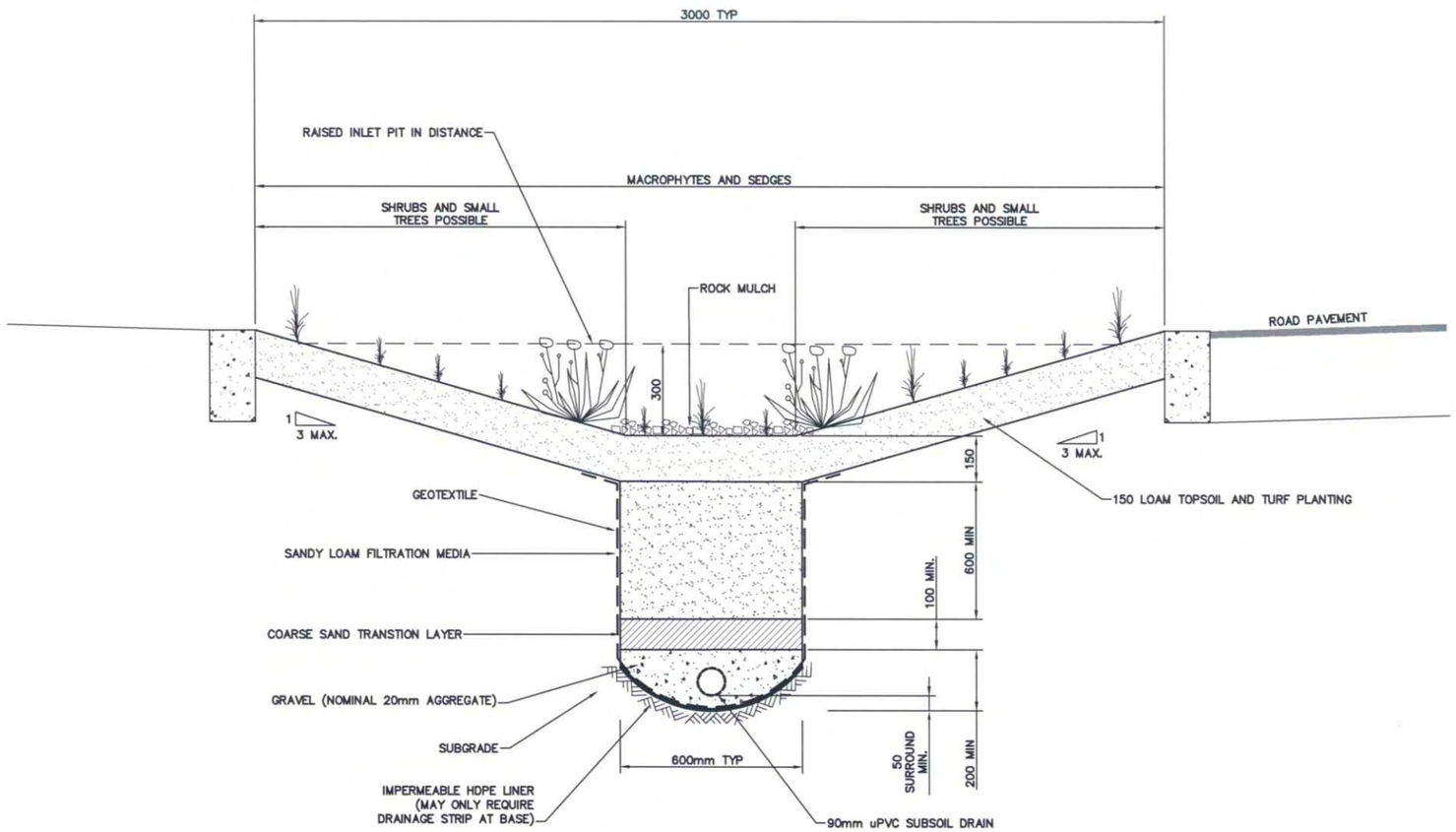
6324 *COASTAL GROVE*

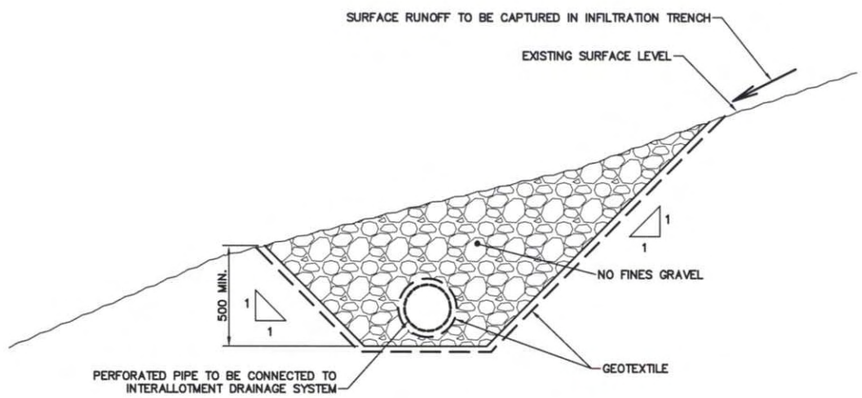
0 1 2 3 4 5m
1:50 (A1) 1:100 (A3)

COASTAL GROVE
RAINGARDEN CONCEPT

FIGURE 3



BIO RETENTION SWALE



TYPICAL SECTION THROUGH INFILTRATION TRENCH

0 200 400 600 800 1000mm
1:10 (A1) 1:20 (A3)

N:\6324-01 Lennox Head\FIGURES\6324 Fig 3 Bio Retention Swale and Infiltration Trench.dwg, Fig 2, 30/08/2006 4:12:36 PM

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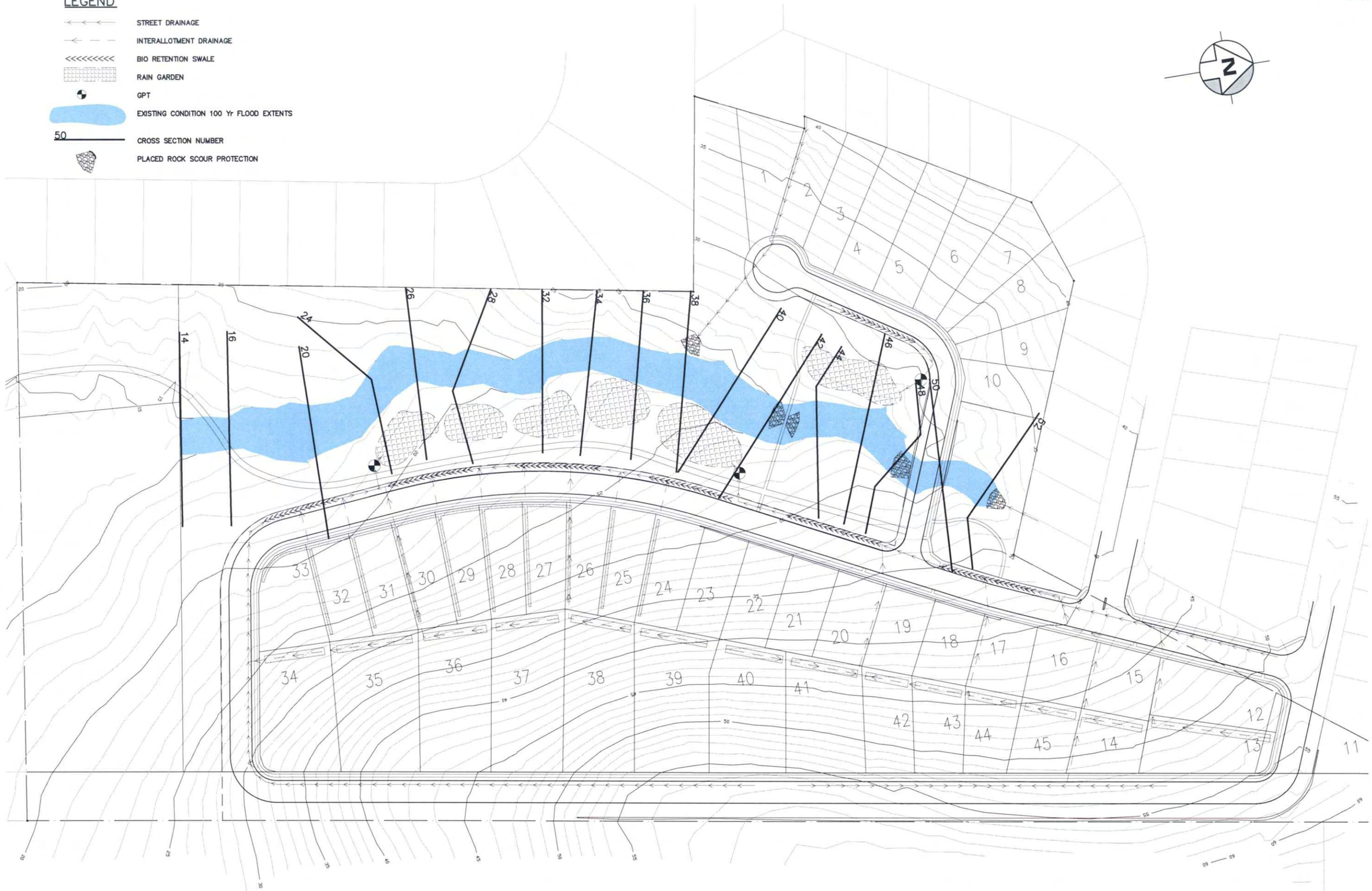
6324 COASTAL GROVE

COASTAL GROVE
BIO RETENTION SWALE AND INFILTRATION TRENCH CONCEPT

FIGURE 4

LEGEND

- STREET DRAINAGE
- INTERALLOTMENT DRAINAGE
- BIO RETENTION SWALE
- RAIN GARDEN
- GPT
- EXISTING CONDITION 100 Yr FLOOD EXTENTS
- 50 — CROSS SECTION NUMBER
- PLACED ROCK SCOUR PROTECTION



0 15 30 45 60 75m
1:750 (A1) 1:1500 (A3)

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6324 *COASTAL GROVE*

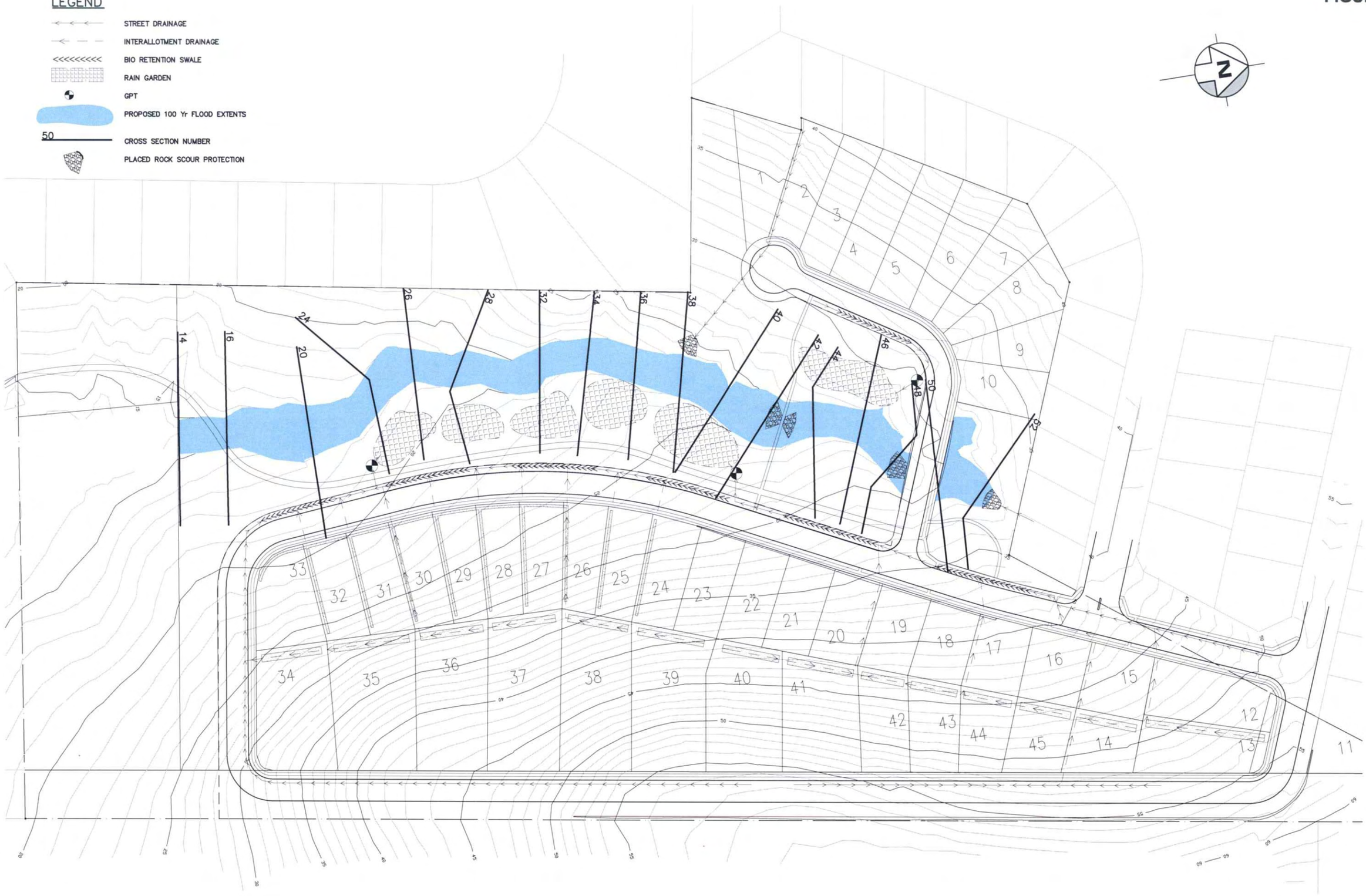
COASTAL GROVE
EXISTING 100 Yr ARI FLOOD EXTENTS

N:\6324-01 Lennox Head\FIGURES\6324 Fig 4 Flood Extents.dwg, Fig 4, 29/08/2006 12:26:50 PM

FIGURE 5

LEGEND

- STREET DRAINAGE
- INTERALLOTMENT DRAINAGE
- BIO RETENTION SWALE
- RAIN GARDEN
- GPT
- PROPOSED 100 Yr FLOOD EXTENTS
- 50 — CROSS SECTION NUMBER
- PLACED ROCK SCOUR PROTECTION



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1:750 (A1) 1:1500 (A3)

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6324 *COASTAL GROVE*

COASTAL GROVE
PROPOSED 100 Yr ARI FLOOD EXTENTS

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APPENDIX A
PHOTOGRAPHS OF SITE

GDA

N W E S

LOCALITY PLAN - Lot 2 DP 622475 LENNOX HEAD
AERIALS 2004 (PLATEAU IMAGES)

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