GWANDALAN

PREFERRED PROJECT REPORT

FOR

MP 07-0107

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1 INTRODUCTION

The Gwandalan Project Application for Catherine Hill Bay/Gwandalan was lodged with the Department of Planning on the 29th August 2007. The plan was subsequently advertised to the public and government agencies. Following receipt of comments and recommendations from several NSW government agencies as well as the Independent Design Review Panel, the Proponent has totally revised the layout of the site and the number of land lots.

The revised layout of Gwandalan was included in the Preferred Project Report for the Concept Plan. The Project Application information includes all the detailed information in the same manner as was previously submitted. As such, attached to this report is a revised Environmental Assessment that includes all the relevant civil and landscape plans.

ASQUITH & deWITT PTY LTD

Environmental Assessment

Description:

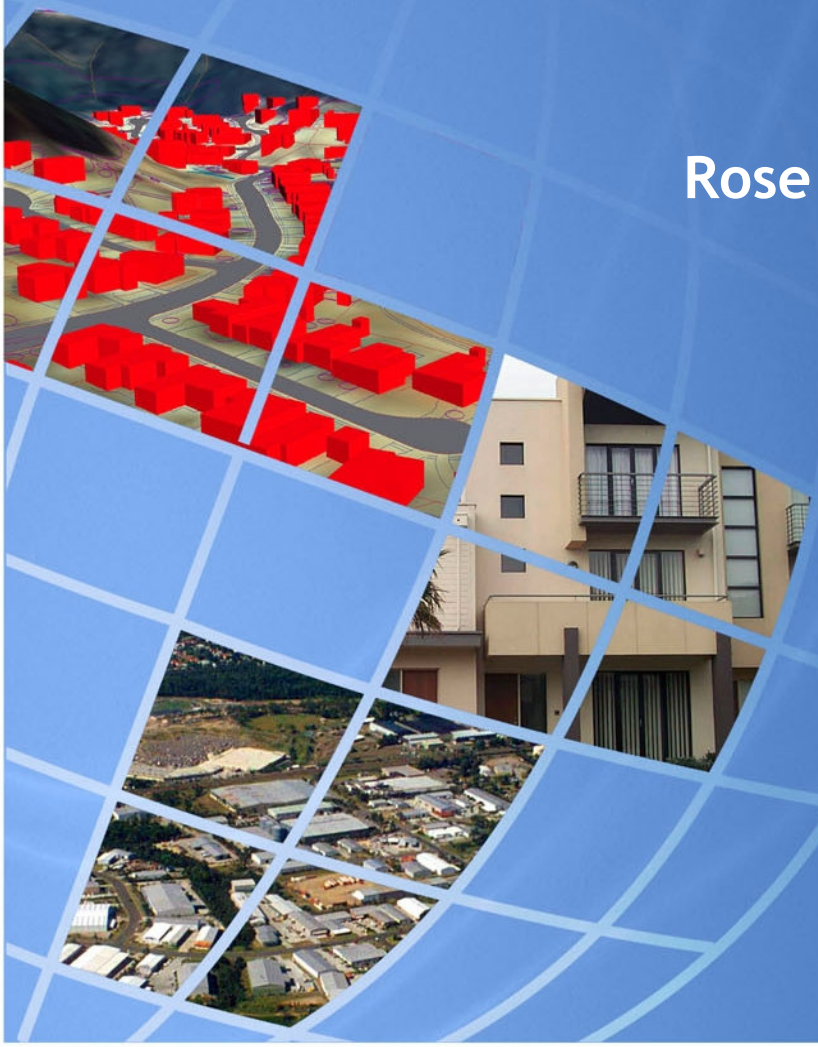
MAJOR PROJECT APPLICATION
188 Lot Subdivision

Property:

Lot 3 DP 588206
Kanangra Drive, Gwandalan

Applicant:

Rose Property Group Pty Ltd



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Section 1
Executive Summary

Approval for a 188 Lot subdivision of Lot 3 DP 588206 is sought by the land owners Lakeside Living Pty Ltd. Approval is sought as a Major Project under Part 3 of the EPA Act 1979.

The site has been gazetted as a site to which Part 3A of the EPA Act applies. A State Significant Site Study covers the land. A Concept Plan has been prepared for the site.

The proposed subdivision has been designed in accordance with the concept plan for the site. The Concept Plan and accompanying Environmental Assessment address the broader environmental issues associated with the proposal.

A high level of environmental assessment for the site has been carried out in the State Significant Site Study for the Catherine Hill Bay/Gwandalan site and in the Environmental Assessment report for the site Concept Plan.

This report provides the detail of the proposed Gwandalan subdivision. This report also details compliance with the planning provisions for the Gwandalan site as contained in relevant SEPP's, the Concept Plan and Wyong Councils subdivision controls.

A set of Director General Requirements has provided the basis of this assessment. The full text of the DGR's is at **Appendix 2.** The following table details of compliance with the DGR's.

Section 2
Introduction

This report has been prepared to meet the requirements for subdivision of the Gwandalan Site under The Concept Plan applying to the land. The report is based on the set of Director Generals Requirements (DGRS) that apply to the site and the provisions of the Concept Plan.

2.1 COMPLIANCE WITH DGRS

Director Generals Requirements

CATHERINE HILL BAY/GWANDALAN DIRECTOR GENERALS REQUIREMENTS					
Director General's Requirement	Response Location				
	Concept Plan EA	Gwandalan PA EA	Moonee Hamlets Proposed Civil Works	CHB Hamlet 1 PA EA	CHB Hamlet 2 PA EA
EA must include:					
1.) Executive Summary;	EA s. 1	EA s. 1	EA s. 2	EA s. 2	EA s. 2
2.) Detailed description of project incl: a.) Strategic justification for the project;	EA s. 3 EA s. 3.1	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
b.) Alternatives considered;	EA s. 3.2	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
c.) Various components and stages of the project;	EA s. 3.3		EA s. 3	EA s. 3	EA s. 3
3.) A statement that the proposal is being assessed under the Bilateral Agreement, which requires the NSW Government to undertake assessment of the proposal which will address matters of national environmental significance;	EA s.2.8	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

4.) A Consideration of the following with any variations to be justified: a.) all relevant SEPP's (with particular regard to Major Projects SEPP, SEPP55, SEPP71 and SEPP(mining, Petroleum Production and Extractive Industries) 2007;	EA s.6.2 EA s.6.3 EA s.6.4 EA s.6.5	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
b.) applicable planning instruments;	EA s.6.11 EA s.6.12	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
c.) relevant legislation and policies, including the NSW Coastal Policy 1997, Lower Hunter Regional Strategy, and the draft Central Coast Regional Strategy;	EA s.6.6 EA s.6.7 EA s.6.8 EA s 6.9	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
d.) Commonwealth Environment Protection and Biodiversity Conservation Act 1999.	EA s.2.8 EA s.6.17 Appendix U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
5.) A consideration of the proposal and cumulative impacts in relation to the development of other future urban land identified in the Lower Hunter Regional Strategy;	EA s.7.6 State Significant Site Study	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
6.) A Draft Statement of Commitments, outlining commitments to the project's management, provision/contribution towards infrastructure, mitigation and monitoring measures with a clear identification of who is responsible for these measures;	EA Appendix A	EA Appendix 1	EA Appendix 4	EA Appendix 1	EA Appendix 1
7.) A conclusion justifying the project, taking into consideration the environmental and construction impacts of the proposal, mitigation measures to address these impacts, the cumulative impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest;	EA s.8	EA s.7	Concept Plan EA	Concept Plan EA	Concept Plan EA

8.) Following consultation with relevant agencies, Councils and other proponents who are proposing development in the vicinity of the site: a.) Identify the development contributions or works in kind applicable to the site or within the LGA including regional and local infrastructure, public transport, social infrastructure and community facilities(including open space); and	Appendix A	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
b.) identify any public benefits to be provided by the development and their consistency with any current development contributions plans;	EA s.8	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
9.) A signed statement from the author of the EA certifying that the information contained in the report is neither false nor misleading; and	EA s.2.7	EA s2.2	EA Page 2	EA Page 2	EA Page 2
10.) A report from a quantity surveyor identifying the capital investment value for the concept plan and the 4 individual project applications.	EA Appendix C	EA Appendix 3	EA Appendix 6	EA Appendix 3	EA Appendix 3
The EA must address the following key issues:					
Independent Panel of Experts Demonstrate that the proposal is consistent with the Interim report to Minister from the Independent Panel of Experts constituted to assess the proposed development. In the event that there are inconsistencies between the proposal and the recommendations of the Panel's Report, justification for the departure must be provided as well as evidence demonstrating how a better outcome will be achieved.	EA s.8 Concept Plan EA S1 Synopsis of Process	Concept Plan Synopsis of Process	Concept Plan Synopsis of Process	Concept Plan Synopsis of Process	Concept Plan Synopsis of Process
EPBC Act – Controlled Action 1.) Impacts on species listed under section 18 & 18A of the EPBC Act 1999;	EA s.2.8,1 s.3.7 s.7.4.7 s.7.5.4 Appendix H, I, P, U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

2.) Impacts on other threatened species, populations or ecological communities, critical habitat(including riparian habitat) and native vegetation generally;	EA Appendix H,I,P,U 2.8.2 EA s7.4.7	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
3.) Impacts on migratory species listed under the EPBC Act 1999;	EA s2.8.3 s7.5.4 Appendix U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
4.) Impacts on RAMSAR Wetlands;	EA s.2.8.4 Appendix U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
5.) Any relevant State and Commonwealth Govt Technical and policy guidelines, including the NSW DoP CEPBC Act 1999: Guide to Implementation in NSW(May 2007);	EAs2.8.5 S6.17 Appendix U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
6.) Proposed offset measures to avoid or mitigate impacts on matters of national environmental significance; and	DA s.2.8.6 Appendix U EA s.3.7	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
7.) Matters outlined in Schedule 4 of the EPBC Regulation 2000.	EA s.2.8.7 Appendix U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Heritage Provide a heritage impact statement should be prepared in accordance with NSW Heritage Office guidelines and DECC's Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation that details the heritage significance of the area and any impacts the development may have upon this significance. The significance is to include an assessment of natural areas, places of Aboriginal, historic or archaeological significance and consider the impact on existing settlements and the iconic elements, such as the Coal Loader Jetty.	EA s.7.4.3 s.7.4.4 s.7.5.10 Appendix E Appendix F	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Flora and Fauna Address the impact of the development on threatened species and their habitat having regard to the Threatened Species Assessment Guidelines and recommend offset measures to avoid or mitigate impacts on threatened species and their habitat.	EA s2.8 s.3.7 s.7.4.7 s.7.5.4 Appendix H, I, P & U	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

Utilities and Infrastructure 1) Prepare a utility and infrastructure servicing report and plan for the Site that includes but is not limited to: a.)Identifying and assessing the capacity of existing utility and infrastructure servicing the site;	EA s.7.4.9 EA s.7.5.5 Appendix J	EA Appendix 4 - Design Plans EA s.3.11	EA s.7	Moonee Civil works EA	Moonee Civil works EA
b.) Identifying that adequate water supply is available for bushfire suppression operations;	EA s.7.4.9 EA s.7.5.6	EA Appendix 4 - Design Plans	EA s.7	Moonee Civil works EA	Moonee Civil works EA
c.)Identifying all necessary augumentation works to service the site and whether these works can sustain this and other development foreshadowed for the Wallarah Peninsula shown in the Lower Hunter Regional Strategy; and	See civils PA's See civils PAs	EA Appendix 4 - Design Plans	EA s.7	Moonee Civil works EA	Moonee Civil works EA
d.)Demonstrate compliance with the requirements of any public authorities in regard to the connection to, relocation and/or adjustment of services affected by the development proposal.	See civils PAs	EA Appendix 4 - Design Plans	EA s.7	Moonee Civil works EA	Moonee Civil works EA
2) Provide appropriate detailed information on the drainage, sewerage and stormwater management measures to be incorporated on Site, including(but not limited to): a.)Sustainable water measures(such as on site stormwater detention, water sensitive urban design measures, and water recycling);	Appendix L & R s.7.4.9 s.7.5.6	Concept Plan s.4.8 Concept Plan EA Appendix 6 EA s.4.12	Concept Plan s.3.9 Concept Plan EA Appendix L	Concept Plan s.3.9 Concept Plan EA Appendix L	Concept Plan s.3.9 Concept Plan EA Appendix L
b.) Sediment and erosion control measures; and	Appendix A, L, R	Design Plans sheet 601	EA Appendix 4	EA Appendix 1	EA Appendix 1
c.) The quality and quantity impacts on surface water, groundwater, the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or a rock platform.	7.4.11 7.5.9 Appendix L & Appendix R	Appendix 6	Concept Plan Appendix R	Concept plan Appendix R	Concept plan Appendix R

Mining Activities 1) Assess the potential for the proposed development and associated conservation offsets to: a.) Restrict access to and future mining of remnant coal resources at CHB and particularly below the Gwandalan site; and	EA 2.4 EA 6.5	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
b.) Restrict access for existing petroleum exploration on PEL No.'s 5 & 446 and any future exploration; and	EA 6.5 SoC	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
c.) Adversely affect or delay the progress of Lakecoal's Mine Closure Plan for Consolidated Coal Lease (CCL) 706 lodged with DPI.	EA 2.4	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
2.) Assess the impact of the proposed development on options to retain or demolish and/or ongoing maintenance of the coal loading jetty, located on MPL 211.	EA 2.4	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
3.) Provide a risk analysis examining the impacts of the former mining use of the site, and in the vicinity of the site, has on future development.	EA 2.4	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Contamination and Geotechnical 1.) Identify and address contamination and geotechnical issues associated with the works. Proposed by the PA's. All relevant legislation and guidelines related to contamination and geotechnical issues are to be addressed.	Appendix A, M & W s. 6.2	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
2.) Provide a geotechnical report that includes details on the classification of soil type generally found within the subject site and demonstrate how the proposal complies with all relevant AS, incl. As2870(Residential Slabs and Footings).	See PA SoC's	Appendix 1	EA Appendix 4	EA Appendix 1	EA Appendix 1

Urban Design & Built Form 1.) Provide plans and documentation for the PA's that is of a quality suitable to assess the building typology(including the quantum of floor space). Plans and documentation should be equivalent to the standard ordinarily required for lodgement under Part 4.	See Concept Plan s.3.10	Concept Plan EA	EA s.1	EA s.1	EA s.1
2.) Address Crime Prevention through Environmental Design principles with consideration given to the relationship to surrounding areas; pedestrian and bicycle movement to, within and through the site; key connections to the existing village and coast.	See PAs for village centre and hamlet 2	EA s.4.4	Concept Plan EA	Concept Plan EA	Concept Plan EA
Ecologically Sustainable Development Demonstrate how the development will commit to ESD principles in design, construction and ongoing operation phases.	Concept Plan s3.13 & 4.9 EA s7.4.15 s7.5.13	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Energy Savings Action Plan 1.) Demonstrate that the development is capable of achieving the requirements of BASIX and what (if any) commitments will be made on other environmental rating tools such as Greenstar and the ABR Scheme.	See PAs & SoC Appendix A	Appendix 1	EA Appendix 4	EA Appendix 1	EA Appendix 1
2.) Prepare an Energy Savings Action Plan in accordance with the requirements of the DWE and the Guidelines for Energy Savings Action Plans, DEUS 2005.	SoC Appendix A	Appendix 1	EA Appendix 4	EA Appendix 1	EA Appendix 1
Traffic and Transport 1) Prepare a Traffic Study in accordance with the *RTA Guide to Traffic Generating Developments* that includes but not limited to the following: a.) Identify all relevant traffic routes and intersection for access and egress;	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

b.) Current traffic counts for all of the above traffic routes and intersections;	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
c.) The anticipated vehicular traffic generated from the proposed lots;	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
d.)Consideration of the traffic impact on the existing intersections and the capacity of the Pacific Hwy to safely and efficiently cater for the additional traffic generated;	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
e.) An analysis of the cumulative traffic and transport impacts of this development on the existing township and taking into consideration other proposed developments; and	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
f.)Traffic analysis, using SIDRA or similar traffic model, for the relevant intersections including: i) Current and traffic growth projects for the life of the project; ii) 95th percentile back of queue lengths; and iii) Delays and level of service on all legs.	See Appendix G & Q	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Bushfire 1.) Demonstrate compliance with the current version of Planning for Bush Fire Protection and AS 3959 – Building in Bush Fire Prone Areas. The EA is to identify the ongoing management arrangements of any proposed APZ's.	Appendix O	Concept Plan EA	Concept Plan EA	EA s.6	EA s.6
2.) Identify future management regimes for any areas of hazard remaining within the subject area. This should focus on the level of hazard posed to future development by the land or adjacent land and how the hazard may change as a result of development.	Appendix O	Concept Plan Appendix O	Concept Plan EA	EA Appendix 4	EA Appendix 4
Impacts on Crown Land Identify potential direct and indirect impacts arising from the development upon the adjoining Munmorah State Recreation Area and Point Wollstonecraft State Recreation Area.	EA s.7.4.14 s.7.5.12	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

Site Preparation Works Provide a report that includes but not limited to: a.) A detailed survey showing existing and proposed levels and quantities of fill necessary for site preparation works;	See PA's for civil works	EA s.6.1.12	EA s.1	Moonee Civil works EA	Moonee Civil works EA
b.) Details o the source of fill including types of materials and their source; and	See PA's for civil works	EA s.6.1.1	EA s.1	Moonee Civil works EA	Moonee Civil works EA
c.) details of the quantity and quality of any excess material and arrangements for its disposal.	See PA's for civil works	EA s.6.1.1 Appendix 4 Drawings 101, 102, 103	EA s.1	Moonee Civil works EA	Moonee Civil works EA
Subdivision 1.) Provide proposed plans of subdivision that identify all covenants, easements and notations proposed for each land title and, if relevant, how the subdivision is to be staged.	See PA's for civil works	EA Design Plans Appendix 4	EA s.1	EA s.1	EA s.1
2.) Provide detail on the management arrangements for all land to be subdivided, but not limited to, titling arrangements; land ownership(particularly future public land); and all proposed covenants and restrictions, including those relating to access.	Concept Plan s3.8, s4.7 EA s.3.9	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
3.) Outline the long term management and maintenance of any areas of open space or conservation (incl. Offset areas) or both, incl. The ownership and control management and maintenance of funding public access revegetation and rehabilitation works and bushfire management.	EA s.3.9	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA
Previous Submissions The EA is to respond to the issues raised in submissions received by the Department following the public exhibition of the CP between Jan 3 2007 and Mar 2 2007.	Appendix S	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

During the preparation of the EA an appropriate and justified level of consultation with any relevant party, having regard to previous consultation with the IPE and the Community Reference Group. Any such consultation prior to exhibition should be documented in the EA. In particular, consultation should be considered with: 1) Agencies and other Authorities a) Commonwealth Dept of Environment & Water Resources b) Lake Macquarie Council c) Wyong Shire Council d) Hunter Water e) Gosford/Wyong Council's Water Authority f) Local Aboriginal Land Council g) Catchment Management Authority h) NSW Dpt of Water & Energy i) NSW DPI j) NSW DECC k) Heritage Office, DoP l) NSW RTA m) NSW Emergency Services agencies; and n) All utility providers.	Appendix S	Concept Plan EA	Concept Plan EA	Concept Plan EA	Concept Plan EA

Gwandalan Subdivision

Environmental Assessment Report

Certificate by author

I certify that the information contained in this report is not false or misleading.

For and on behalf of Asquith & de Witt Pty Ltd.

Certified by Ian McNicol

Position: Senior Planner/Project Manager

Disclaimer

This report was prepared from information and material from a large range of sources. While checking has taken place it is not possible for Asquith & de Witt to independently verify that all information and materials used are correct, current, complete and accurate.

Section 3 Description of Development

3.1 PURPOSE

The subdivision will provide for further needed residential development of the Gwandalan-Summerland Point area.

The need for residential subdivision of the land is identified in the Lower Hunter Regional Strategy, the Draft Central Coast Regional Strategy and the Wyong Residential Strategy and the State Significant Site Study for Catherine Hill Bay/Gwandalan.

Subdivision will be by Torrens Title with roads dedicated to Council.

The subdivision design and landscape plans are at **Appendix 4**.

3.2 YIELD

The subdivision will comprise 188 lots for residential development. The 188 lots is made up of 187 new lots and a residue lot for the existing foreshore dwelling.

3.3 CHARACTER

The character of the subdivision will be detached low density residential in keeping with existing Gwandalan development.

3.4 INCOMING POPULATION

The incoming population is described in Social Sustainability report see the Appendices which accompany the Environmental Assessment (EA) to the Concept Plan for the land.

The population is expected to be predominantly young families.

3.5 DESIGN

The subdivision design complements the location by respecting development on adjoining lands.

The guidelines and development standards contained in Wyong DCP 66 – Subdivisions have been applied to the proposal. See **Appendix 5.**

3.6 CONSTRUCTION

Construction will commence as soon as practicable after approval processes have been completed.

Construction will proceed as follows:

i) clearing and site preparation for (ii) and (iii) and (iv);

ii) civil works including:

- earthworks & site regrading;
- major drainage controls & infrastructure provision; and
- bus route and roads.

iii) release (a) of 64 lots;

iv) release (b) of 42lots;

v) civil works release (c); and

vi) release (c) of 81 lots.

3.7 STAGING

The residential subdivision will be in 3 releases as shown in the Concept Plan figure 4.10.1.

3.8 LANDSCAPING

The proposed subdivision will house a residential community set amongst the tall native Scribbly Gums, Peppermint and native Apple trees on the shores of Lake Macquarie. As many trees as possible will be retained on existing lots, roadside settings, parklands and perimeter buffer zones to create a distinctive 'Gwandalan' character and integrate the development with the surrounding dry sclerophyll bushland. The landscape concept plan is provided in **Appendix 4**.

3.9 ACCESS

Access to the proposed subdivision is provided for via 3 access points off Kanangra Drive. Two of these access points will allow for bus access to the subdivision.

Section 4
Site Description

4.1 LEGAL

The development site is Lot 3 in DP 588206 and is owned by Lakeside Living Pty Ltd. There are no easements over the land.

4.2 LOCATION

The land is located on Kanangra Drive, Gwandalan in Wyong Shire Council's area.

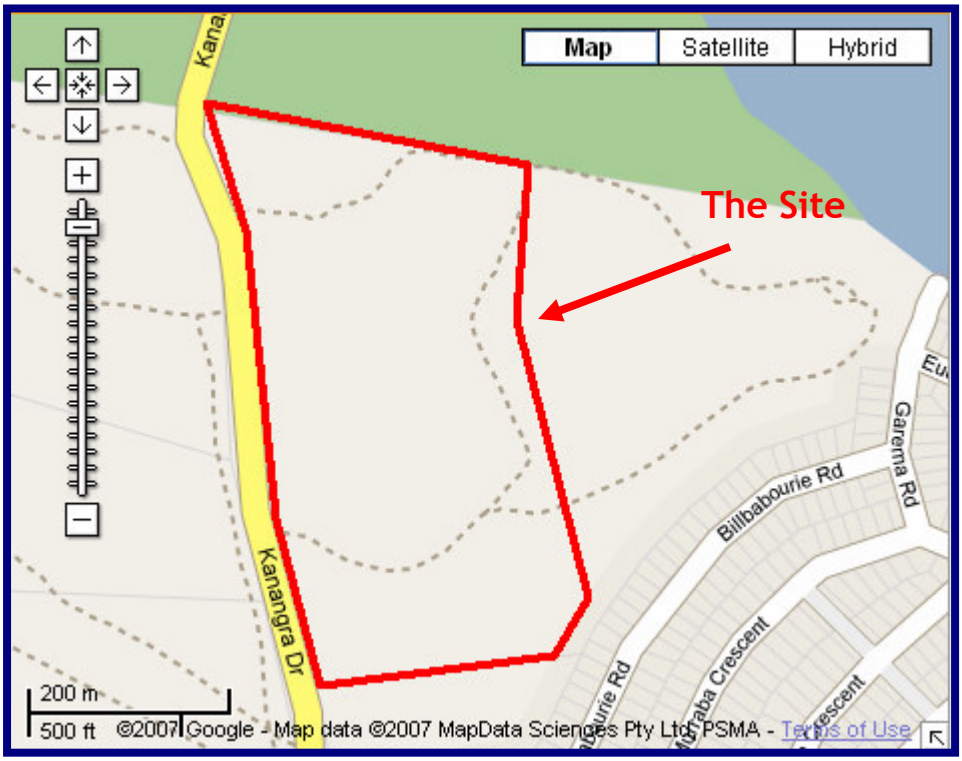

Figure 1: Locality Plan

4.3 HISTORY

4.3.1 Prior Development

The site has been partly developed. The site contains a caretakers dwelling, dams and orchard, fine trails and access to a dwelling on the foreshore. A high screen fence has been erected for the full Kanagra Drive frontage.

4.3.2 Land Use

Some of the site, approximately 30%, has been cleared, the remainder is disturbed bushland.

4.3.3 Heritage & Archaeology

There is a foreshore midden on Lot 3 in front of the existing dwelling.

4.3.4 Previous Studies

A comprehensive range of studies has provided information on the development potential of Lot 104. The range of previous studies, in addition to the heritage work described above includes:

- Bushfire by Ecobiological, 2006 and Barry Eadie, 2007;
- Ecological Constraints Report by Wildthing 2003 and HSO 2007;
- Drainage & Stormwater by Umwelt and Asquith & de Witt 2007;
- Geotechnical by RCA Australia;
- Aboriginal Heritage by ERM, 2007; and
- Services, by Hyder Consulting 2003 and Asquith & de Witt Pty Ltd 2007.

4.4 ACCESS AND TRAFFIC

The existing access is off Kanangra Drive. The proposed access points will service the whole subdivision and will also be off Kanangra Drive. The traffic report is included in the Concept Plan EA.

4.5 AIR & NOISE

No issues are known to affect the area.

4.6 DRAINAGE

Despite drainage lines being shown of topographical maps, there are no perennial watercourses on the site. The site comprises a small catchment and it appears there is insufficient flow to create a natural watercourse. There is riparian vegetation on the North East corner of Lot 3. Drainage on the site is via constructed dams and drains.

4.7 SLOPE/TOPOGRAPHY

Generally the site forms a basin sloping east towards the lake. Slopes are generally less than 5% and there are no significant topographic features. See contour plan at **Appendix 4 Sheet 501.**

4.8 SOILS

Soils on the site are from the Doyalson landscape and are described in the Geotechnical Report. There are no soils issues apart from erosion and sediment controls, see appendix A Sheet 601, and an acid sulphate management plan will be required for the constructed wetland.

4.9 FLORA & FAUNA

Flora and fauna and ecological matters are dealt with as part of the Concept Plan.

4.10 EASEMENTS

No easements affect the site.

4.11 SERVICES

Services advice for the proposed subdivision of the site has been provided by Wyong Council in regard to the proposed upgrading of water supply and sewerage infrastructure.

The following was advised by Wyong Council in March 2007:

A. Water Supply

The extension of 250 mm water main along Kanangra Dr is required in conjunction with the commencement of this development as identified in the DSP 12 in order to meet the fire fighting requirements. Council will not allow connection to the new 250 water main for servicing the proposed new lots. A rider main (100 mm or 150 mm) is be constructed to service the new lots. The rider main will be part of the reticulation within the subdivision of Precinct 1A.

B. Sewerage

- *Up to 20 lots*

  No upgrading of the existing sewerage infrastructure is required.

- *Above 21 lots*

  Upgrade (E&M) works of SPS G1 is required.

- *Above 71 lots*

Upgrade of sewer gravity main "Line AA" in accordance with DSP 12 is required.

- *Above 146 lots*

  Upgrade (E&M) works of SPS G2 and upgrade its Rising Main as identified in DSP 12 is required.

- *Any increase beyond 250 lots will entail the following additional work:*

  a. Upgrade the civil, electrical and mechanical works of SPS G1.

  b. Upgrade 240 metres of the Rising Main G1 from 150 mm to 200 mm pipe.

  c. Upgrade approximately 235 metres of the sewer gravity main of "Line AA" from 225 mm to 300 mm pipe in SPS G2 catchment area.

4.12 FLOODING

While part of Lot 3 DP 588206 is flood affected, this part is not proposed for new residential subdivision. Flooding is restricted to foreshore areas.

4.13 BUSHFIRE

The land is identified as a bushfire prone area. Bushfire hazards exist to the north and west of the site. Appropriate APZ's have been incorporated into the subdivision design in accordance with concept plan. See Appendix O of the Environmental Assessment Report to the Concept Plan.

4.14 URBAN CAPABILITY

There are no significant urban capability limitations. Those areas with limitations for urban development are outside the proposed subdivision area.

4.15 SCENIC QUALITY

No major scenic natural features are located on the land. The site is screened from view by the fence on Kanangra Drive.

4.16 SITE ANALYSIS

The site analysis reveals no significant subdivision constraints other then the existing bushland. The site analysis is in the Concept Plan section 4.2.

Section 5
Planning

This section briefly describes and assesses the planning controls that apply to the land.

5.1 EP&A ACT

The site subdivision development is to be pursued in accordance with the MoU, mainly under Part 3A of the EPA Act. The processes of Part 3A will be used to establish appropriate planning controls for the site. The site was gazetted as subject to Part 3A on July 2007.

5.1.1 State Significant Site Study

It is intended to rezone the site area for development through an amendment to the Major Projects SEPP.

A State Significant Site Study has been lodged in conjunction with the Concept Plan and the major project application. The proposal establishes the footprint of the proposed development through zonings and limits the development permitted within the respective zones. The zones establish the permissibility of proposed development on the Concept Plan site.

The zones as proposed for the site will be established by an amendment to SEPP Major Projects.

The zones as proposed are consistent with The Standard Instrument (Local Environmental Plans) Order 2006. The zones proposed are:

- Zone R1 General Residential.

The R1 zone will permit the proposed subdivision and subsequent residential housing development.

5.1.2 Concept Plan

The overall development of the site must be consistent with the concept plan which establishes design parameters, staging and controls for development such as services, drainage, landscaping and streetscaping.

5.1.3 Project Approval

This major project application for the subdivision is being lodged concurrently with the concept plan. These project applications will be dealt with under Part

3A of the EP&A Act by New South Wales Department of Planning and the Minister for Planning.

This project application should be viewed as part of the detail of the overall proposal.

Housing on the approved lots will be approved by Wyong Council under Part 4 of the EPA Act.

5.1.4 Approvals under Part 5 of the EPA Act

Infrastructure including water and sewer will be approved under Part 5 of the EPA Act. It is believed Wyong Council will provide these works in accordance with DSP 12.

5.2 SEPP 55 REMEDIATION OF LANDS

The land use history of the Gwandalan site does not indicate any likelihood of contamination.

5.3 SEPP 71 COASTAL PROTECTION

The rezoning of the site to residential requires a Site Master Plan before a subdivision can be approved. The Master Plan must be approved by the Minister. The Concept Plan provides a "Masterplan" for the site in accordance with the SEPP.

Under SEPP 71 the aims of the SEPP and the matters specified in Clause 8 must be considered. The relevant considerations are addressed in the Concept Plan EA Section 6. The Gwandalan subdivision is part of the overall development under the CHBG Concept Plan and has been assessed accordingly.

5.4 SEPP BASIX

All residential buildings in the proposed development at Gwandalan will be subject to BASIX assessment.

5.5 SEPP MAJOR PROJECTS

The site was declared to be a State Significant Site by Ministerial Order on 6 July 2007.

5.6 SEPP MINING & PETROLEUM

Relevant matters are addressed in the Concept Plan EA.

5.7 LOWER HUNTER REGIONAL STRATEGY

The Lower Hunter Regional Strategy identifies the Gwandalan Draft Central Coast Regional Strategy land for urban development. Development of the land will help meet the objectives for residential development, jobs and conservation identified in the strategies.

The land is also identified as part of the North Wyong Structure Plan Area in the draft Central Coast Regional Strategy.

5.8 NSW COASTAL POLICY

The primary objective of the NSW Coastal Policy is to protect coastlines and beaches for the enjoyment of future generations and to ensure that coastal development is balanced, well planned and environmentally sensitive. The overriding vision is of an ecologically sustainable NSW coast.

The key themes of the policy set out some basic principles for development. While the focus is on conservation initiatives this does not mean that future urban development in coastal area should be sterilised. In particular the policy promotes the need for local housing strategies to provide opportunities to more efficiently use land. These opportunities can ensure that equity considerations are fulfilled by allowing more people to live in the coastal zone while preserving important environmental attributes.

Another key theme of the policy is ESD (Ecologically Sustainable Development). The principles of ESD provide guidance and an integrating role in the development of the policy. The policy states that ESD provides a framework for reconciling issues when necessary and making choices between competing demands for access to the resources of the coastal zone. The policy also states that ESD should be a guide to new development and resources exploitation in the coastal zone which balances human and ecological needs. Overall the ESD section of the policy advocates cautious, careful and well planned development. The precautionary principle is seen as an integrating mechanism rather than as advocating a no development approach.

The policy principles are to be read within the broader vision of the coast being a coastal environment which is preserved and enhanced for its natural and cultural values while also providing for the economic, social and spiritual well being of the community.

In the case of Gwandalan, the site has been identified for residential development since the 1980s and represents a logical extension of the existing urban area. The Gwandalan proposal is consistent with the Coastal Policy.

The major policy considerations for the site are addressed in Section 6 of the Concept Plan EA and the State Significant Site Study.

5.9 NSW COASTAL DESIGN GUIDELINES

The New South Wales Government has produced the Coastal Design Guidelines (CDG). The guidelines are to ensure that decision making about coastal development is approached on an urban design basis and is responsive to the character of a place. The guidelines seek to replace ad hoc decision making with a process more attuned to the character and environment of a place and to social and economic positively.

The Coastal Design Guidelines are addressed via the Concept Plan.

5.10 WYONG LEP

Under Wyong LEP 1991 the land is currently zoned 7(b) Scenic Protection and 7(e) Coastal Lands Acquisition.

The site is to be rezoned via SEPP Major Projects to permit the proposed development. The zone will be R1 General Residential in accordance with the Standard Order for Local Environmental Plans.

5.11 DEVELOPMENT CONTROL PLANS

Wyong DCP applies to land in that LGA.

Relevant controls from the DCP have been incorporated into the Concept Plan. The Gwandalan subdivision design is based on the Wyong subdivision code, i.e. Chapter 66 of the DCP. An assessment of the subdivision against Wyong's DCP controls is provided at **Appendix 5.**

5.12 SECTION 94 AND DEVELOPMENT CONTRIBUTIONS PLANS

The Gwandalan site is subject to the Gwandalan Section 94 contributions plan and the Wyong DSP for water and sewer services. The s94 plan however does not anticipate the proposed development. Contributions will be required as conditions of approval. Details of proposed contributions are provided in the draft Statement of Commitments.

5.13 COMPLIANCE WITH CONCEPT PLAN

The Concept Plan provides a level of detail consistent with a master plan. The concept plan establishes a subdivision pattern that is accurately reproduced in the design plans. A landscape plan consistent with the standard set in the concept plan is provided as **Appendix 4.**

Section 6 Assessment of Environmental Issues

The analysis and addressing of environmental issues is based on the draft Director General Requirements.

The background studies have informed the proposed design, management and mitigation measures.

The Concept Plan provides an overview of the subdivision while this Environmental Assessment and draft Statement of Commitments identify the management and mitigation measures needed to ensure that both the short and longer term effects of the proposal are not significant.

6.1 SITE SUITABILITY GWANDALAN

Significant considerations include:

- The MOU development areas;
- The established environmental offsets for the project;
- Existing site development;
- Integration with the existing Gwandalan urban form;
- Amenity; and
- Proximity to the primary school.

The site has few physical constraints being of low relief and located away from foreshore areas. Services are for the most part already in place.

There is on the site, some 13 hectares of bushland. As part of the proposal environmental offsets for the site have been negotiated. Although most of the bushland will be lost, the offsets cover the loss. Once the offsets are taken into account there are few constraints other than bushfire.

The Gwandalan site is proposed for subdivision only. Built form will be as provided for in Wyong Council's DCP controls.

6.1.1 Subdivision Works

Cut and fill will be required to establish the services roads and lots on the site. The details are shown on the design plans.

Works have been designed to balance cut and fill. No fill will be imported or exported from the site. Details of regrading works are shown on plans 101 to 103 in **Appendix 4**.

Management and Mitigation

- An Environmental Management Plan will need to be prepared to ensure the works are managed and constructed in keeping with best practice.
- Particular attention will need to be paid to erosion and sediment controls to ensure Lake Macquarie is protected.
- Noise should be controlled by applying standard construction hours as conditions of approval.

6.1.2 Visual Impact

The majority of the site is very well screened by existing fencing, vegetation and the foreshore dwelling.

There are filtered views into the site from adjoining dwellings to the south. The house is highly visible from, and across, the lake. The proposed subdivision will however have very little visibility from public places other than Kanangra Drive. From Kanangra Drive, immediately adjacent the site the appearance will be that of a standard subdivision. The proposed streetscaping will help set a high visual standard.

The visual impact of the subdivision will be affected by the standard of housing on the lots. The standard of housing will be determined by Councils DCP controls. Chapter 100 of Wyong Council's DCP - Quality Housing should ensure a satisfactory appearance low visual impact and high amenity.

Management and Mitigation

- Implementation of streetscaping in accordance with the concept plan will promote sound visual outcomes and high amenity.

6.1.3 Bushfire

A bushfire hazard assessment in accordance with the Planning for Bushfire Protection Guidelines has been prepared by Barry Eadie 2007, see Appendix O of the Concept Plan EA.

There is a bushfire hazard to the west and north that requires Asset Protection Zones (APZs) of varying widths.

The required APZs have been incorporated into the subdivision layout identified in the concept plan. Some dwellings will require construction in accordance with AS 3959.

Management and Mitigation

- APZ's will be incorporated into lots and appropriate management promoted through positive covenants and restrictions on title.

- Building construction standards where required will be noted as restrictions on title.

6.1.4 Ecological Impact

Ecological effects were addressed in the Concept Plan. The effects of development on the site are offset by the dedication of 310 ha of land for conservation purposes.

Other issues are the proximity to the State Conservation Area and drainage from the site to Lake Macquarie.

Management and Mitigation

- As part of the overall CHBG proposal the dedication of 310 hectares of land of high conservation value as an environmental offset.

- Drainage to adjoining land will be managed consistent with protection of natural systems.

- Drainage direct to Lake Macquarie from the site will be managed to protect aquatic ecology.

6.1.5 Coastal and Foreshore Public Access

The adjoining land to the north is managed by both NPWS and NSW Sport and Recreation and is part of the Lake Macquarie State Conservation Area.

The opportunity for direct public access to the site foreshore is severely limited by the existing dwelling and associated structures such as the boatshed.

It is not proposed to provide any direct access to the foreshore and adjoining recreation camp area from the proposed subdivision. This is to protect the conservation values of this area. Access to the foreshore with the Point Wollstoncroft area is available from within the recreation camp.

Management and Mitigation

- No access will be provided to the adjoining NPWS/Sport and Recreation Camp.

6.1.6 Utilities and Infrastructure

The site is addressed as part of the Development Servicing Plan for the Gwandalan District (DSP 12).

Water and sewer services are available to the land. A 150 mm water main fronts the site. A sewer pump station is located just outside the site near the boat shed, the site can drain to this station.

Consultation with Wyong Council and the Gosford Wyong Water Supply and Sewer Authority has identified the additional work needed to service the site.

An additional water main will be needed to adequately provide water to the site.

Staged upgrading of sewer infrastructure will be required. This will be in accordance with DSP 12.

Electricity and telecommunications infrastructure will be provided as additions to existing networks.

Management and Mitigation

- No specific mitigation measures are required.
- Connections into the existing networks will be done to the satisfaction of relevant authorities.
- Infrastructure Developer Contributions will be made as required to the relevant local authorities.

6.1.7 Social Infrastructure

A Social Sustainability Report by Key Insights 2006, see Concept Plan EA, summarises local social infrastructure, summarises previous public consultations and assesses the likely social consequences of the subdivision development.

The social assessment identified a net positive effect as result of development.

Management and Mitigation

- The effects of additional population will be dealt with through contributions and conditions when or upon approval of the Concept Plan. The details are addressed in the draft Statement of Commitments.

6.1.8 Traffic

A Traffic Assessment has been being carried out by Masson Wilson Twiney, and is included in the Concept Plan EA.

All subdivision construction traffic will access the site via Kanangra Drive. No access through residential streets will be required.

The subdivision will generate additional traffic with potential traffic effects. The existing street network has the capacity to provide adequate service levels for the predicted traffic increases.

The internal street layout of the subdivision has been assessed and will function adequately and safely.

Management and Mitigation

- Construction traffic will be limited to Kanangra Drive
- Any damage to Kanangra Drive as a result of construction works will be made good.

6.1.9 Water Quality and Drainage

Assessment has been undertaken by Asquith & de Witt 2007. The report is included in Appendix 6.

Most of the site drains through a series of dams to the large pond and then through the harbour to the lake.

An erosion and sediment controls plan has been prepared as part of the proposal.

A constructed wetland is proposed as part of the treatment train. **See Appendix 4 Drawing 501.**

Management and Mitigation

- Implement water management measures in accordance with the Asquith & de Witt report 2007.
- Soil and water management plan to control run off during construction in accordance with Landcom guidelines.
- Provide the drainage controls as the first step in Stage 1 construction.

6.1.10 Aboriginal Heritage

A preliminary survey found no significant sites or relics on the area of land to be developed. Details are in the Concept Plan EA.

Mitigation and Management

- No requirements have been identified.

6.1.11 Mine Subsidence

Advice from the Mine Subsidence Board was sought as part of previous investigations. The advice was that residential development on the site in accordance with applicable construction guidelines was acceptable.

Mitigation and Management

- Dwellings on the site will need Mine Subsidence Board approval.

6.1.12 Impact on Lake Macquarie State Conservation Area

The site adjoins the Point Wollstoncroft recreation camp which is part of Lake Macquarie State Conservation Area. The specific management objectives for the SCA are:

- protection of visual and aesthetic qualities;
- conservation of biodiversity;
- promotion of community involvement in management; and
- provision of sustainable recreation opportunities.

The proposal will introduce an increased local population which has the potential to affect conservation of biodiversity through increased use. Offsetting this is the proposed dedication of lands that will provide additional areas of land specifically for conservation.

Management and Mitigation

- No specific sustainability actions are required in addition to those inherent in approval processes and identified management actions.

6.1.13 Cumulative Issues

All matters likely to result in cumulative effects, such as traffic, drainage and services have been addressed and appropriate mitigation measures identified. No significant cumulative effects are likely.

Section 7
Project Justification and Conclusion

The development of the Gwandalan site will provide high quality housing outcomes, enhanced community facilities, improved pollution control and environmental protection.

7.1 PUBLIC BENEFITS

The proposed development compliments and is fully consistent with both the Lower Hunter and Draft Central Coast Regional Strategies, and associated MOUs.

The Gwandalan subdivision is part of an overall proposal that provides for urban development and the securing of a green buffer between the Central Coast and the Lower Hunter as envisaged under the Lower Hunter REP. The development will also comply with relevant SEPPs, the principles of the Coastal Policy and the NSW Coastal Design Guidelines.

Of particular note is that the proposal will help secure public ownership of some 310 ha of high value conservation land which the Department of Environment and Conservation has identified as priority habitat. This land currently has a number of development rights associated with it which will not be pursued as a result of this proposal. This conservation is more than adequate to offset any adverse ecological impacts on the development sites and will provide a major ecological legacy to the community.

All sites will use water sensitive urban design to protect water quality and will provide SEPP BASIX compliant housing thereby making a contribution to sustainable development.

The Gwandalan site has been identified as an area for urban land release since 1987. In effect, this Project Application simply enacts a long term Council policy outcome.

The proposal features a network of footpaths.

The development of Gwandalan is in the public interest. It accords with all relevant planning strategies, provides enhanced public access to coast and foreshore, respects heritage attributes, will enhance community facilities and services, and will lead to the creation of a large area of conservation reserve to meet a key conservation priority of the region.

The proposed subdivision meets Council requirements and is consistent with the capability and suitability of the site.

7.2 SITE CAPABILITY

No matters have been identified that indicate the site lacks the capability to support the proposed subdivision. Areas identified as having insufficient or doubtful capability have not been proposed for subdivision.

All relevant matters have been addressed. There are no environmental hazards that significantly affect the site. There are no particular problems with soils, vegetation, drainage or slope.

All essential services are available to the site.

7.3 SITE SUITABILITY

The suitability of the site for the proposed development has been assessed from several perspectives. These issues are dealt with in detail in the State Significant Study and the Concept Plan EA. The proposed offsets address the loss of local bushland.

The land use relationships in the immediate area have been examined, there are no potentially significant conflicts between adjoining land use and the subdivision layout as proposed.

Construction of urban subdivision is now subject to a high standard of environment controls that are readily accepted by the development and produce no unacceptable long term effects on the environment.

The site assessments and studies needed to prepare is the subdivision proposal provide high level certainty of good design outcomes.

An environmental management plan (EMP) addressing the subdivision works will be required. The EMP can incorporate all relevant requirements and the management controls identified in the site specific studies. As such the EMP will provide a suitable vehicle for ensuring that subdivision works are carried out to the required standards.

7.4 CONCLUSION

The proposed subdivision is consistent with the Concept Plan, the DGRs and is unlikely to result in any significant environmental effects.

Appendix 1

DRAFT STATEMENT OF COMMITMENTS

DEFINITIONS

In this statement the following definitions apply:

Act means the Environmental Planning and Assessment Act, 1979 (as amended).

BCA means the Building Code of Australia.

Catherine Hill Bay/Gwandalan Concept Plan 2007 means the project described in Condition A2.

Concept Plan Area means the land shown in Figure 1.1.1 of the Catherine Hill Bay/Gwandalan Concept Plan 2007.

Department means the Department of Planning or its successors.

Director General means the Director General of the Department of Planning

Minister means the Minister for Planning.

Project means development that is declared under Section 75B of the Act to be a project to which Part 3A of the Act applies.

Proponent means the person proposing the carrying out of development comprising all or any part of the project, and includes persons certified by the Minister to be the proponent.

Regulations means the Environmental Planning and Assessment Regulations, 2000 (as amended).

RTA means the Roads and Traffic Authority.

Subject Site has the same meaning as the land identified in Part A of this schedule.

PART A — ADMINISTRATIVE CONDITIONS

A1. Development Description

The Project Application is to permit the following:

- Bulk Earthworks
- Construct the principal road network and services
- Carry out landscape works as shown in the plans.
- Subdivide the site into two hundred and fourteen(215) lots.

A2. Development in Accordance with Plans

The development shall be generally in accordance with the Catherine Hill Bay/Gwandalan Concept Plan 2007.

PART B—PRIOR TO ISSUE OF CONSTRUCTION CERTIFICATE

Design Details and Changes

B1. Development Control

Any departure from the terms of the Catherine Hill Bay/Gwandalan Concept Plan 2007 will require lodgement of further detailed plans and documentation to the Department addressing, and where required revising, development envelopes, the internal circulation network (within the Concept Plan area), and any other aspect of the proposal that requires amending.

The timing, format and content of further detailed plans and documentation to be lodged in respect of Condition B1 will be agreed by the Department.

Responsibility – Proponent and Department of Planning

B2. Outdoor Lighting

All outdoor lighting shall comply with, where relevant, AS/NZ1158.3: 1999 *Pedestrian Area (Category P) Lighting* and AS4282: 1997 *Control of the Obtrusive Effects of Outdoor Lighting*.
Details demonstrating compliance with these requirements are to be submitted to the satisfaction of the Certifying Authority prior to the issue of the relevant Construction Certificate.

Responsibility – Proponent

B3. Treatment of Vehicular Entry

In order to improve the appearance of buildings when viewed from the street, any part of the walls and ceilings of vehicular entry points that are visible from the street shall be adequately finished and no service ducts or pipes are to be visible.

Responsibility – Proponent

B4. Disabled Access

Access and facilities for people with disabilities shall be provided in accordance with AS1428 parts 1-4 where applicable. Prior to the issue of a Construction Certificate for subsequent project applications, a certificate certifying compliance with this condition from an appropriately qualified person shall be provided to the Certifying Authority.

Responsibility – Proponent

B5. Erosion and Sedimentation Control

A Soil erosion and sediment control plan shall be submitted to the Certifying Authority. Details are to be submitted to the satisfaction of the Certifying Authority prior to the issue of the Construction Certificate.

Responsibility – Proponent

B6. Geotechnical

Provide a geotechnical report confirming classification of soil and that the house footing design complies with AS2870. Details are to be submitted to the satisfaction of the Certifying Authority prior to the issue of the Construction Certificate.

Responsibility – Proponent

Traffic & Parking

B7. Number of Car Spaces

The maximum number of car spaces to be provided for the development shall comply with the Environmental Assessment. Details confirming the parking numbers shall be submitted to the satisfaction of the Certifying Authority prior to the issue of the relevant Construction Certificate for subsequent project applications.

Responsibility – Proponent

B8. Number of Bicycle Spaces

Bicycle spaces are to be provided in accordance with the Environmental Assessment. Details shall be submitted to the satisfaction of the Certifying Authority prior to the issue of the relevant Construction Certificate for subsequent project applications.

Responsibility – Proponent

B9. *State Environmental Planning Policy Building Sustainability Index (BASIX)*

The proponent will comply with the NSW Government Building Sustainability Index targeting 40% reduction for potable water consumption, 40% reduction for greenhouse gas emissions and improvement in the thermal performance of all new residential buildings.

An Energy Savings Action Plan will be prepared in accordance with the requirements of the DWE and the Guidelines for Energy Savings Action Plans, DEUS 2005.

Responsibility – Proponent

Waste Management

B10. Storage and Handling of Waste

The design and management of facilities for the storage and handling of waste will comply with the requirements of the Waste Management Plan. Details are to be submitted to the satisfaction of the Certifying Authority prior to the issue of the relevant Construction Certificate for the subsequent project applications.

Responsibility – Proponent

PART C — PRIOR TO COMMENCEMENT OF WORKS
Excavation Works

C1. Notice to be Given Prior to Excavation
The PCA and Council shall be given written notice, at least 48 hours prior to the commencement of excavation, shoring or underpinning works on the site.

Responsibility – Contractor

C2. Traffic & Pedestrian Management Plan
Prior to the commencement of any works on the site, a Traffic and Pedestrian Management Plan prepared by a suitably qualified person shall be submitted to and approved by the Certifying Authority. The Plan shall address, but not be limited to, the following matters:

(1) ingress and egress of vehicles to the site,
(2) loading and unloading, including construction zones,
(3) predicted traffic volumes, types and routes,
(4) pedestrian and traffic management methods, and

The Applicant shall submit a copy of the approved plan to the Department.

Responsibility – Contractor

C3. Noise and Vibration Management Plan
Prior to the commencement of any works on the site, a Noise and Vibration Management Plan prepared by a suitably qualified person shall be submitted to and approved by the Director. The Plan shall address, but not be limited to, the following matters:

(1) Identification of the specific activities that will be carried out and associated noise sources,
(2) Identification of all potentially affected sensitive receivers including residences, schools, and properties containing noise sensitive equipment,
(3) The construction noise objective specified in the conditions of this consent,
(4) The construction vibration criteria specified in the conditions of this consent,
(5) Determination of appropriate noise and vibration objectives for each identified sensitive receiver,
(6) Noise and vibration monitoring, reporting and response procedures,
(7) Assessment of potential noise and vibration from the proposed construction activities including noise from construction vehicles and any traffic diversions,
(8) Description of specific mitigation treatments, management methods and procedures that will be implemented to control noise and vibration during construction
(9) Justification of any proposed activities outside the construction hours specified in the conditions of this consent.
(10) Construction timetabling to minimise noise impacts including time and duration restrictions, respite periods, and frequency,
(11) Procedures for notifying residents of construction activities that are likely to affect their amenity through noise and vibration,
(12) Contingency plans to be implemented in the event of non-compliances and/or noise complaints,

The Applicant shall submit a copy of the approved plan to The Department..

Responsibility – Contractor and Proponent

C4. Construction Noise Objective
Approved silencing measures shall be provided and maintained on all power-operated plant used in demolition, excavation, earthworks, and construction of the building, or work.

Responsibility – Contractor

PART D — PRIOR TO SUBDIVISION OR STRATA SUBDIVISION

D1. Subdivision of Land

This consent allows for a 187 lot land subdivision. A subdivision certificate for complying development may be issued by an accredited private certifier under Division 3 of Part 23 of the Conveyancing Act 1919.

Responsibility – Proponent

D2. Strata Subdivision

This consent allows for the creation of a maximum of NIL strata lots. The Strata subdivision is Exempt Development and may be issued by an accredited private certifier.

Responsibility – Proponent

PART E — PRIOR TO OCCUPATION OR COMMENCEMENT OF USE

Engineering

E1. Fire Safety Certificate

A Fire Safety Certificate will be furnished to the PCA for all the Essential Fire or Other Safety Measures forming part of subsequent project approvals prior to issue of the relevant Occupation Certificate(s). A copy of the Fire Safety certificate must be submitted to the consent authority and Department by the PCA.

Responsibility – Private Certifying Authority

E2. Mechanical Ventilation

Following completion, installation and testing of all the mechanical ventilation systems, the applicant will provide evidence to the satisfaction of the PCA, prior to the issue of the relevant Occupation Certificates, that the installation and performance of the mechanical systems complies with:

(1) The Building Code of Australia;
(2) Australian Standard AS1668 and other relevant codes;
(3) The relevant project approval(s) and any relevant modifications; and,
(4) Any dispensation granted by the New South Wales Fire Brigade.

Responsibility – Contractor

E3. Structural Inspection Certificate

A Structural Inspection Certificate or a Compliance Certificate must be submitted to the satisfaction of the PCA prior to the issue of the relevant Occupation Certificate(s) and/or use of the premises for subsequent project applications.

Responsibility – Contractor

Easements

E4. Registration of Easements

Prior to the issue of the relevant Occupation Certificate for subsequent project applications, the applicant shall provide to the PCA evidence that all easements required by this approval and subsequent project approvals, and other relevant consents have been or will be registered on the certificates of title.

Responsibility – Proponent

Appendix 2

DIRECTOR GENERAL'S REQUIREMENTS

NSW GOVERNMENT
Department of Planning

Facsimile

To	Bob Rose Rosegroup Pty Ltd	**Fax**	(02) 8302 1407
		Phone	(02) 8302 1444
From	Liz Peterson Strategic Assessments	**Fax**	(02) 9228 6224
		Phone	(02) 9228 6407
	Strategic Sites and Urban Renewals	**Email**	elizabeth.peterson@planning.nsw.gov.au
Date	2 August, 2007	**Total pages** (incl cover sheet)	8

Subject: Director Generals Requirements - Catherine Hill Bay/ Gwandalan

Mr Rose,

Please find attached the covering letter and Director General's Requirements for the Concept Plan and four project applications for your proposed development at Catherine Hill Bay and Gwandalan.

Regards

Liz Peterson

OSDAA, 23-33 Bridge Street, Sydney NSW 2000 OR GPO Box 3927 Sydney NSW 2001

This message is intended for the addressee named and may contain confidential/privileged information. If you are not the intended recipient, please destroy it and notify sender. Views expressed in this message are of the individual sender, and are not necessarily the views of the NSW Department of Planning.

NSW GOVERNMENT
Department of Planning
Office of the Director General

Contact: Stephanie Ballango
Phone: 02 9228 6101
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Email: stephanie.ballango@planning.nsw.gov.au

Our ref: Y07/1866
File Ref: S06/00813

Mr Bryan Rose
Managing Director
Rosegroup Pty Ltd
51 Riley St
Wolloomooloo NSW 2011

Dear Mr Rose,

Subject: Catherine Hill Bay and Gwandalan – Director General's Requirements

I refer to your letter and preliminary documentation dated 14 June 2007 requesting the Ministers authorisation to submit a revised concept plan and four individual project applications and the issuing of Director Generals Requirements (DGRs) pursuant to Part 3A project in the *State Environmental Planning Policy (Major Projects) 2005* (Major Projects SEPP) for land at Catherine Hill Bay and Gwandalan.

I can advise that the Minister for Planning made a declaration on 25 June 2007 that the revised concept plan and 4 project applications are subject to Part 3A of the EP&A Act. A notice of the Minister's declaration was published in the Government Gazette on 6 July 2007.

I have attached a copy of the DGRs for the concept plan and four individual project applications. These requirements have been prepared in consultation with the relevant Government authorities, and are based on the information you provided. Please note that under Section 75F(3) of the *Environmental Planning and Assessment Act 1979* (EP&A Act), I may alter these requirements at any time.

As you are aware, the Australian Department of Environment and Water Resources (DEWR) has advised that the proposed development at Catherine Hill Bay and Gwandalan is a controlled action under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act). As part of the recent bilateral agreement between the NSW Government and the Australian Government, the Department of Planning sought input from DEWR to the preparation of the DGRs under Part 3A of the EP&A Act. DEWR's comments have been included in the attached DGRs.

Once you lodge the EA for the Concept Plan and four individual project applications they will be the subject of individual tests of adequacy to determine whether the DGRs have been adequately addressed. I may choose to consult with the relevant authorities to determine if they adequately addresses the DGRs. If I consider the EAs to be inadequate, you will be required to revise them prior to public exhibition.

Once the test of adequacy has been undertaken, you will be advised on the consultation and public exhibition arrangements that will apply, including the number of copies (hard copy and CD-ROM) of the EA that will be required for exhibition purposes.

The DGRs will be placed on the Department's website along with other relevant information which becomes available during the assessment of the project. It would be appreciated if all documents submitted are in a suitable format for the web (such as, PDF) and preferably less than 2Mb but no more than 5Mb. Could you please make arrangements for an electronic version of the individual EAs for the project to be hosted on a suitable website and confirm the proposed URL at your earliest convenience.

Finally, please note that the DGRs require a report from a quantity surveyor identifying the capital investment value for the concept plan and the four individual project applications. This report is to be provided at the time of lodgement so that the fees applicable to the applications (see Division 1A, Part 15 of the *Environmental Planning and Assessment Regulation 2000*) can be determined prior to public exhibition of your documentation. At this time, you should provide your completed application form.

Should you have any enquiries, please contact Stephanie Ballango, Team Leader – Strategic Assessments or Antony Pedroza, Senior Planner – Strategic Assessment on 9228 6545.

Yours sincerely

Sam Haddad 1/8/07
Director General

cc. Matthew Crozier
Crozier CGS Pty Ltd

Director-General's Requirements

Section 75F of the Environmental Planning and Assessment Act 1979

Project	**Concept approval** A residential subdivision of the Gwandalan portion of the site and the following for the Catherine Hill Bay portion of the site: ▪ An extension of the existing village and restoration of heritage buildings; ▪ A new coastal village of up to 600 dwellings; ▪ Conservation and public areas comprising approximately 85% of the site; ▪ Commercial/retail component; and ▪ Associated infrastructure. **4 Project applications** ▪ Site preparation works and subdivision at Gwandalan; ▪ Site preparation works across the entire Catherine Hill Bay / Moonee site along with subdivision of the site into "super lots"; ▪ Subdivision and construction of the Village Centre Precinct; and ▪ Subdivision and construction of Hamlet 3.
Location	**Catherine Hill Bay** (Lots 5, 6 and 7 in DP 774923, Part Lot 2031 in DP841175, Lot 2 in DP8049795, Lot 201 in DP702669, Lot A in DP 384745, Lot B in DP 384745, Lot 2 in DP 809795, Lots 3 and 4 in DP 129431) **Gwandalan** (Lot 3 in DP 588206).
Proponent	Lakeside Living Pty Ltd and Coastal Hamlets Pty Ltd
Date issued	1 August 2007
Expiry date	1 August 2009
General requirements (to be addressed by concept plan and each project application individually)	Each Environmental Assessment (EA) must include (1) an executive summary; (2) a detailed description of the project including the: (a) strategic justification for the project; (b) alternatives considered; and (c) various components and stages of the project; (3) a statement that the proposal is being assessed under the Bilateral Agreement, which requires the NSW Government to undertake assessment of the proposal which will address matters of national environmental significance; (4) a consideration of the following with any variations to be justified: (a) all relevant State Environmental Planning Policies (with particular regard to Major Projects SEPP, SEPP 55, SEPP 71 and *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*, (b) applicable planning instruments, (c) relevant legislation and policies, including the *NSW Coastal Policy 1997*, Lower Hunter Regional Strategy, and the draft Central Coast Regional Strategy, (d) Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (5) a consideration of the proposal and cumulative impacts in relation to the development of other future urban land identified in the Lower Hunter Regional Strategy; (6) a draft Statement of Commitments, outlining commitments to the project's management, provision / contribution towards infrastructure, mitigation and monitoring measures with a clear identification of who is responsible for these measures;

	(7) a conclusion justifying the project, taking into consideration the environmental and construction impacts of the proposal, mitigation measures to address these impacts, the cumulative impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest; (8) following consultation with relevant agencies, Councils and other proponents who are proposing development in the vicinity of the site: (a) identify the development contributions or works in kind applicable to the site or within the LGA including regional and local infrastructure, public transport, social infrastructure and community facilities (including open space); and (b) identify any public benefits to be provided by the development and their consistency with any current development contribution plans; (9) A signed statement from the author of the EA certifying that the information contained in the report is neither false nor misleading; and (10) A report from a quantity surveyor identifying the capital investment value for the concept plan and the four individual project applications.
Key Issues (to be addressed by concept plan and each project application individually)	Each EA must address the following key issues: **Independent Panel of Experts** Demonstrate that the proposal is consistent with the Interim Report to Minister from the Independent Panel of Experts constituted to assess the proposed development. In the event that there are inconsistencies between the proposal and the recommendations of the Panel's Report, justification for the departure must be provided as well as evidence demonstrating how a better outcome will be achieved. **EPBC Act – Controlled action** (1) Impacts on species listed under Section 18 and 18A of the *Environment Protection and Biodiversity Conservation Act 1999*; (2) Impacts on other threatened species, populations or ecological communities, critical habitat (including riparian habitat) and native vegetation generally; (3) Impacts on migratory species listed under the *Environment Protection and Biodiversity Conservation Act 1999*; (4) Impacts on RAMSAR Wetlands; (5) Any relevant State and Commonwealth Government Technical and policy guidelines, including the NSW Department of Planning's *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999: Guide to Implementation in NSW* (May 2007); (6) Proposed offset measures to avoid or mitigate impacts on matters of national environmental significance; and (7) Matters outlined in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulation 2000*. **Heritage** Provide a heritage impact statement in accordance with current NSW Heritage Office guidelines and DECC's *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* that details the heritage significance of the area and any impacts the development may have upon this significance. The significance is to include an assessment of natural areas, places of Aboriginal, historic or archaeological significance and consider the impact on existing settlements and the iconic elements, such as the Coal Loader Jetty. **Flora and Fauna impact** Address the impact of the development on threatened species and their habitats having regard to the Threatened Species Assessment Guidelines and recommend offset measures to avoid or mitigate impacts on threatened species and their habitat. **Utilities and Infrastructure** (1) Prepare a utility and infrastructure servicing report and plan for the Site that

includes (but is not limited to):

(a) identifying and assessing the capacity of existing utility and infrastructure servicing the site,

(b) identifying that adequate water supply is available for bushfire suppression operations,

(c) identifying all necessary augmentation works to service the site and whether these works can sustain this and other development foreshadowed for the Wallarah Peninsula shown in the Lower Hunter Regional Strategy, and

(d) demonstrate compliance with the requirements of any public authorities in regard to the connection to, relocation and/or adjustment of services affected by the development proposal.

(2) Provide appropriate detailed information on the drainage, sewerage and stormwater management measures to be incorporated on Site, including (but not limited to):

(a) sustainable water measures (such as on site stormwater detention, water sensitive urban design measures, and water recycling);

(b) sediment and erosion control measures; and

(c) the quality and quantity impacts on surface water, groundwater, the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or a rock platform.

Mining Activities

(1) Assess the potential for the proposed development and associated conservation offsets to:

(a) restrict access to and future mining of remnant coal resources at Catherine Hill Bay and particularly below the Gwandalan site; and

(b) restrict access for existing petroleum exploration on Petroleum Exploration Licence (PEL) Nos. 5 and 446 and any future exploration; and

(c) adversely affect or delay the progress of Lakecoal's Mine Closure Plan for Consolidated Coal Lease (CCL) 706 lodged with Department of Primary Industries.

(2) Assess the impact of the proposed development on options to retain or demolish and/or on-going maintenance of the coal loading jetty, located on Mining Purpose Lease (MPL) 211.

(3) Provide a risk analysis examining the impacts of the former mining use of the site, and in the vicinity of the site, has on future development.

Contamination and Geotechnical

(1) Identify and address contamination and geotechnical issues associated with the works proposed by the project applications. All relevant legislation and guidelines related to contamination and geotechnical issues are to be addressed.

(2) Provide a geotechnical report that includes details on the classification of soil type generally found within the subject site and demonstrate how the proposal complies with all relevant Australian Standards, including AS2870 (Residential Slabs and Footings).

Urban design and built form

(1) Provide plans and documentation for the project applications that is of a quality suitable to assess the building typology (including the quantum of floor space). Plans and documentation should be equivalent to the standard ordinarily required for lodgement under Part 4.

(2) Address Crime Prevention Through Environmental Design principles with consideration given to the relationship to surrounding areas; pedestrian and bicycle movement to, within and through the site; key connections to the existing village and coast.

Ecologically Sustainable Development

Demonstrate how the development will commit to ESD principles in design, construction and ongoing operation phases.

Energy Savings Action Plan

(1) Demonstrate that the development is capable of achieving the requirements of BASIX and what (if any) commitments will be made on other environmental rating tools such as Greenstar and the Australian Building Rating Scheme.

(2) Prepare an Energy Savings Action Plan in accordance with the requirements of the DWE and the *Guidelines for Energy Savings Action Plans*, DEUS 2005.

Traffic and Transport

Prepare a Traffic Study in accordance with RTA's *Guide Traffic Generating Developments* that includes (but is not limited to) the following:

(a) Identify all relevant vehicular traffic routes and intersection for access and egress;

(b) Current traffic counts for all of the above traffic routes and intersections;

(c) The anticipated vehicular traffic generated from the proposed lots;

(d) Consideration of the traffic impact on the existing intersections and the capacity of the Pacific Highway to safely and efficiently cater for the additional vehicular traffic generated;

(e) An analysis of the cumulative traffic and transport impacts of this development on the existing township and taking into consideration other proposed developments; and

(f) Traffic analysis, using SIDRA or similar traffic model, for the relevant intersections including:

(i) Current and traffic growth projects for the life of the project;

(ii) 95th percentile back of queue lengths; and

(iii) Delays and level of service on all legs.

Bushfire

(1) Demonstrate compliance with the current version of *Planning for Bush Fire Protection* and AS3959 (Building in Bush Fire Prone Areas). The EA is to identify the ongoing management arrangements of any proposed APZ.

(2) Identify future management regimes for any areas of hazard remaining within the subject area. This should focus on the level of hazard posed to future development by the land or adjacent land and how the hazard may change as a result of development.

Impacts on Crown land

Identify potential direct and indirect impacts arising from the development on the adjacent Munmorah State Conservation Area and Point Wollstonecraft State Recreation Area.

Site preparation works

Provide a report that includes (but is not limited to):

(a) a detailed survey showing existing and proposed levels and quantities of fill necessary for site preparation works;

(b) details on the source of fill including types of materials and their source; and

(c) details of the quantity and quality of any excess material and arrangements for its disposal.

Subdivision

(1) Provide proposed plans of subdivision that identify all covenants, easements and notations proposed for each land title and, if relevant, how the subdivision is to be staged.

(2) Provide detail on the management arrangements for all land to be subdivided, including (but not limited to) titling arrangements; land ownership (particularly future public land); and all proposed covenants and restrictions, including

	those relating to access. (3) Outline the long-term management and maintenance of any areas of open space or conservation (including off-set areas) or both, including the ownership and control, management and maintenance of funding public access revegetation and rehabilitation works and bushfire management. **Previous Submissions** The EA is to respond to the issues raised in submissions received by the Department following the public exhibition of the Concept Plan between 3 January 2007 and 2 March 2007.
Consultation	During the preparation of the EA, you should undertake an appropriate and justified level of consultation with any relevant parties, having regard to previous consultation with the Independent Panel of Experts and the Community Reference Group. Any such consultation prior to exhibition should be documented in the EA. In particular, consultation should be considered with: *(1) Agencies and other authorities:* (a) Commonwealth Department of Environment and Water Resources; (b) Lake Macquarie Council; (c) Wyong Shire Council; (d) Hunter Water; (e) Gosford/Wyong Council's Water Authority; (f) Local Aboriginal Land Council; (g) Catchment Management Authority - Hunter – Central Rivers; (h) NSW Department of Water and Energy; (i) NSW Department of Primary Industries; (j) NSW Department of Environment and Climate Change; (k) Heritage Office, Department of Planning; (l) NSW Roads and Traffic Authority; (m) NSW Emergency Service agencies, namely NSW Police Department, the Ambulance Service of NSW, the State Emergency Service, NSW Rural Fire Service, and NSW Fire Brigades; and (n) All utility providers.
Deemed Refusal Period	120 days

Appendix 4

DESIGN & LANDSCAPE PLANS

CONCEPT CIVIL ENGINEERING DESIGN PLANS FOR PROPOSED RESIDENTIAL SUBDIVISION

KANANGRA DRIVE, GWANDALAN
WYONG SHIRE COUNCIL

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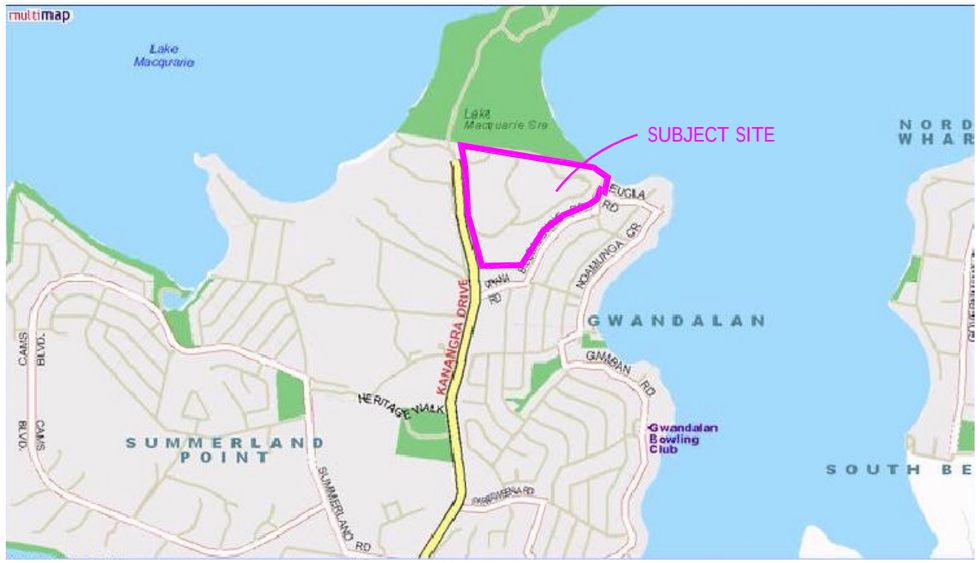
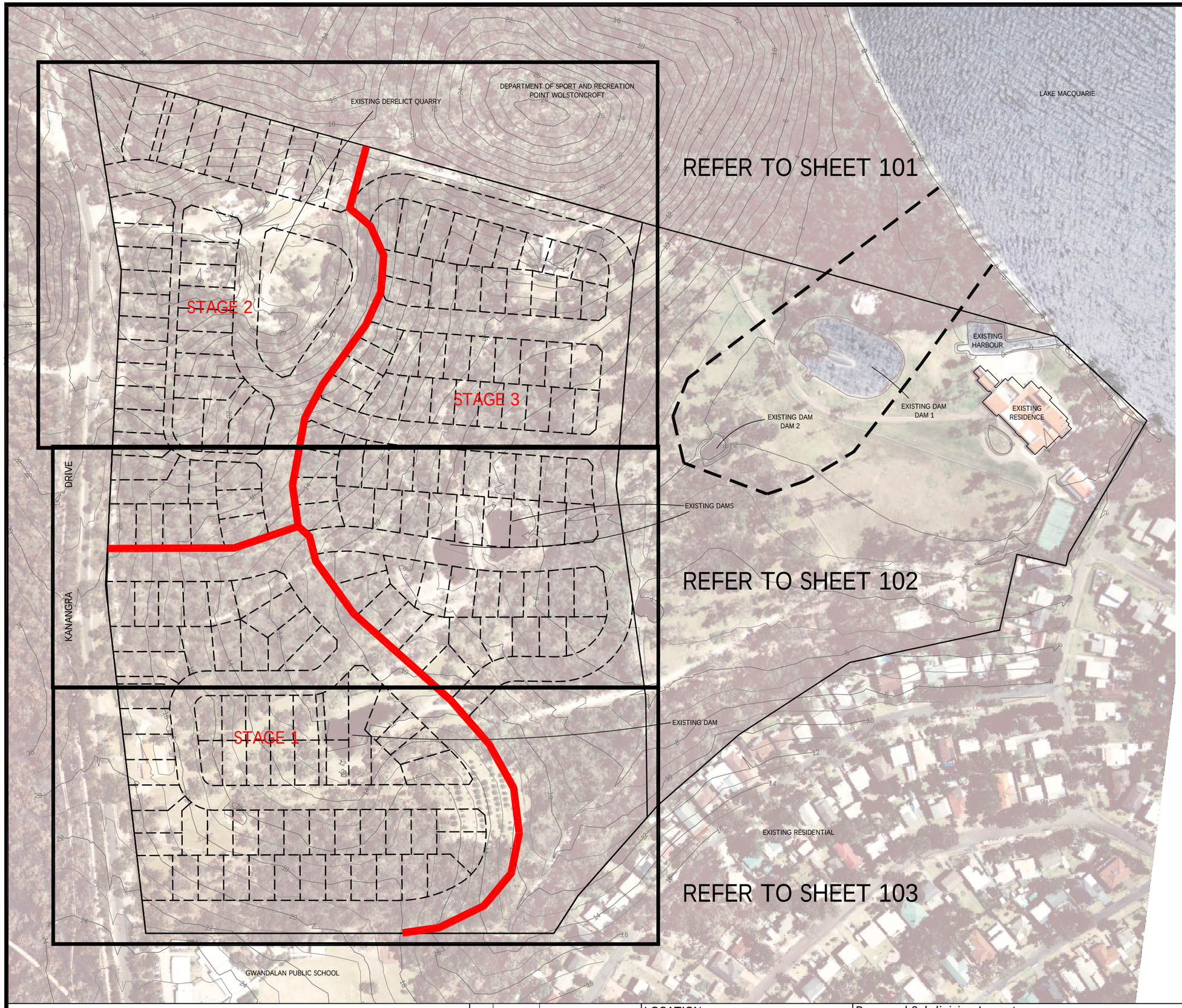
Creating a quality way of living



LOCALITY PLAN
(FROM MULTIMAP)

AutoCAD File: N:\11778\Dwg\Eng\11778eng-3d

SHEET	SHEET TITLE	VER.
000	TITLE SHEET, INDEX, LOCATION DIAGRAM & GENERAL NOTES	
001	PROPOSED SUBDIVISION LAYOUT	D
101	DETAIL PLAN 1	D
102	DETAIL PLAN 2	D
103	DETAIL PLAN 3	D
201	LONGITUDINAL SECTION - KANANGRA DRIVE	D
211	LONGITUDINAL SECTION - ROAD 1 (CH.-15.19 - 314.81)	D
212	LONGITUDINAL SECTION - ROAD 1 (CH.314.81 - 644.81)	D
213	LONGITUDINAL SECTION - ROAD 1 (CH.644.81 - CH.921.29)	D
221	LONGITUDINAL SECTION - ROAD 2	D
231	LONGITUDINAL SECTION - ROAD 3	D
241	LONGITUDINAL SECTION - ROAD 4	D
251	LONGITUDINAL SECTION - ROAD 5	D
261	LONGITUDINAL SECTION - ROAD 6 (CH.0 - CH.330)	D
262	LONGITUDINAL SECTION - ROAD 6 (CH.330 - CH.593.43)	D
271	LONGITUDINAL SECTION - ROAD 7	D
281	LONGITUDINAL SECTION - ROAD 8	D
291	LONGITUDINAL SECTION - ROAD 9	D
501	STORMWATER CATCHMENTS	D
502	CONSTRUCTED WETLAND	D
601	SOIL AND WATER MANAGEMENT	D
701	TYPICAL SECTIONS	D
702	LEAD-IN WATER MAIN AND SEWER SERVICING	D



N

LEGEND

- SITE BOUNDARY
- PROPOSED BOUNDARY
- MAJOR NATURAL CONTOUR
- MINOR NATURAL CONTOUR
- WETLAND DEVELOPMENT CONTROL PLAN AREA
- STAGE BOUNDARY

THIS SHEET IS NOT TO SCALE

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FAX: (02) 4978 5199

Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Proposed Subdivision Layout

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size A1

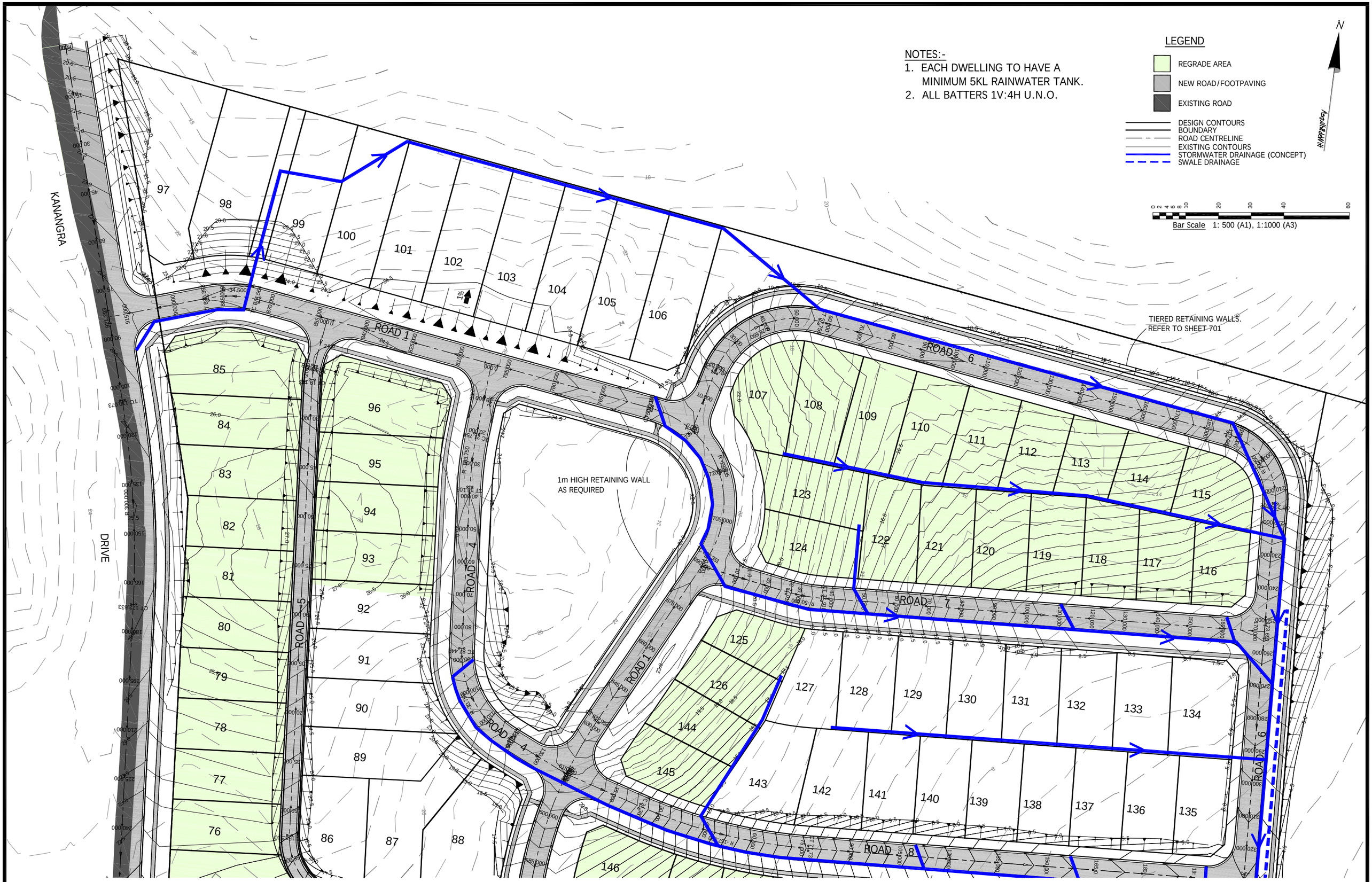
Sheet 001

NOTES:-
1. EACH DWELLING TO HAVE A MINIMUM 5KL RAINWATER TANK.
2. ALL BATTERS 1V:4H U.N.O.

LEGEND
- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD
- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE

N

Bar Scale 1: 500 (A1), 1:1000 (A3)



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LOCATION

KANANGRA DRIVE, GWANDALAN

Detail 1

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
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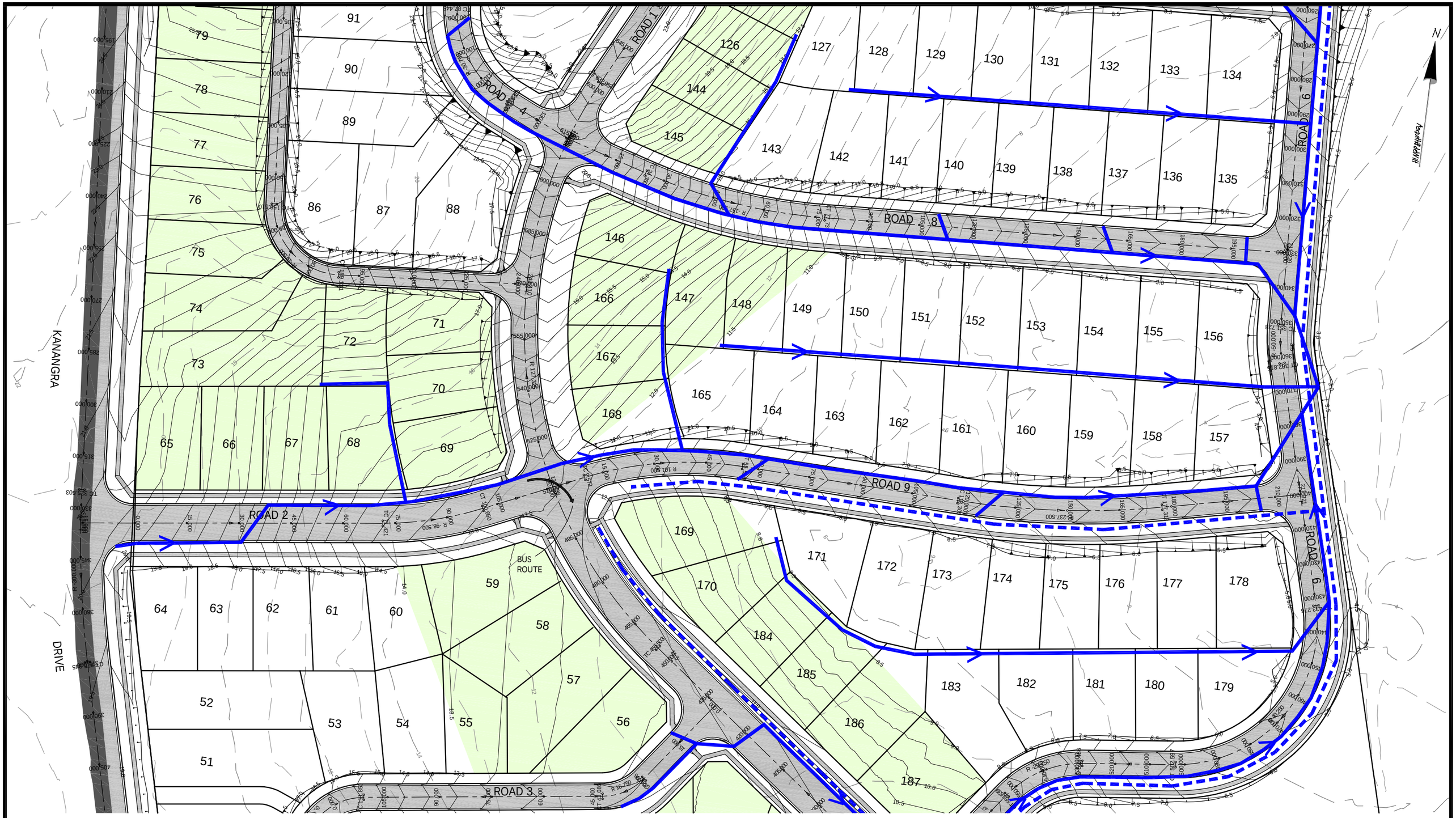

LEGEND

- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE
- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD

NOTES:-

1. EACH DWELLING TO HAVE A MINIMUM 5KL RAINWATER TANK.

Bar Scale 1: 500 (A1), 1:1000 (A3)

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LOCATION

KANANGRA DRIVE, GWANDALAN

Detail 2

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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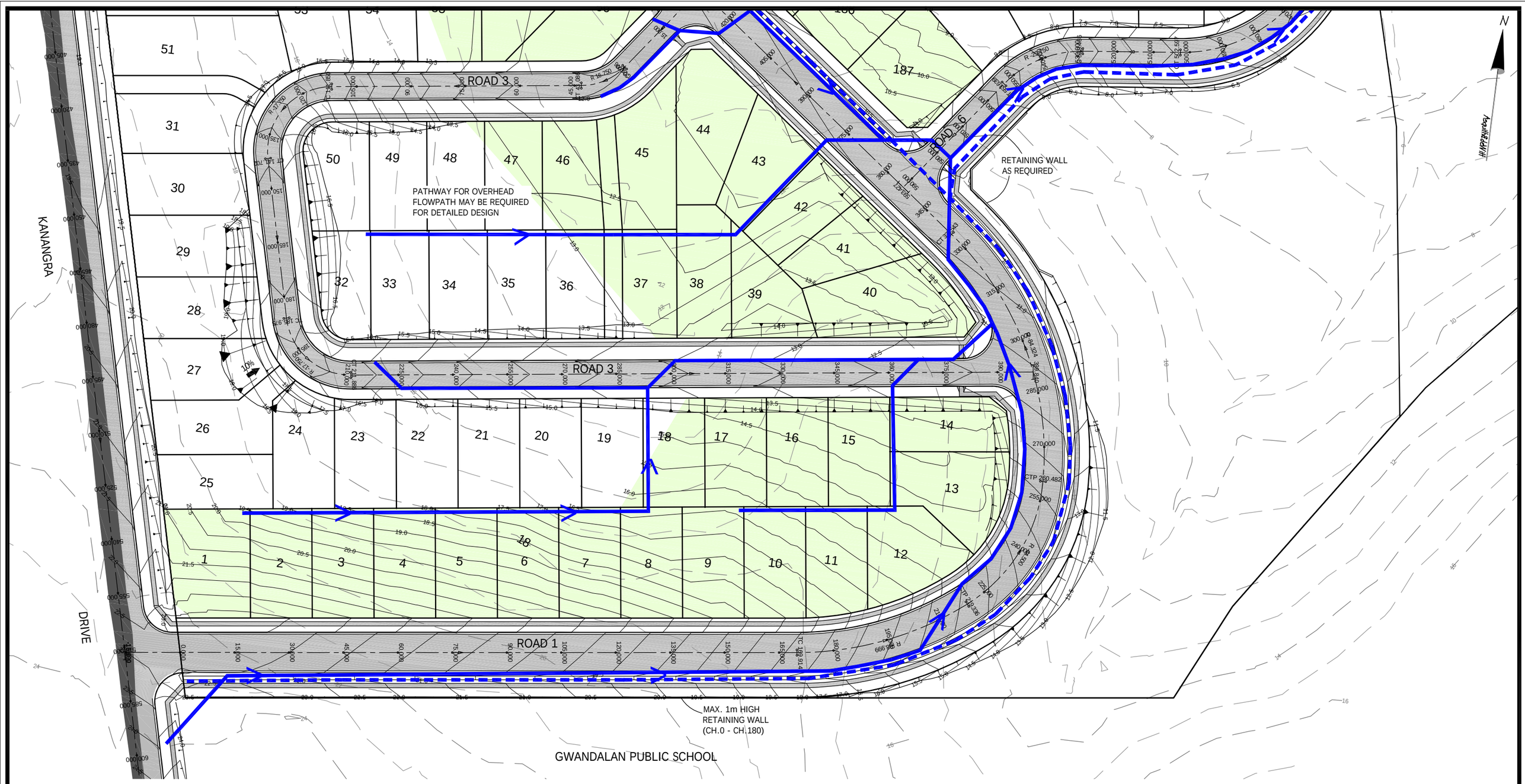
Sheet 102



LEGEND

- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD
- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE

NOTES:-

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KANANGRA DRIVE, GWANDALAN

Detail 3

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Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
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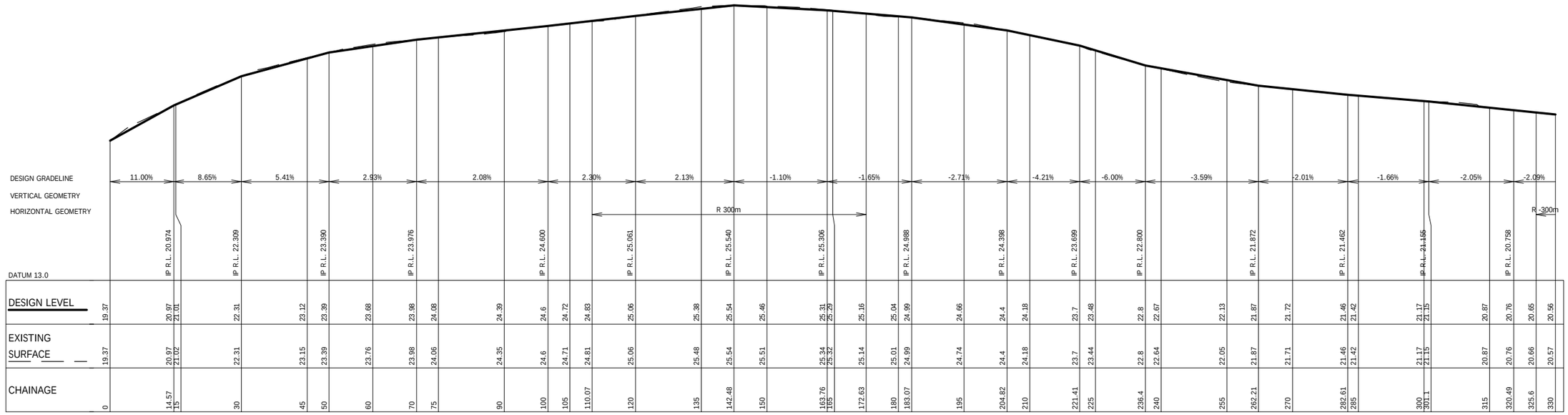

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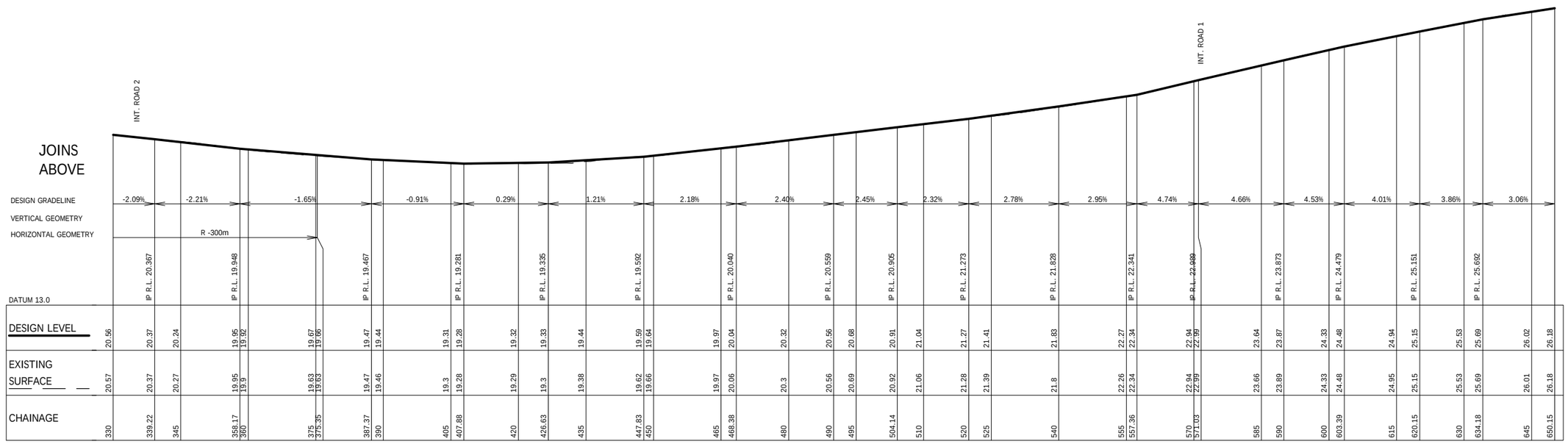
Vertical scale 1:100



NOTES:-
1. HALF ROAD CONSTRUCTION ONLY

LONGITUDINAL SECTION KANANGRA DR
Horizontal scale 1:500
Vertical scale 1:100

Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

Vertical Scale 1: 100 (A1), 1: 200 (A3)

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LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Kanangra Drive

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
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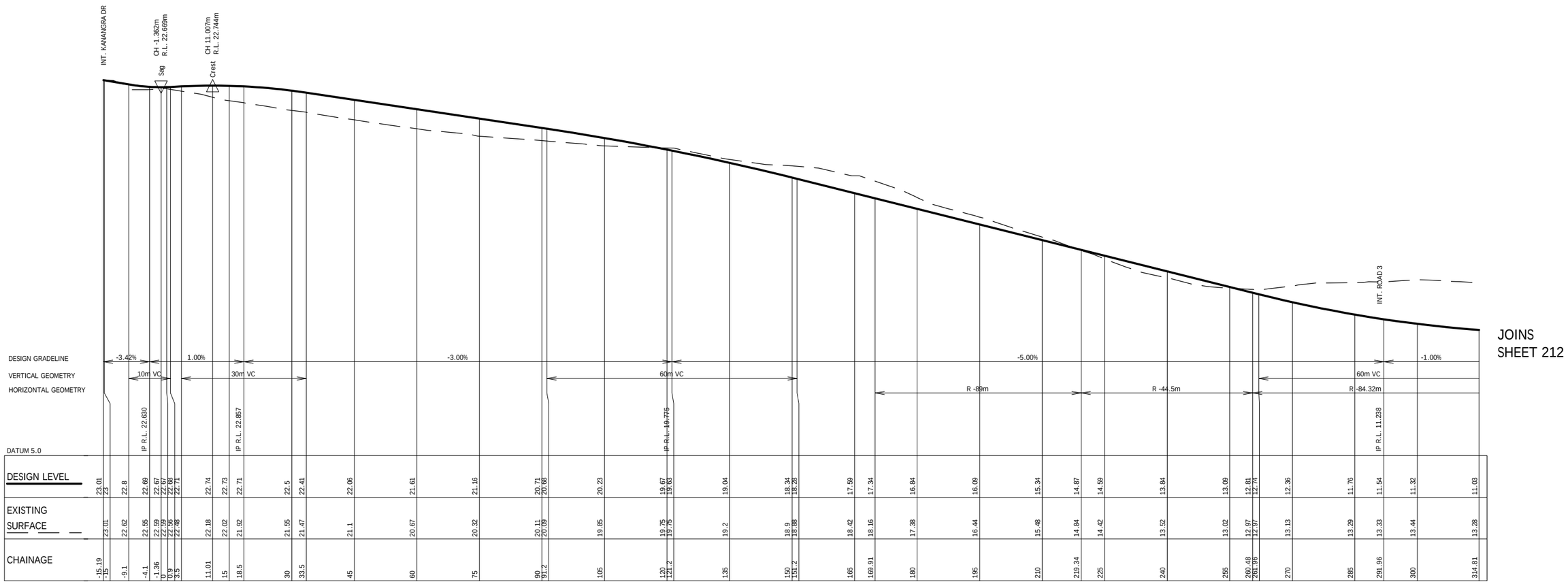

LONGITUDINAL SECTION ROAD 1
Horizontal scale 1:500
Vertical scale 1:100

0m 5 10 20 50
Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 1
Ch. -15.19 - Ch. 314.81

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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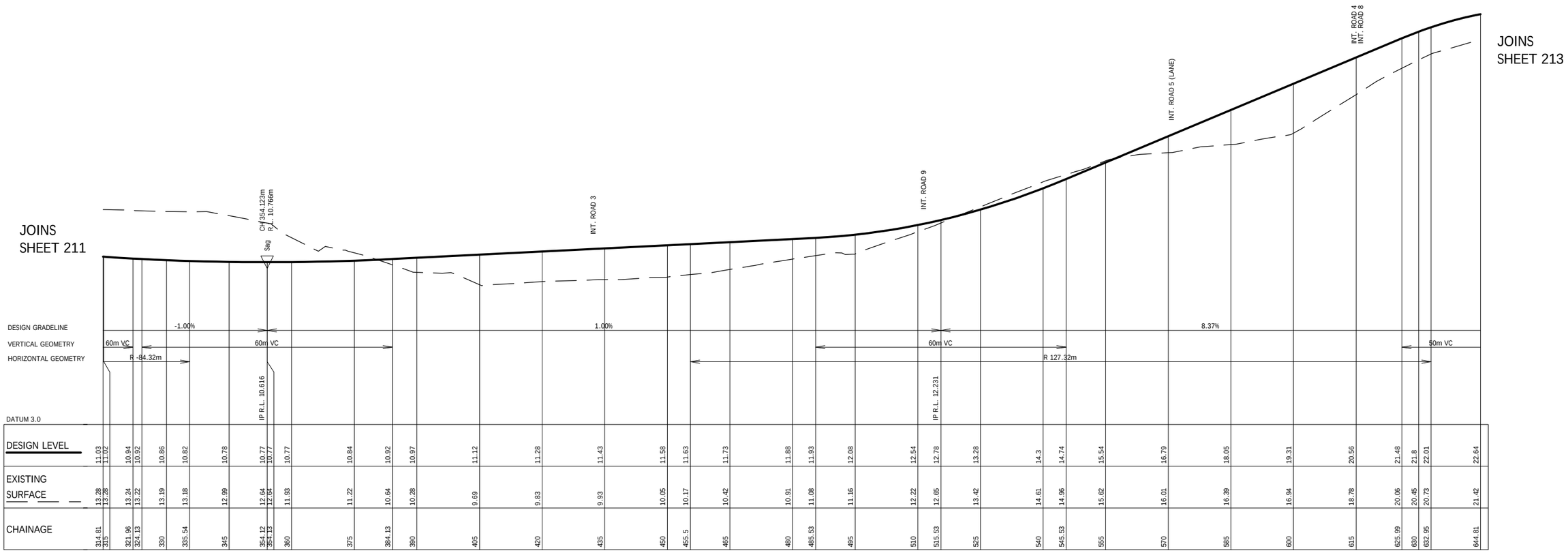
Original Size
A1

Sheet
211



CHAINAGE	DESIGN LEVEL	EXISTING SURFACE
314.81	11.03	13.28
315	11.02	13.28
321.96	10.94	13.24
324.13	10.92	13.22
330	10.86	13.19
335.54	10.82	13.18
345	10.78	12.99
354.12	10.77	12.64
354.13	10.77	12.64
360	10.77	11.93
375	10.84	11.22
384.13	10.92	10.64
390	10.97	10.28
405	11.12	9.69
420	11.28	9.83
435	11.43	9.93
450	11.58	10.05
455.5	11.63	10.17
465	11.73	10.42
480	11.88	10.91
485.53	11.93	11.08
495	12.08	11.16
510	12.54	12.22
515.53	12.78	12.65
525	13.28	13.42
540	14.3	14.61
545.53	14.74	14.96
555	15.54	15.62
570	16.79	16.01
585	18.05	16.39
600	19.31	16.94
615	20.56	18.78
625.99	21.48	20.06
630	21.8	20.45
632.95	22.01	20.73
644.81	22.64	21.42

LONGITUDINAL SECTION ROAD 1
Horizontal scale 1:500
Vertical scale 1:100

0m 5 10 20 50
Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 1
Ch. 314.81 - Ch. 644.81

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size
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Sheet
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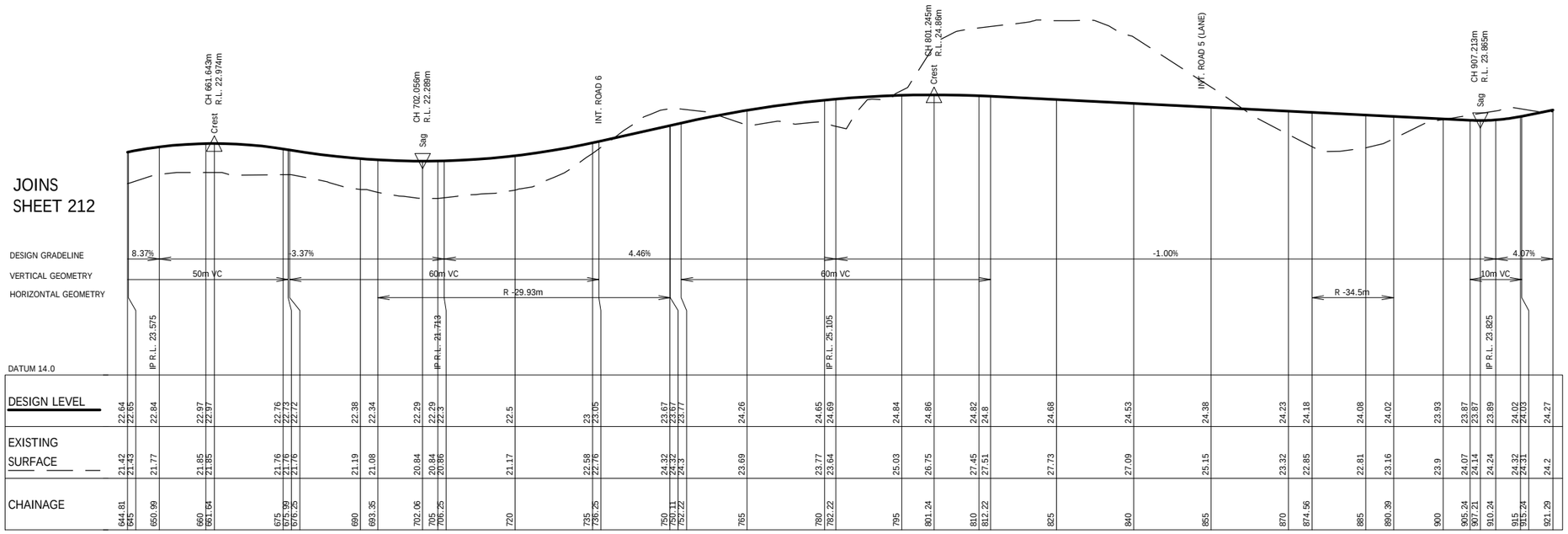

LONGITUDINAL SECTION ROAD 1
Horizontal scale 1:500
Vertical scale 1:100

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 1
Ch. 644.81 - Ch. 921.29

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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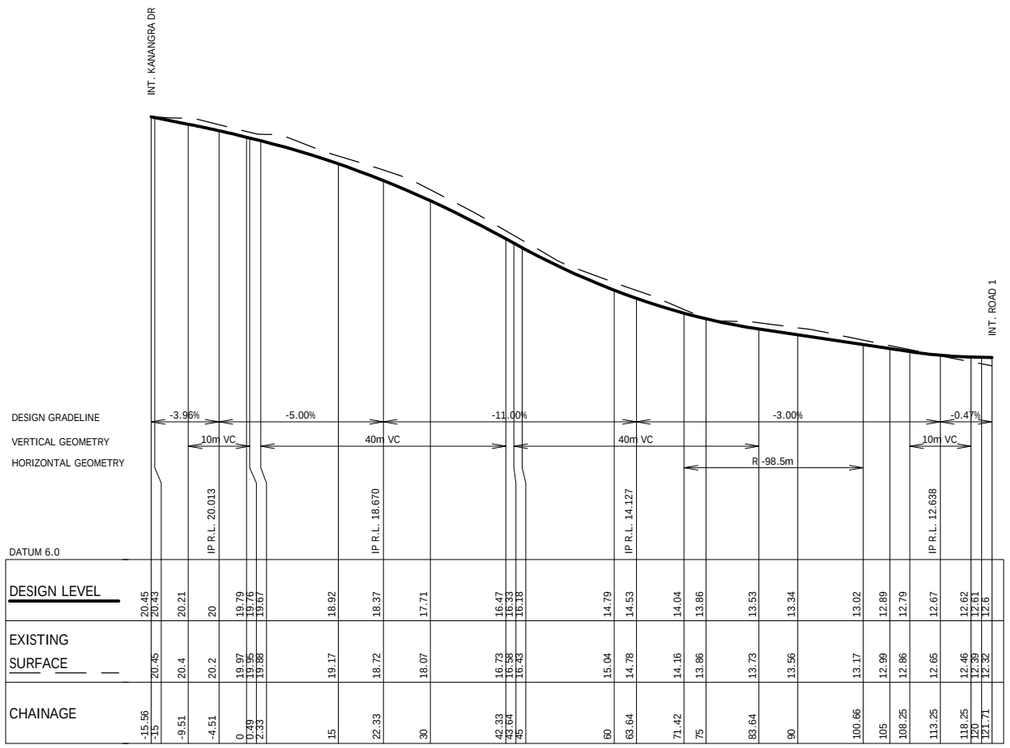
Original Size
A1

Sheet
213



LONGITUDINAL SECTION ROAD 2
Horizontal scale 1:500
Vertical scale 1:100

Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

Vertical Scale 1: 100 (A1), 1: 200 (A3)

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D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 2

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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A1

Sheet
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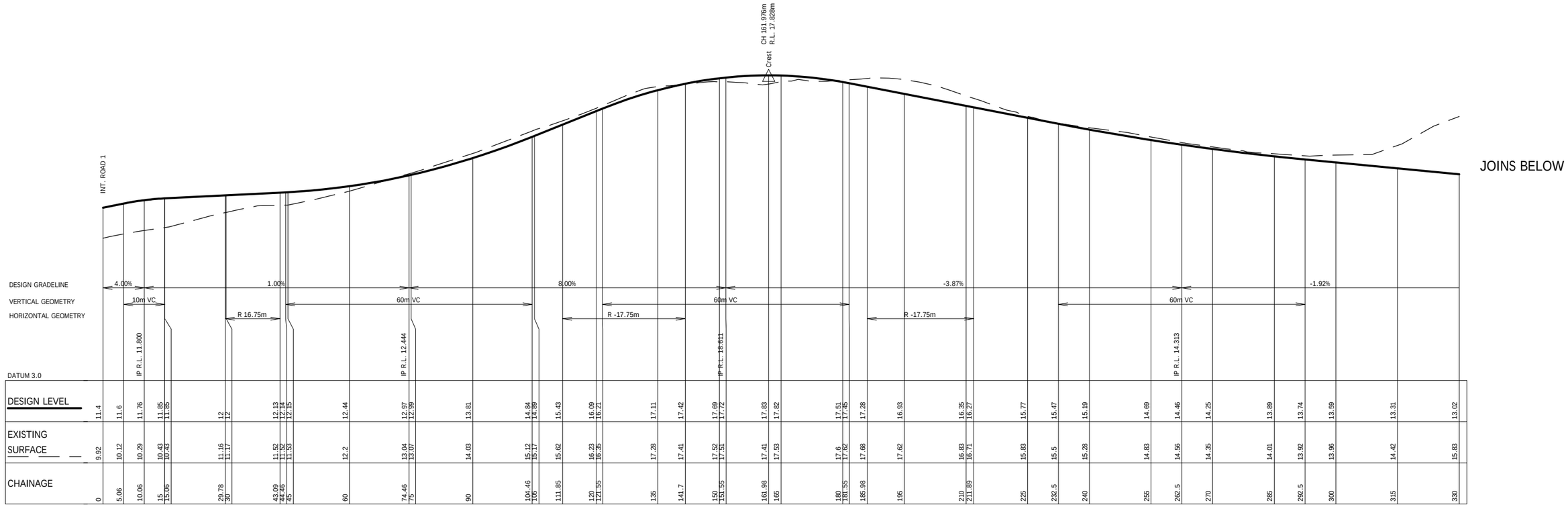
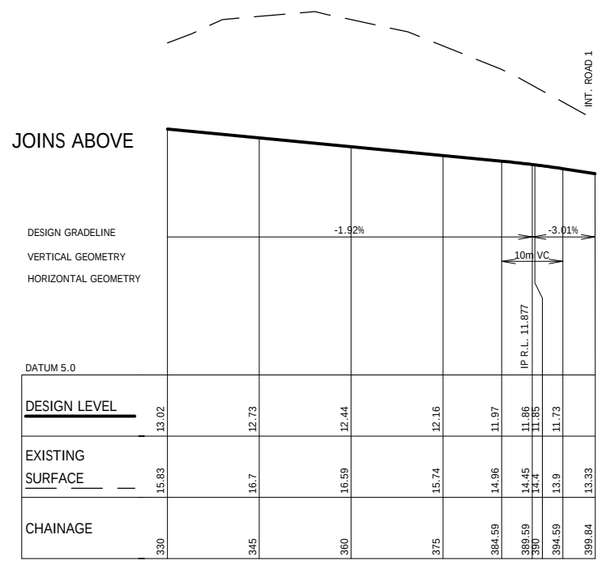


LONGITUDINAL SECTION ROAD 3
Horizontal scale 1:500
Vertical scale 1:100



LONGITUDINAL SECTION ROAD 3
Horizontal scale 1:500
Vertical scale 1:100

0m 5 10 20 50
Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 3

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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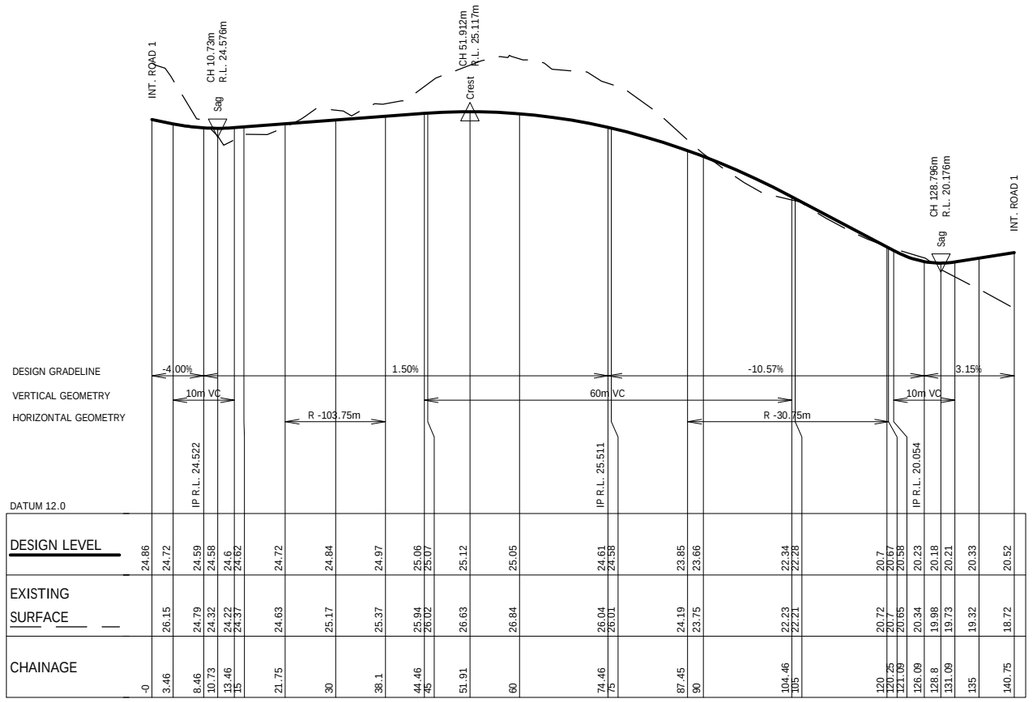
Original Size A1

Sheet 231



LONGITUDINAL SECTION ROAD 4
Horizontal scale 1:500
Vertical scale 1:100

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D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 4

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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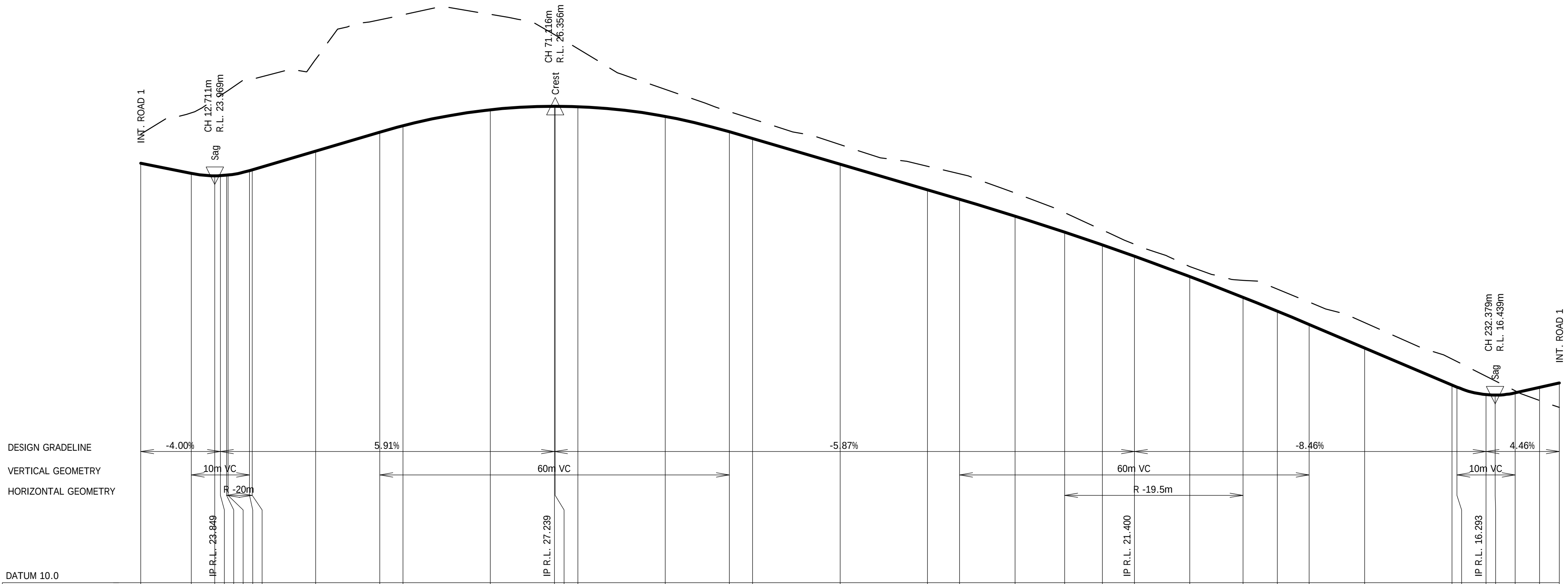
Original Size A1

Sheet 241



CHAINAGE	DESIGN LEVEL	EXISTING SURFACE
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8.68	24.05	26.13
12.71	23.97	26.59
13.68	23.97	26.72
14.75	23.99	26.86
15	23.99	26.9
18.68	24.15	27.3
19.14	24.17	27.31
30	24.81	27.96
41	25.47	29.32
45	25.69	29.49
60	26.23	29.51
71	26.36	28.81
71.12	26.36	28.8
75	26.34	28.33
90	26.01	26.94
101	25.48	26.17
105	25.24	25.92
120	24.36	25.04
135	23.48	24.29
140.49	23.16	24.03
150	22.58	23.37
158.51	22.03	22.71
165	21.59	22.1
170.49	21.21	21.61
180	20.5	20.85
189.13	19.79	20.38
195	19.32	20.08
200.49	18.86	19.63
210	18.06	18.93
225	16.79	17.67
225.83	16.72	17.59
230.83	16.45	17.09
232.38	16.44	16.93
235.83	16.52	16.59
240	16.7	16.26
243.41		16.02

LONGITUDINAL SECTION ROAD 5 (LANE)
Horizontal scale 1:500
Vertical scale 1:100

Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

Vertical Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION
KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 5

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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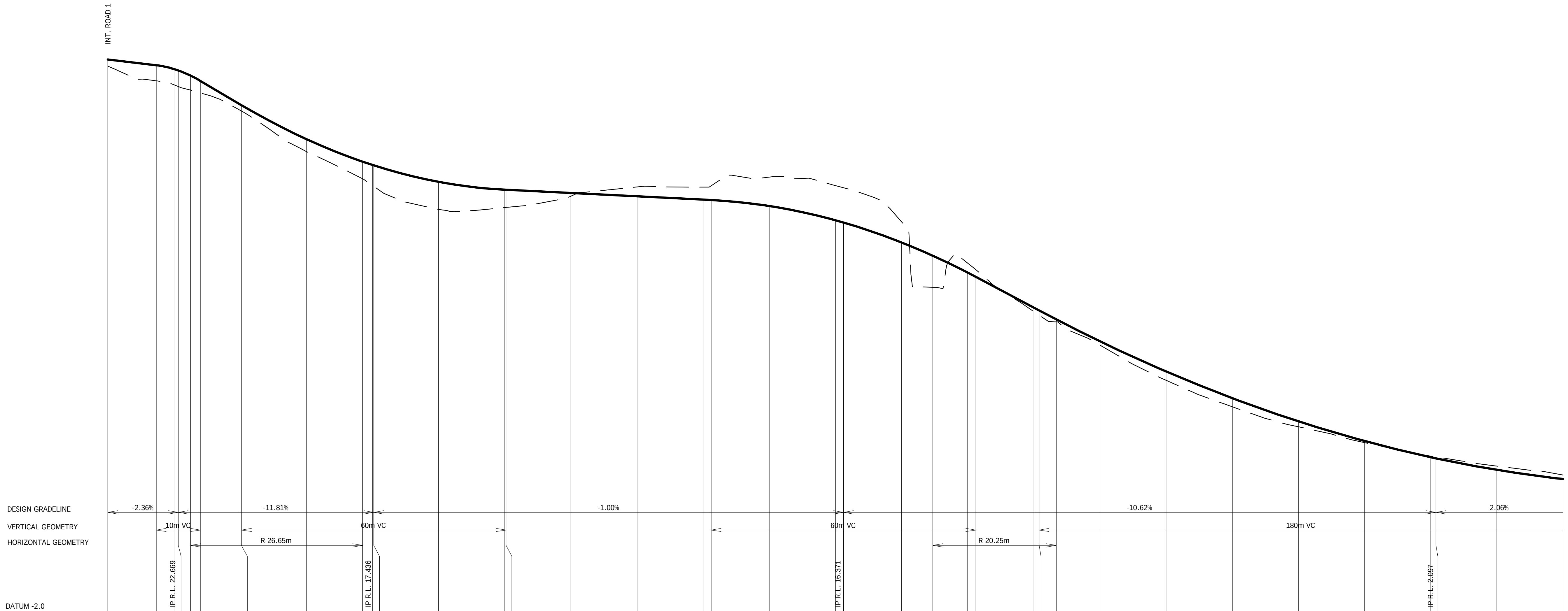
Original Size A1

Sheet 251

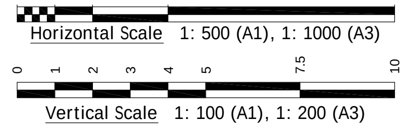


DESIGN LEVEL	23.05	22.79	22.62	22.55	22.32	22.08	21.01	20.98	19.44	18.42	18.27	18.25	17.5
EXISTING SURFACE		22.08	21.9	21.82	21.66	21.54	20.75	20.72	18.88	17.64	17.34	17.3	16.25
CHAINAGE	-0	10.99	15	15.99	18.78	20.99	30	30.3	45	57.75	60	60.3	75

DESIGN LEVEL	17.14	17.14	16.99	16.84	16.69	16.67	16.4	15.75	15.65	14.74	14.15	13.38	13.18
EXISTING SURFACE	16.33	16.33	16.85	17.27	17.26	17.32	17.71	17.33	17.23	15.69	12.71	13.81	13.52
CHAINAGE	90	90.3	105	120	135	136.83	150	165	166.83	180	187.07	195	196.83

DESIGN LEVEL	11.79	11.66	11.25	10.26	8.89	7.68	6.63	5.74	5	4.95	4.43	4.01
EXISTING SURFACE	11.6	11.44	11.14	10.09	8.49	7.29	6.38	5.66	5.05	5.01	4.6	4.19
CHAINAGE	210	211.21	215.1	225	240	255	270	285	300	301.21	315	330

LONGITUDINAL SECTION ROAD 6
Horizontal scale 1:500
Vertical scale 1:100



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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 6
Ch. 0 - Ch. 330

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size
A1

Sheet
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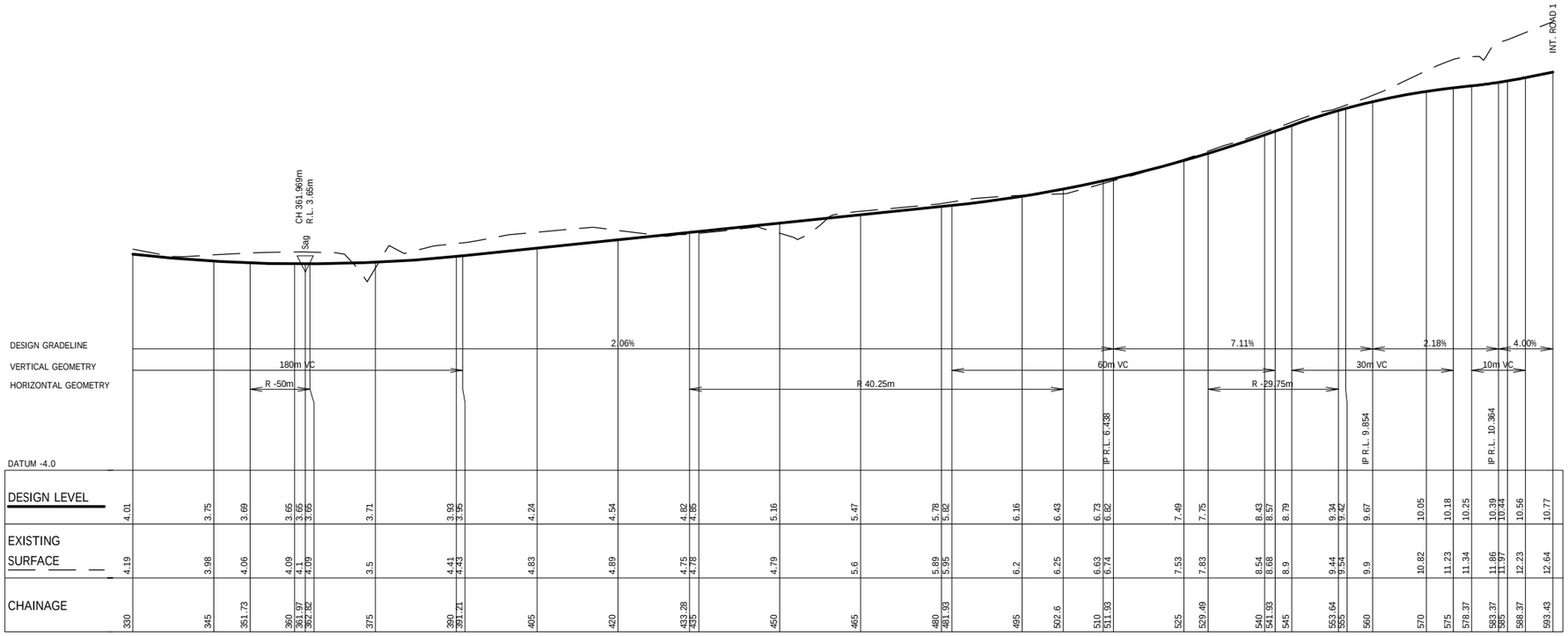

CHAINAGE	EXISTING SURFACE	DESIGN LEVEL
330	4.19	4.01
345	3.98	3.75
351.73	4.06	3.69
360	4.09	3.65
361.97	4.1	3.65
362.82	4.09	3.65
375	3.5	3.71
390	4.41	3.93
397.21	4.43	3.95
405	4.83	4.24
420	4.89	4.54
433.28	4.75	4.82
435	4.78	4.85
450	4.79	5.16
465	5.6	5.47
480	5.89	5.78
481.93	5.95	5.82
495	6.2	6.16
502.6	6.25	6.43
510	6.63	6.73
511.93	6.74	6.82
525	7.53	7.49
529.49	7.83	7.75
540	8.54	8.43
541.93	8.68	8.57
545	8.9	8.79
553.64	9.44	9.34
555	9.54	9.42
560	9.9	9.67
570	10.82	10.05
575	11.23	10.18
578.37	11.34	10.25
583.37	11.86	10.39
585	11.97	10.44
588.37	12.23	10.56
593.43	12.64	10.77

LONGITUDINAL SECTION ROAD 6
Horizontal scale 1:500
Vertical scale 1:100

0m 5 10 20 50
Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 6
Ch. 330 - Ch.593.43

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size
A1

Sheet
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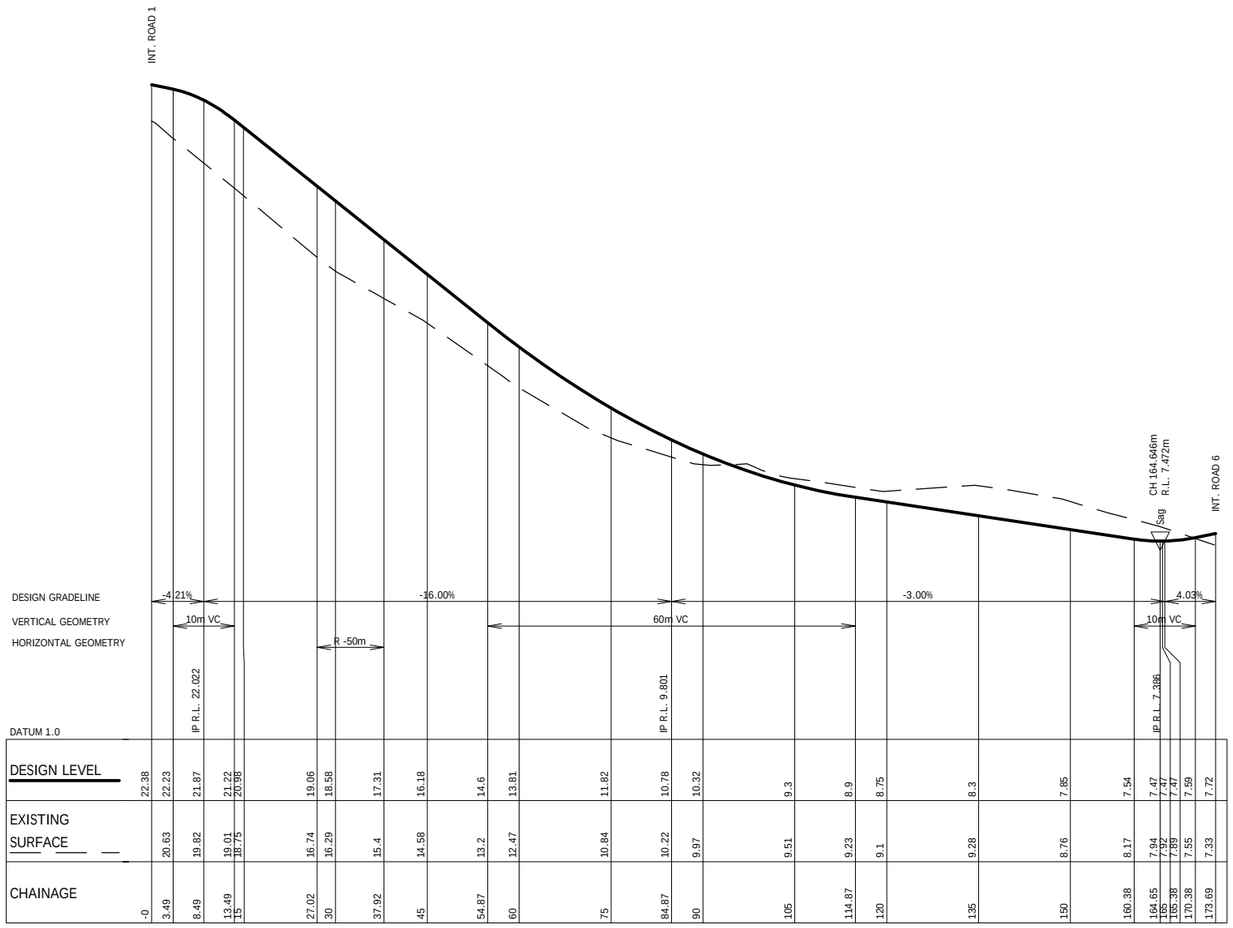

LONGITUDINAL SECTION ROAD 7
Horizontal scale 1:500
Vertical scale 1:100

0m 5 10 20 50
Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 7

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size A1

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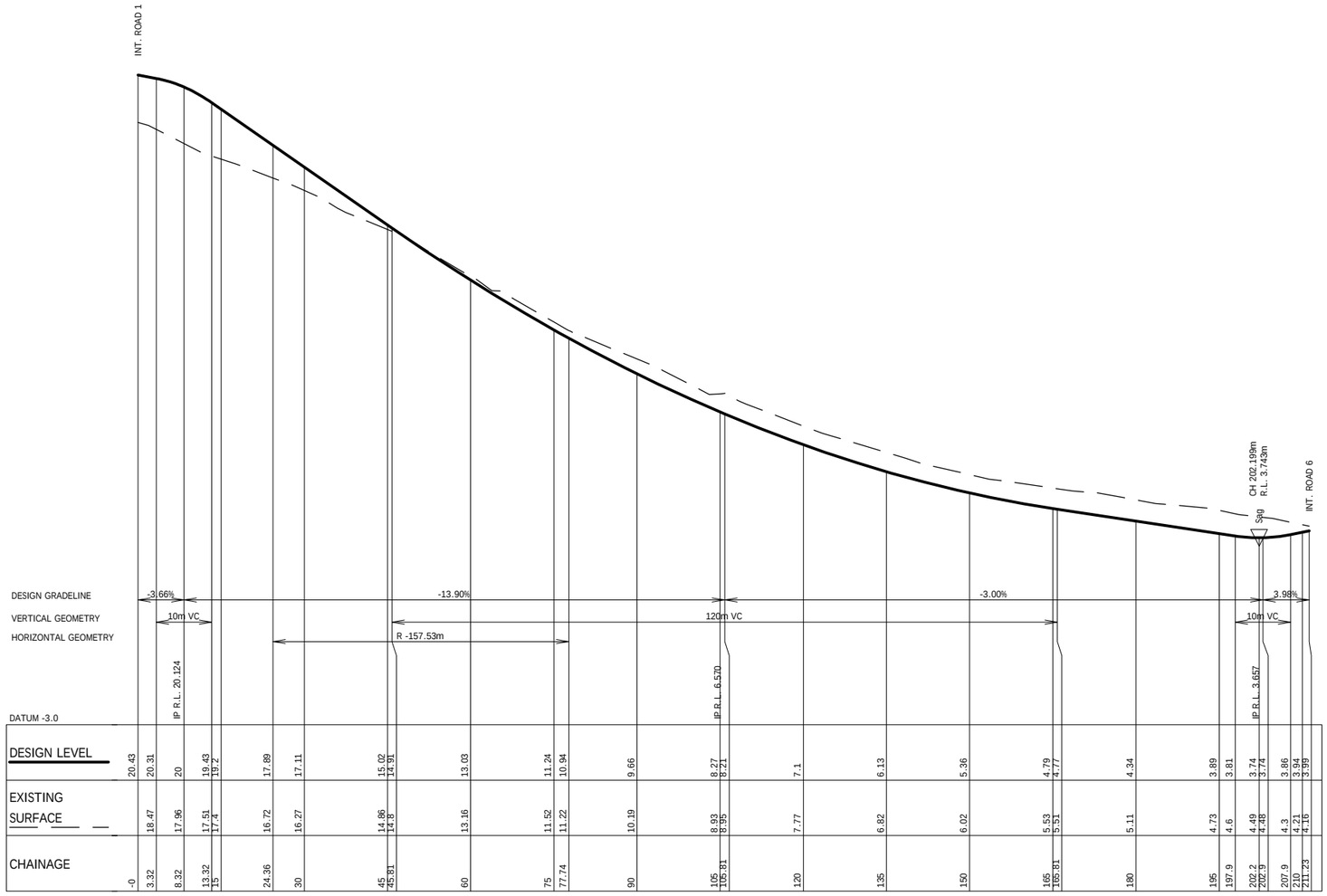

LONGITUDINAL SECTION ROAD 8
Horizontal scale 1:500
Vertical scale 1:100

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Horizontal Scale 1: 500 (A1), 1: 1000 (A3)

0 1 2 3 4 5 7.5 10
Vertical Scale 1: 100 (A1), 1: 200 (A3)

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D	12/2007	Amend to New Layout
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B	07/2007	Project Application
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LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 8

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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A1

Sheet
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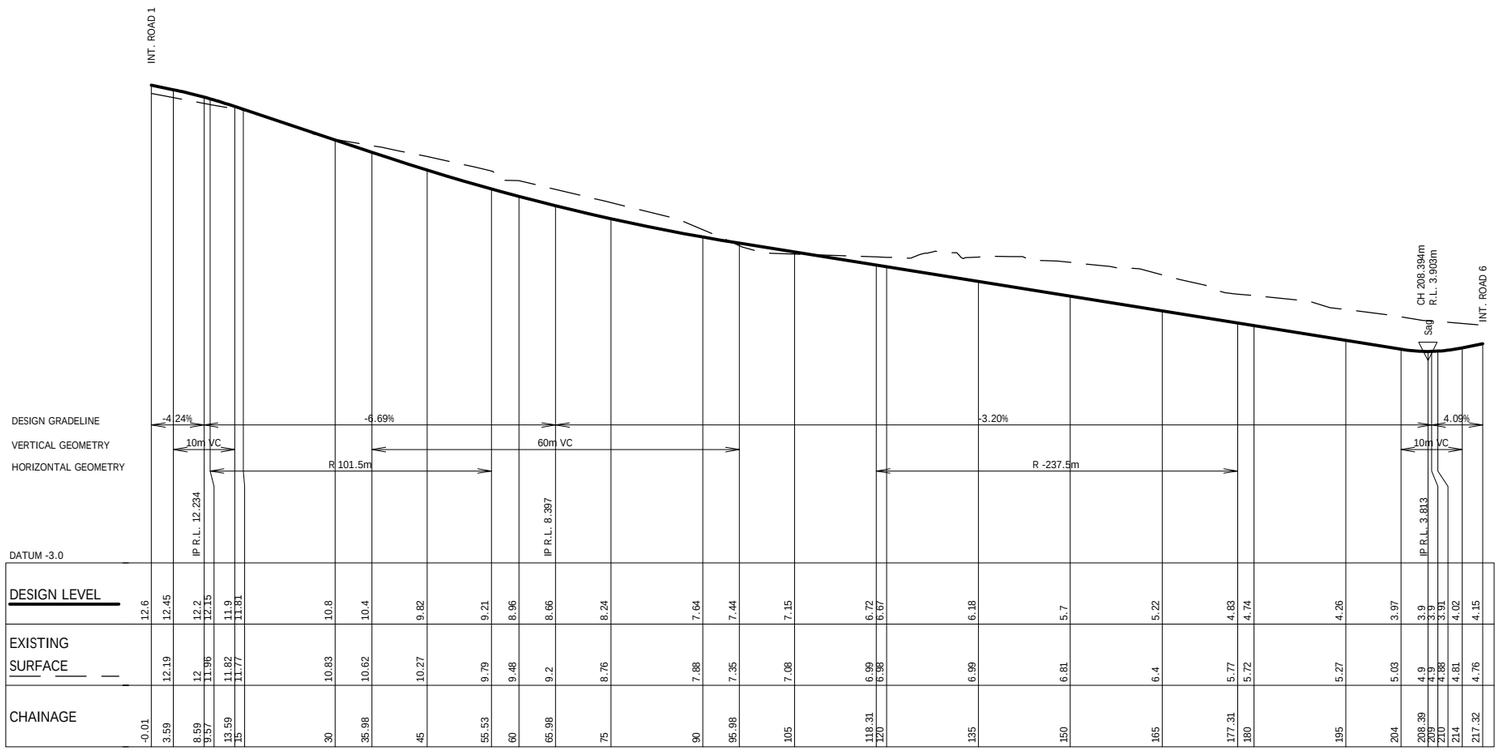
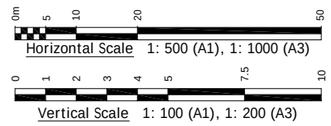


LONGITUDINAL SECTION ROAD 9
Horizontal scale 1:500
Vertical scale 1:100



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Ver.	Date	Comment
D	12/2007	Amend to New Layout
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A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Longitudinal Section - Road 9

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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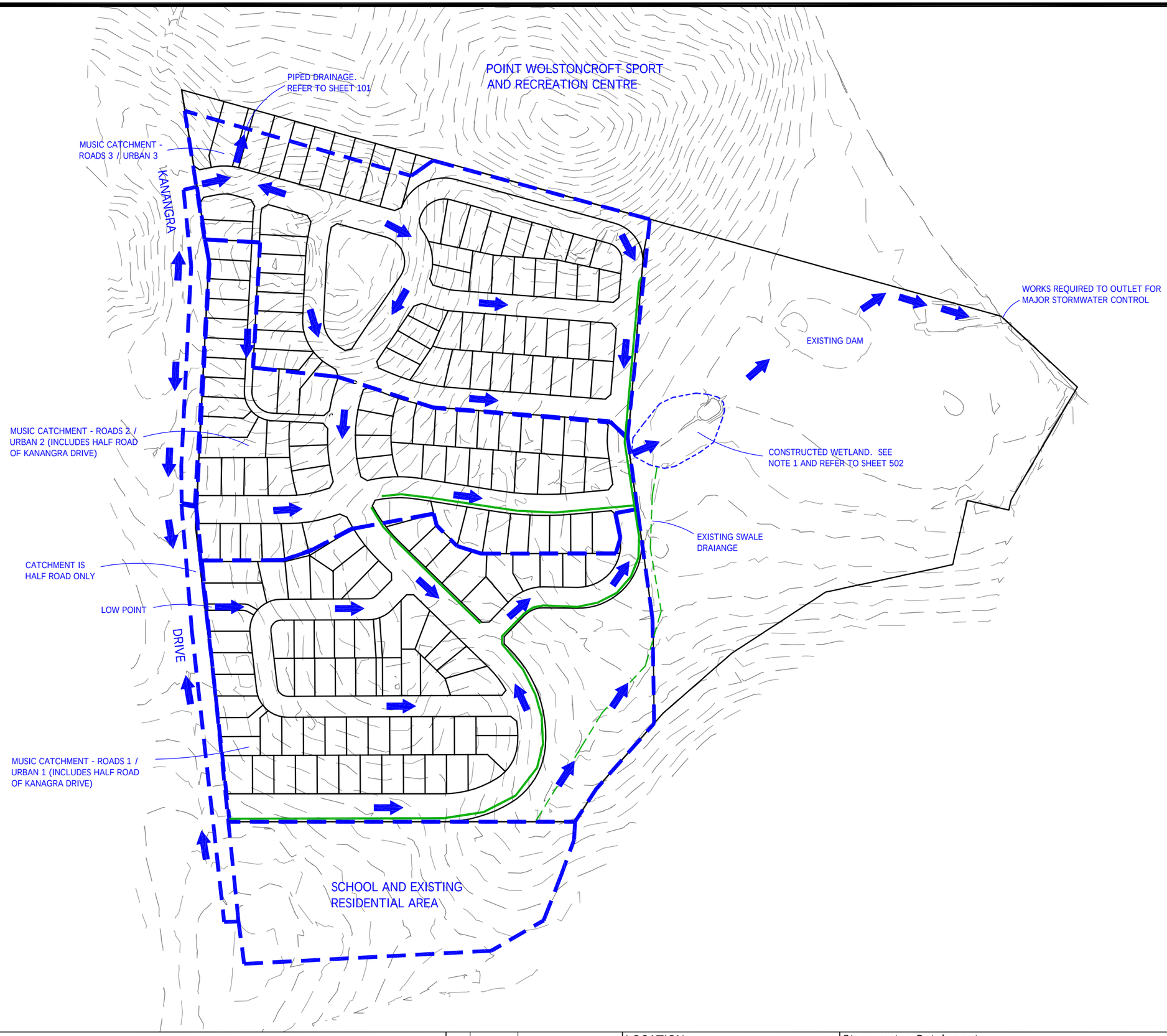
Original Size A1

Sheet 291



LEGEND

- BOUNDARIES
- CATCHMENT BOUNDARIES (USED IN MUSIC MODEL)
- SWALE DRAINAGE (LOW FLOWS / ROAD ONLY)
- EXISTING SWALE DRAINAGE
- FLOW DIRECTION

N

NOTES:-

1. THE CONSTRUCTED WETLAND IS THE FINAL CONTROL FOR STORMWATER REQUIREMENTS OF RUNOFF QUALITY AND QUANTITY FROM THE DEVELOPMENT

0 25 50 75 100 150

Bar Scale 1: 1500 (A1), 1: 3000 (A3)

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LOCATION

KANANGRA DRIVE, GWANDALAN

Stormwater Catchments

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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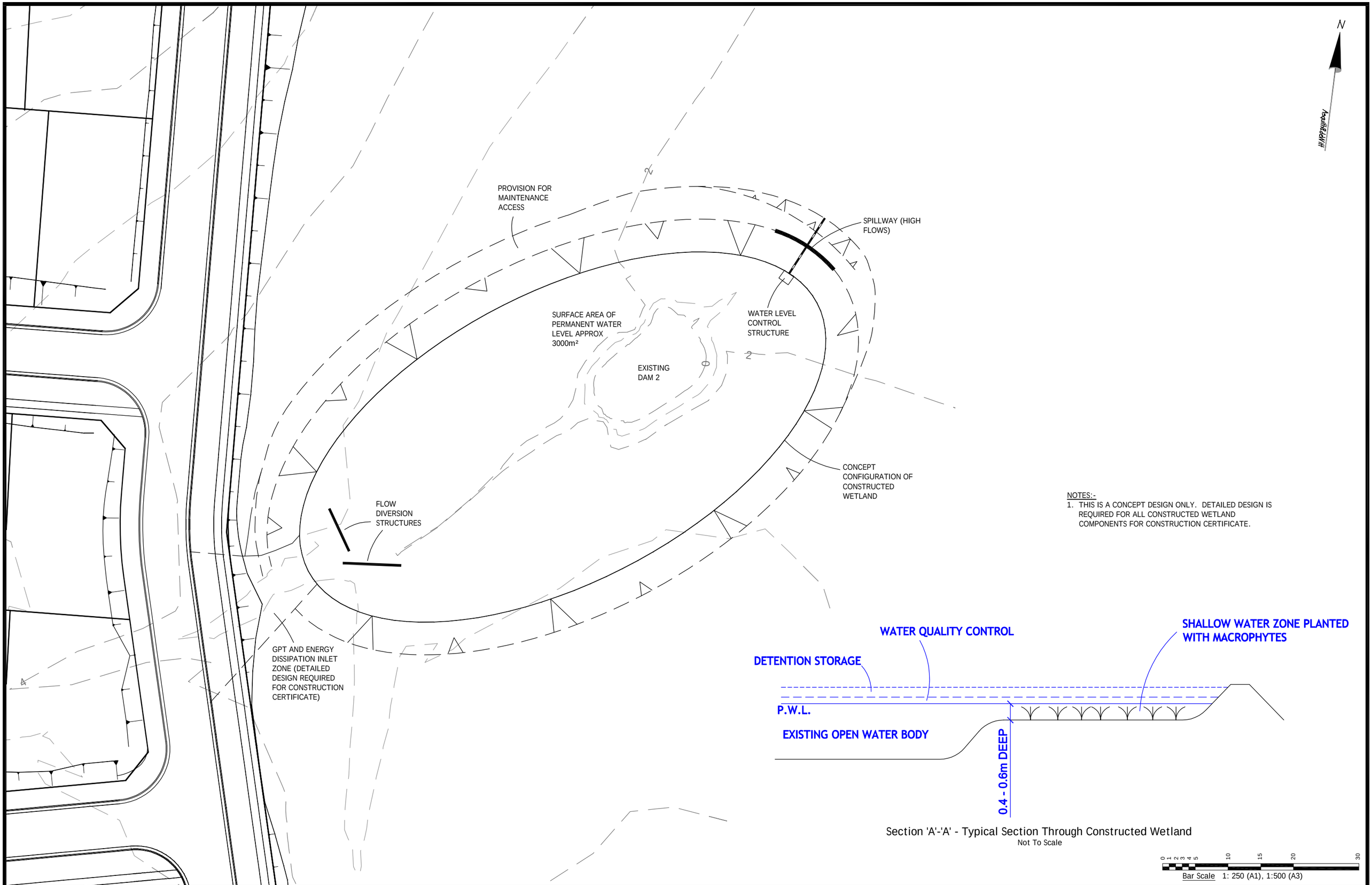
Sheet 501



NOTES:-

1. THIS IS A CONCEPT DESIGN ONLY. DETAILED DESIGN IS REQUIRED FOR ALL CONSTRUCTED WETLAND COMPONENTS FOR CONSTRUCTION CERTIFICATE.

Section 'A'-'A' - Typical Section Through Constructed Wetland
Not To Scale

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D	12/2007	Amend to New Layout
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LOCATION

KANANGRA DRIVE, GWANDALAN

Constructed Wetland (Concept)

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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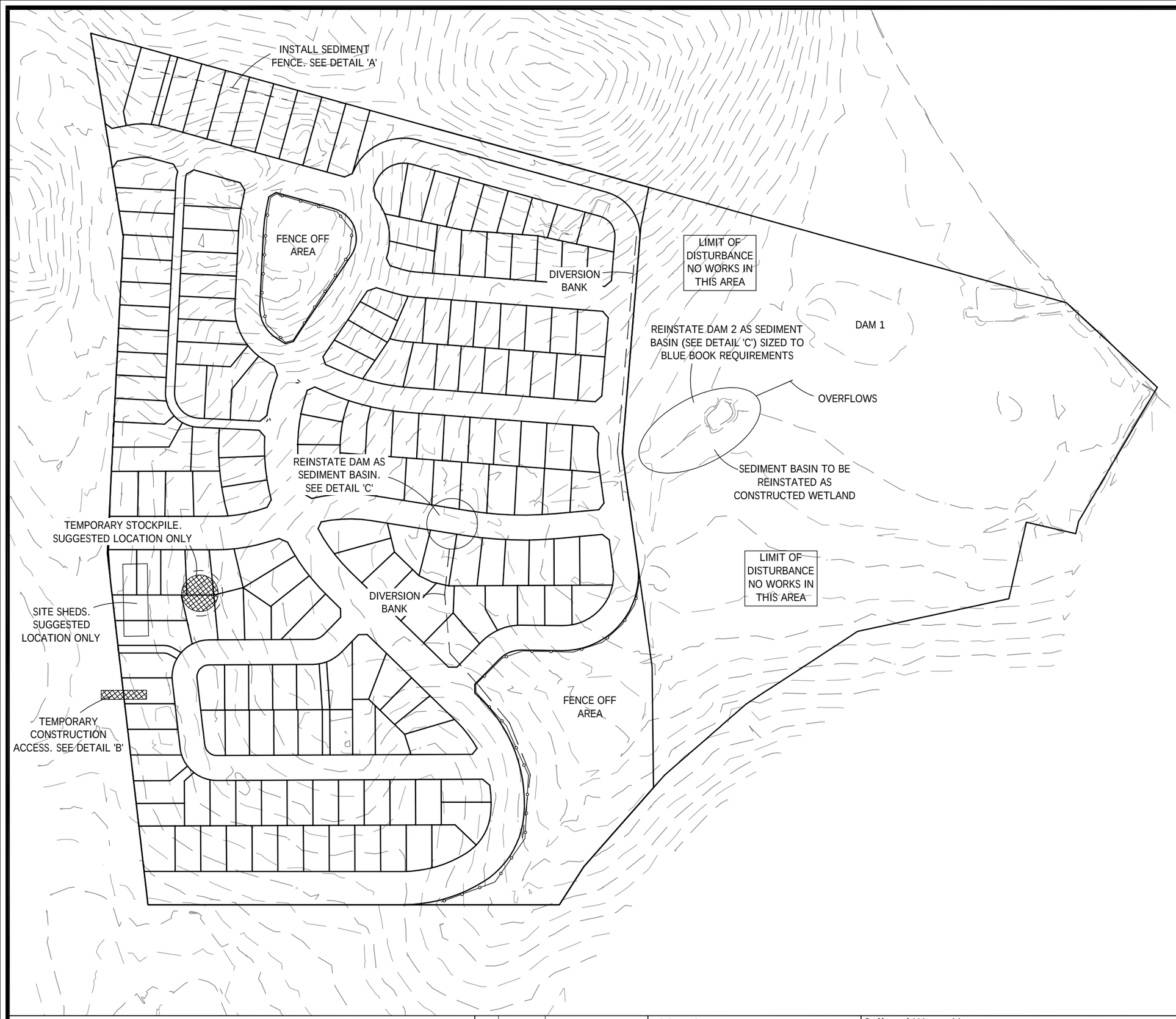
Original Size A1

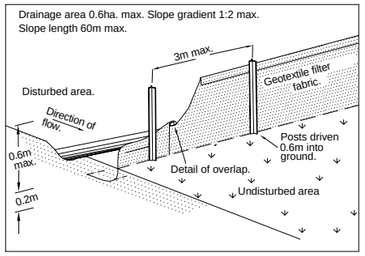
Sheet 502



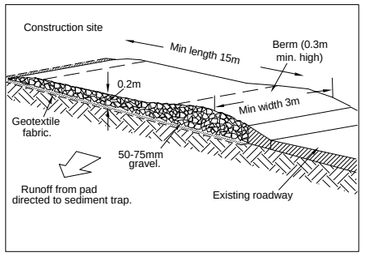
N

LEGEND

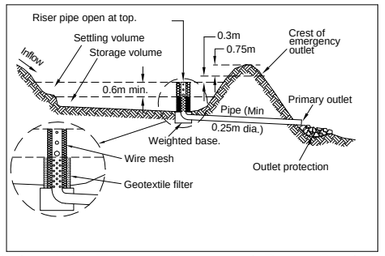
- BARRIER FENCING
- SITE BOUNDARY
- PROPOSED BOUNDARY
- MAJOR NATURAL CONTOUR
- MINOR NATURAL CONTOUR



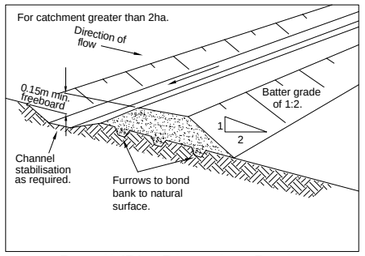
Detail 'A' - Sediment Fence



Detail 'B' - Temporary Construction Access



Detail 'C' - Typical Sediment Basin Section



Detail 'D' - Diversion Drain

THIS SHEET IS NOT TO SCALE

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Soil and Water Management

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size A1

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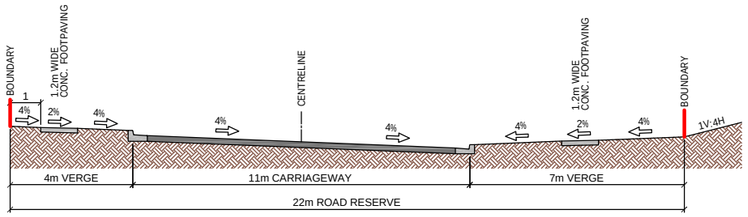
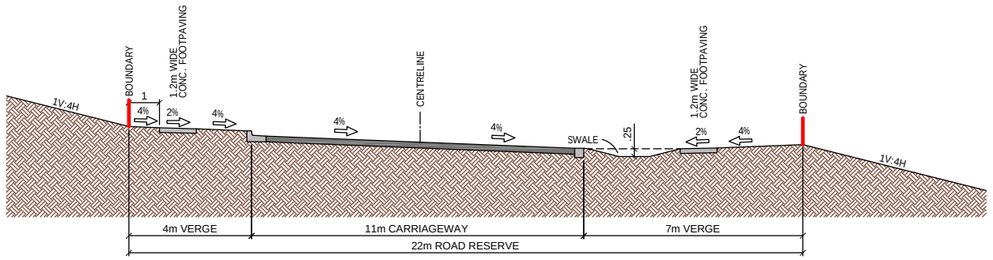
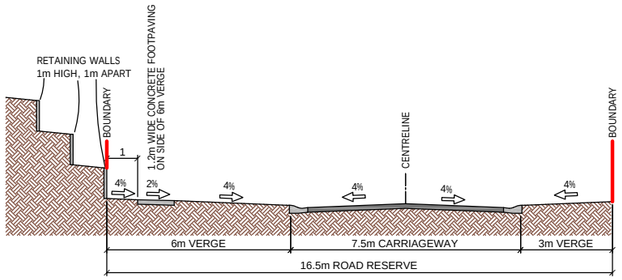


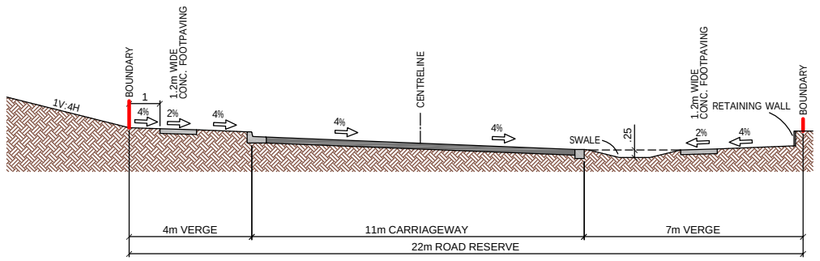
Standard Section - 22m Road Reserve
No Swale Drain



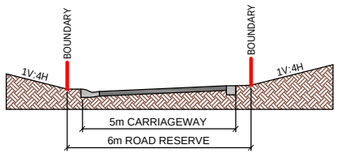
Standard Section - 22m Road Reserve
With Swale Drain



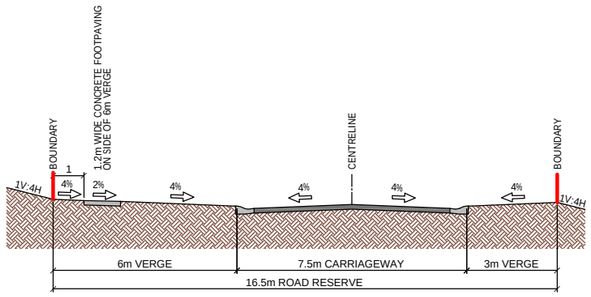
Section - 16.5m Road Reserve
Tiered Retaining Walls



Standard Section - 22m Road Reserve
Retaining Wall

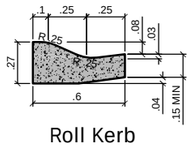


Standard Section - 6m Road Reserve
Lane Way



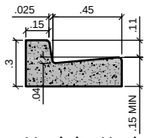
Standard Section - 16.5m Road Reserve

NOTES:-
1. SWALE DRAINS FOR ROAD FLOWS ONLY, LIMITED TO LONGITUDINAL GRADES <5%



Roll Kerb
NTS

Edge Restraint
NTS



Upright Kerb
NTS

0 1 2 3 4 5 7.5 10
Bar Scale 1: 100 (A1), 1: 200 (A3)

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION
KANANGRA DRIVE, GWANDALAN

Typical Sections

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:		Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size
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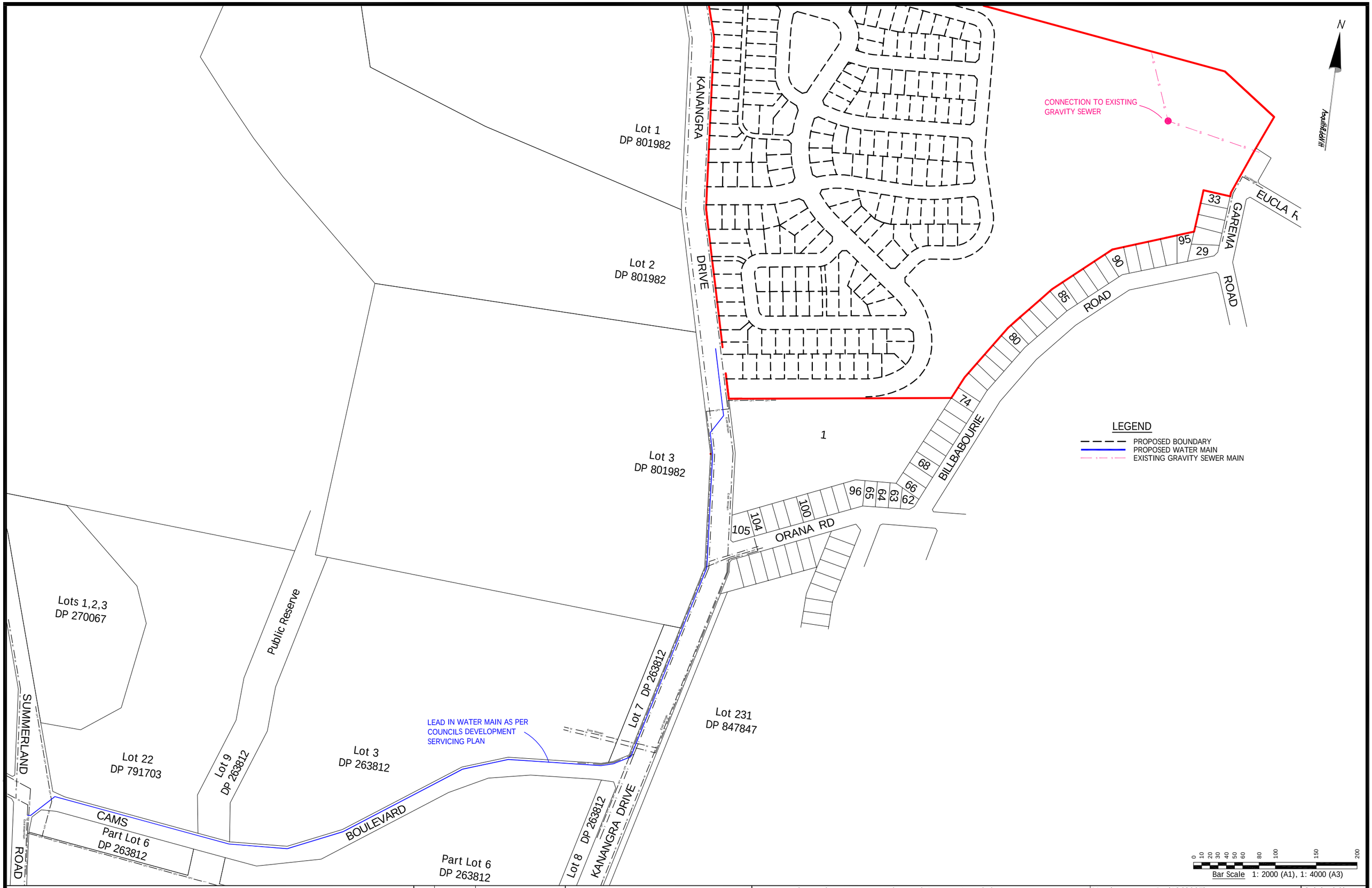
Sheet
701



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LOCATION

KANANGRA DRIVE, GWANDALAN

Proposed Lead-In Water Main and Sewer Servicing

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
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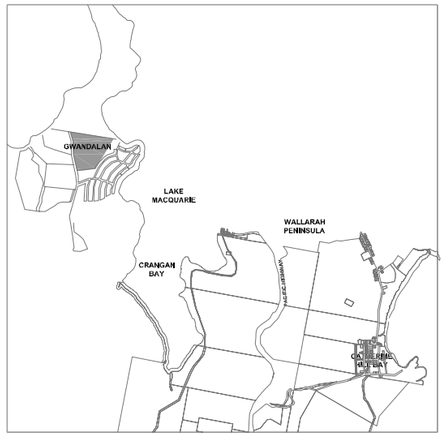
Sheet 702

GWANDALAN, NSW
PROJECT APPLICATION

LOCATION PLAN



DRAWING INDEX

07520 G L - 0	Cover Sheet
07520 G L - 1	Gwandalan Landscape Plan
07520 G L - 2	Gwandalan Landscape Sections
07520 G L - 3	Gwandalan Landscape Details

PRELIMINARY not for Construction

Date	Amendment	Issue
18.12.07	Project Application	C
23.08.07	Project Application	B
10.08.07	Project Application	A

Notes

Verify all dimensions on site before commencing work. Report all discrepancies to the Architect Prior to construction. Use figured dimensions in preference to scaled dimensions.

Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales or for general purposes.

All work is to conform to relevant Australian Standards and Codes together with all Authorities' requirements and Regulations.

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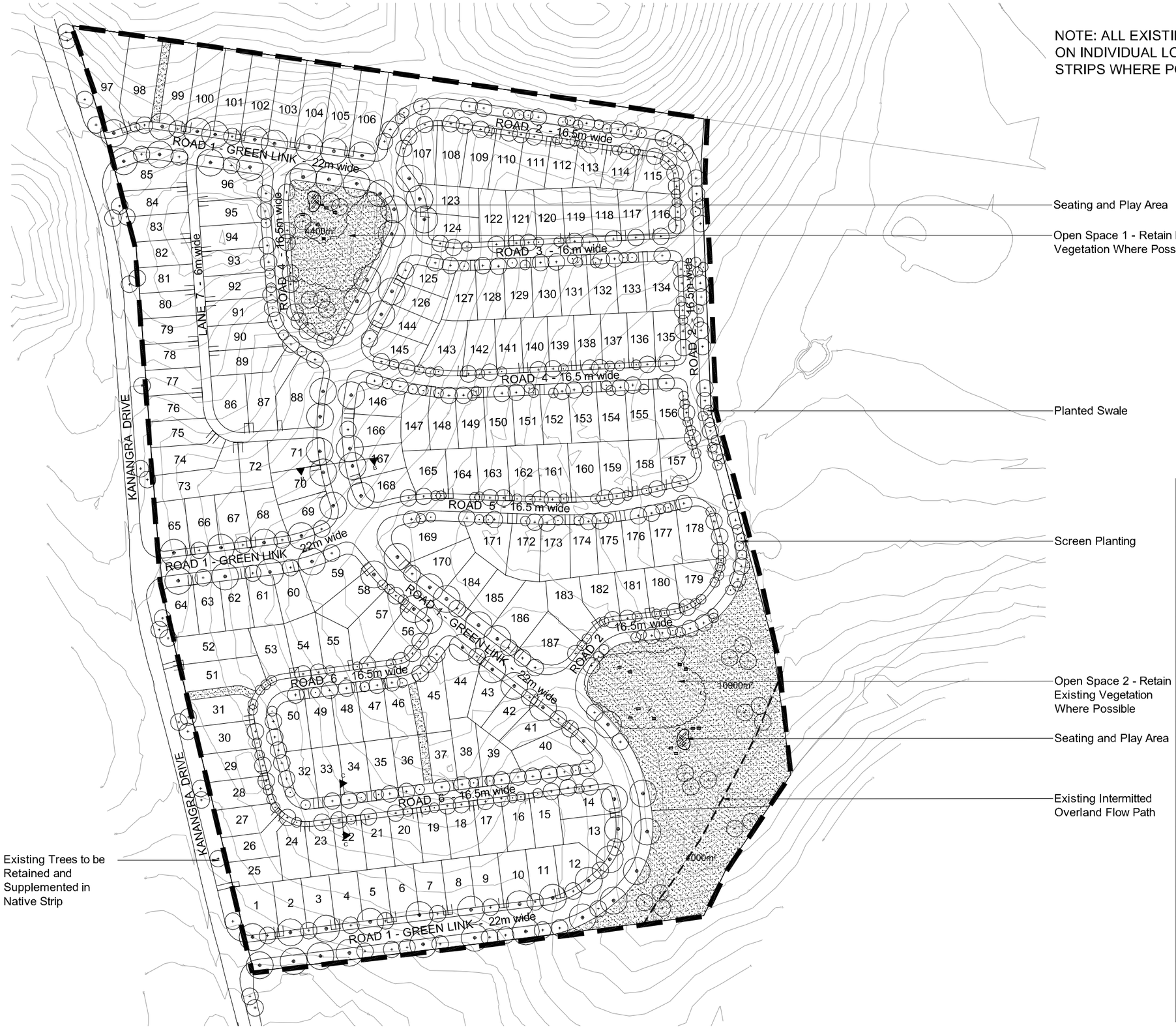
LANDSCAPE ARCHITECT

52-58 William Street, East Sydney NSW 2011
P.O Box A666 Sydney South NSW 1235
T. 61 2 9244 8660 F. 61 2 92448688
E. contextl@context.net.au
www.context.net.au ACN 055 972 248

context

Project	Gwandalan Project Application Gwandalan	Title	Coversheet
Client	Rose Property Group Pty Ltd	Date	18 December 2007
		Dwg No	07520 G L - 0
		Dr/Ch	MV/OC
		Issue	C



NOTE: ALL EXISTING TREES WILL BE RETAINED ON INDIVIDUAL LOTS AND IN THE NATURE STRIPS WHERE POSSIBLE

Seating and Play Area

Open Space 1 - Retain Existing Vegetation Where Possible

Planted Swale

Screen Planting

Open Space 2 - Retain Existing Vegetation Where Possible

Seating and Play Area

Existing Intermitted Overland Flow Path

Existing Trees to be Retained and Supplemented in Native Strip

LEGEND

- EXTENT OF WORKS
- PROPOSED TREES
- SHRUBS/GROUNDCOVERS
- TURF
- PLANTED SWALE
- DRIVEWAY
- INDICATIVE CHILDRENS PLAYGROUND
- PICNIC SETTING
- PARK BENCH
- DRAINAGE CORRIDOR

GWANDALAN PLANT SCHEDULE

Botanical Name	Common Name	Mature Height
TREES		
Green Link Planting		
Cupaniopsis anacoides	Tuckeroo	8-10m
Eucalyptus capitellata	Brown stringybark	8-12m
Eucalyptus racemosa	Scribbly gum	10-15m
Streetscape Planting		
Angophora costata	Sydney red gum	10-15m
Banksia integrifolia	Coast banksia	5-8m
Eucalyptus piperita	Sydney peppermint	10-15m
Eucalyptus racemosa	Scribbly gum	10-15m
Eucalyptus umbra	Broad leaved white mahogany	10-15m
Hibiscus tiliensis	Rosemallow	8-10m
Lagerstroemia indica	Crape myrtle	8-10m
Plumeria	Frangipani	5m
Tibouchina spp.	Glory tree	5m
Park Planting		
Angophora costata	Sydney red gum	10-15m
Banksia integrifolia	Coast banksia	5-8m
Cupaniopsis anacoides	Tuckeroo	8-10m
Eucalyptus gummifera	Red bloodwood	15-20m
Eucalyptus capitellata	Brown stringybark	8-12m
Eucalyptus piperita	Sydney peppermint	10-15m
Eucalyptus punutata	Gray gum	10m
Eucalyptus racemosa	Scribbly gum	15-20m
Melaleuca quinquinerva	Paper barked tea tree	5-10m
Swale Planting		
Carex appressa	Tall Sedge	80
Isolepis nodosa	Knobby Club Rush	1m
Juncus kraussii	Sea Rush	50cm
Lomandra longifolia	Spiny Headed Matt Rush	1m
Phragmites australis	Common Reed	3m

PRELIMINARY not for Construction

0 10 20 30 40 50m 1:1000 @ B1

Date	Amendment	Issue
18.12.07	Project Application	C
23.08.07	Project Application	B
10.08.07	Project Application	A

Notes

Verify all dimensions on site before commencing work. Report all discrepancies to the Architect Prior to construction. Use figured dimensions in preference to scaled dimensions.

Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales or for general purposes.

All work is to conform to relevant Australian Standards and Codes together with all Authorities' requirements and Regulations.

ROSE
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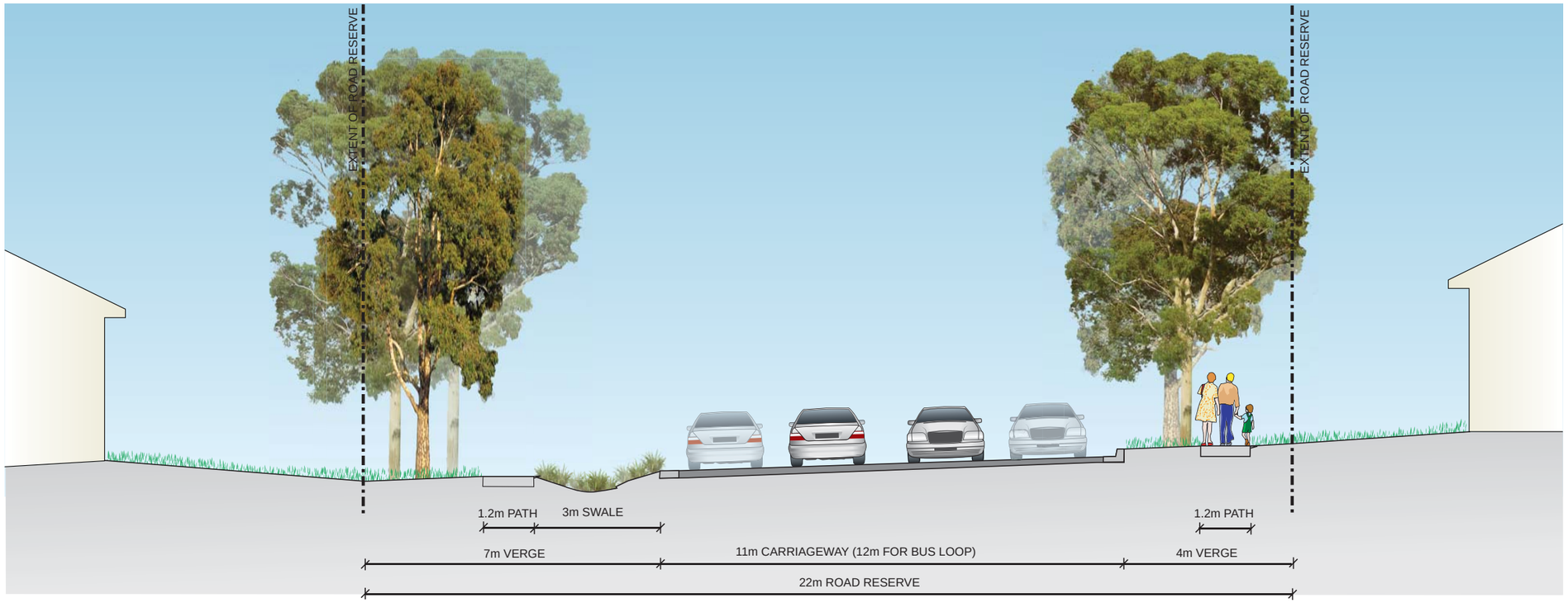
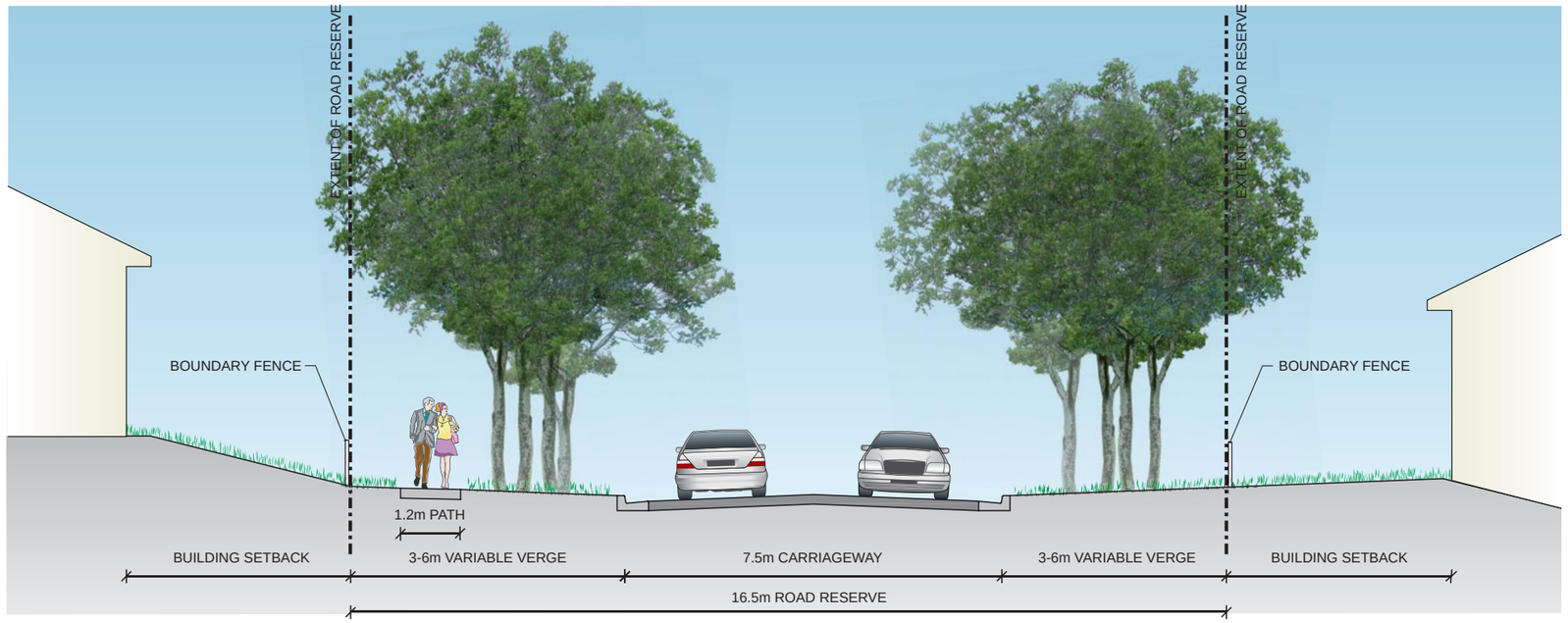
Project	Gwandalan Project Application	Title	Gwandalan Landscape Plan
	Gwandalan	Date	18 December 2007
Client	Rose Property Group Pty Ltd	Drwg No	07520 G L - 1
		Dr/Ch	MV/OC
		Issue	C



22M ROAD TYPICAL SECTION
SCALE: 1:50



16M ROAD TYPICAL SECTION
SCALE: 1:50

GWANDALAN - KEY PLAN

PRELIMINARY not for Construction

1:50 @ B1

18.12.07	Project Application	C
04.12.07	Project Application	B
10.08.07	Project Application	A
Date	Amendment	Issue

Notes
Verify all dimensions on site before commencing work. Report all discrepancies to the Architect Prior to construction. Use figured dimensions in preference to scaled dimensions.

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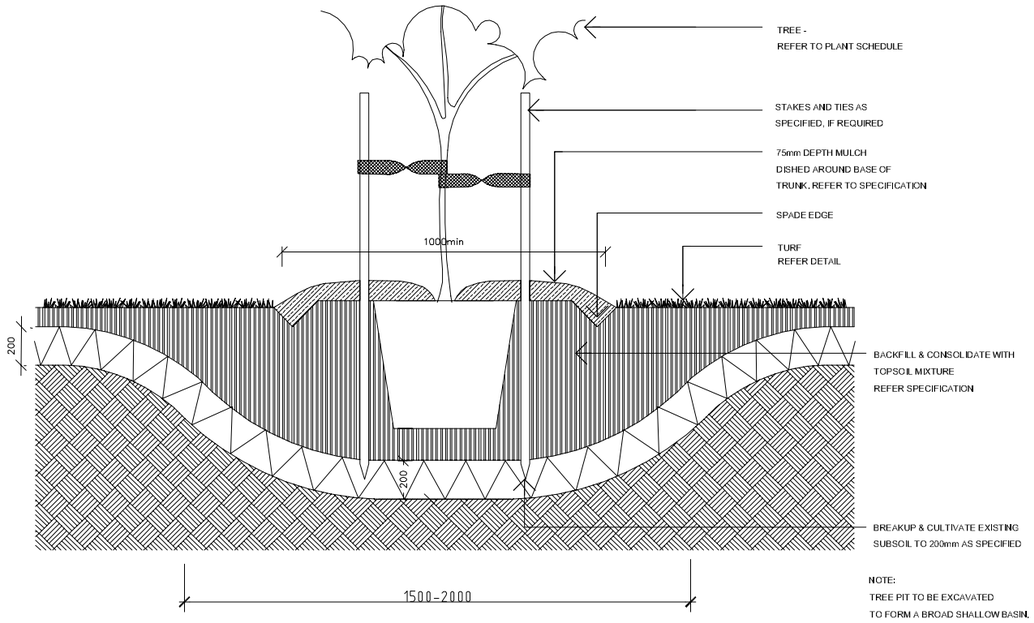
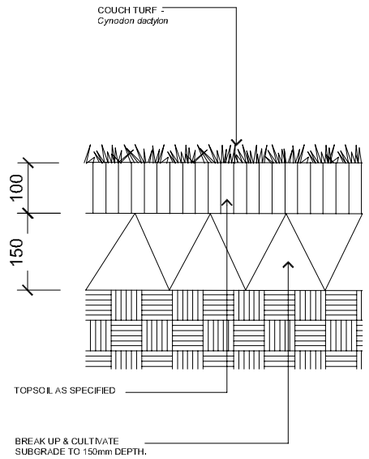
Project	Gwandalan Project Application	Title	Gwandalan Landscape Sections
Client	Gwandalan	Date	18 December 2007 Dn/Ch MV/OC
	Rose Property Group Pty Ltd	Drwg No	07520 G L - 2 Issue C



NOTE:
TREE PIT TO BE EXCAVATED
TO FORM A BROAD SHALLOW BASIN.

1 / - TREE IN GRASS DETAIL
Scale 1:20



2 / - GRASS DETAIL
Scale 1:5

Date	Amendment	Issue
18.12.07	Project Application	A

Notes
Verify all dimensions on site before commencing work. Report all discrepancies to the Architect Prior to construction. Use figured dimensions in preference to scaled dimensions.

Drawings made to larger scales and those showing particular parts of the works take precedence over drawings made to smaller scales or for general purposes.

All work is to conform to relevant Australian Standards and Codes together with all Authorities' requirements and Regulations.

ROSE
Creating a quality way of living

PRELIMINARY not for Construction

0 10 20 30 40 50m
1:1000 @ B1

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Project	Gwandalan Project Application	Title	Gwandalan Landscape Details
Client	Rose Property Group Pty Ltd	Date	18 December 2007 Dn/Ch MV/OC
		Drwg No	07520 G L - 3 Issue A

Appendix 5

COMPLIANCE WITH WYONG SUBDIVISION CONTROLS

WYONG SHIRE DCP 66 – SUBDIVISION COMPLIANCE

4.1.1 LOT SIZE		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Sufficient area	YES	Lot sizes are sufficient enough to encompass all aspects of the DCP performance criteria.
Lot Categories A). -minimum lot size = 500m² - minimum width = 15m at building line	YES	Majority of Lots are > 500m 2 Smallest Lot width is 15.5m
B.) -minimum lot size = 232m² -minimum width = 7.5m at building line	YES	Smallest Lot size is 395m² Smallest Lot width is 15m
C.) (battleaxe) -minimum lot size = 750m² -minimum width = 4m accessway, 15m at shortest boundary -Frontage to no more than 4 adjoining residential lots	N O	No battleaxe lots proposed
General	YES	A range of Lot sizes are provided within the plans All Lots are provided with street frontage Finished site w ill not exceed slope of 10 degrees. There are mixed width Lots, the average Lot width being > 15m

4.1.2 LOT DESIGN		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Optimisation of solar access	YES	The majority of Lots have a north-south orientation, which aim s to optimise solar access.
Adjacent lot boundaries should coincide with the minimum number of abutting Lots	YES	Regular subdivision pattern minimises the number of adjoining lots.
Street frontage orientation of Lots	YES	All Lot frontages within the plan are oriented towards streets.
Category B Lots should generally be rectangular in shape	YES	Most of the category B lots are rectangular in shape.
Pattern of Development	YES	The design of the Lots and overall layout provides for an ordered pattern of developments.

4.1.3 STREET DESIGN		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Encouraging innovation through flexibility	YES	Streets have been configured so that street plantings "shorten" appearance of street lengths.
Satisfaction of objectives, performance criteria, "design speed" and "verge width".	YES	All roads comply with maximum acceptable longitudinal grades. Verge widths for access streets and bus route vary from 3 to 7 m wide. Radii acceptable for bus route. Laneway to be low speed environ with traffic controls. Paved footpaths meet the 1.2 m wide requirements.
Attractive and pleasant streetscape	YES	See Landscape Plan
Minimisation of vehicle presence	YES	Streets will be pedestrian friendly.

4.1.4 PUBLIC OPEN SPACE		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Open space provided and developed in accordance with strategies and principles of Wyong Open Space Plan	YES	See Landscape Plan
Walking distance from public open space – no Lot m ore than 400m	YES	Achieved
Walking distance from playground – no Lot m ore than 500m		No playground provided
Character of the subdivisions	YES	Consistent with low density residential nature of Gwandalan. The subdivision character is established by streetscaping.
No more than 25% of Lots adjacent to Open Space shall abut that Open Space on a side or rear boundary	YES	The subdivision com plies with this requirement of the DCP
Development in flood prone land	N /A	No residential development is proposed on or below the flood level.

4.1.5 STORM WATER MANAGEMENT		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Storm water drainage systems and networks meeting Council requirements.	YES	Storm water treatment as proposed will help protect the Lake.
Erosion and Sediment Control	YES	Erosion and sediment control plan provided.
Public drainage	YES	Drainage system flows to adjoining private land.

4.1.6 UTILITY SERVICES		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Utility Services Installation accordance with WSC's Engineering Requirements for Development.	YES	Existing services systems to be augmented to accommodate development.
Proposed subdivision services encouraged to be provided in a shared trench	YES	Services Plan provided. Shared trench proposed.
Established area services shall have regard to existing m ode of installation	YES	Shared trenching.
All services shall be provided underground	YES	Underground provision provided
Communication infrastructure to be provided underground	YES	Underground provision provided
Attractiveness of lights installed in public places	YES	See streetscaping plans

4.1.7 COMMUNITY SAFETY AND SECURITY		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Streets designed in accordance with Street Design criteria	YES	Designed to Council requirements.
Sight lines preserved at all intersections Compliance with Council's policy on Fencing and Planting on Residential Land	YES	Achieved
Lighting shall be provided for safety and to engender a feeling of security	YES	Lights to be located to illuminate paths.

4.1.8 HERITAGE		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Provision of details of any identified heritage item or aboriginal archaeological site	No	No items or sites know n on proposed development area.
Compliance with the provisions of the W SC Draft DCP for Conservation of the Built Environment	N/A	
Aboriginal archaeological sites found to be treated in accordance with the provisions of the National Parks and Wildlife Act 1974.	N/A	No sites will be disturbed or affected by development.

4.1.9 BENCHING		
ISSUE	**RELEVANCE**	**COMMENT AND SECTION**
Provision of details on batters and the means of retention along the street boundary of all Lots w here the extent of cut and fill is likely to exceed 1000m.	YES	Details in design plans.
Retaining w alls adjoining and extending over 2 Lots shall not exceed a combined height of 1000 mm.	N/A	Details in design plans. N o retaining walls in house lots.
Retaining walls for cutting shall not extend as a continuous straight w all over m ore than two Lots.	YES	Comply
Retaining w alls along side boundaries shall only be constructed behind the building line.	YES	More proposed.
Any change of level achieved along the side boundary in front of the building line shall be by the use of batters.	YES	Achieved.
Retaining w all materials should be similar to and complement the character of the proposed residential development	YES	Can be achieved.
Retaining w alls across a site at or near the front boundary shall be landscaped.	YES	No front boundary retaining walls.
All retaining w alls shall be designed with a minimum life expectancy of 50 years	YES	CC detail.
Information on the size and slope of each proposed Lot should be provided with the DA.	YES	See design plans
Proposed residential Lots should have capacity to accommodate high quality dwellings and any ancillary developments	YES	Lots have been sized to accommodate standard project homes.

Appendix 6

STORMWATER MANAGEMENT

ASQUITH & deWITT PTY LTD

Engineering Report for Residential Development - Stormwater Management, Concept Civil Design & Services

Property:

Lot 3 DP 588206
Kanangra Drive,
Gwandalan

Owner:

Rose Property Group
Pty Limited

Version 4 - December, 2007

Unit 7/335 Hillsborough Road,
Warners Bay NSW 2290
Ph: (02) 4978 5100 Fax: (02) 4978 5199
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APPENDIX B - MUSIC MODEL DETAILS

APPENDIX C - SOIL & WATER MANAGEMENT CALCULATIONS

This report has been prepared using the most up to date available survey information and current flooding analysis methods. No responsibility for loss occasioned to any person acting or refraining from action as a result of any material in this publication will be accepted by Asquith & deWitt.

Prepared by:

Scott Day B.E. (Env.), Hons. MIEAust CPEng NPER
Member No. 1465150 Civil and Environmental Colleges
Senior Environmental Engineer

Section 1.0 Introduction

Asquith & deWitt Pty Limited has been commissioned by Rose Property Group Pty Limited to complete the engineering report for stormwater management, concept civil design and services for the residential development of Lot 3 DP 588206, Kanangra Drive, Gwandalan.

The NSW Department of Planning issued Director General's Requirements (DGRs) on 2 August 2007. This report will address the following DGRs for the development of the Gwandalan site:

Utilities and Infrastructure

(1) Prepare a utility and infrastructure servicing report and plan for the Site that includes (but is not limited to):

(a) identifying and assessing the capacity of existing utility and infrastructure servicing the site,

(b) identifying that adequate water supply is available for bushfire suppression operations,

(c) identifying all necessary augmentation works to service the site and whether these works can sustain this and other development foreshadowed for the Wallarah Peninsula shown in the Lower Hunter Regional Strategy, and

(d) demonstrate compliance with the requirements of any public authorities in regard to the connection to, relocation and/or adjustment of services affected by the development proposal.

(2) Provide appropriate detailed information on the drainage, sewerage and stormwater management measures to be incorporated on Site, including (but not limited to):

(a) sustainable water measures (such as on site stormwater detention, water sensitive urban design measures, and water recycling);

(b) sediment and erosion control measures; and

(c) the quality and quantity impacts on surface water, groundwater, the sea or any nearby beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or a rock platform.

Site preparation works

Provide a report that includes (but is not limited to):

- *(a) a detailed survey showing existing and proposed levels and quantities of fill necessary for site preparation works;*
- *(b) details on the source of fill including types of materials and their source; and*
- *(c) details of the quantity and quality of any excess material and arrangements for its disposal.*

A Rezoning report on stormwater management was previously submitted to Wyong Shire Council. The report was prepared by Umwelt (Australia) Pty Limited "Stormwater Management Plan for the Residential Rezoning of Lot 3 DP 588206, Kanangra Drive, Gwandalan", Report No. 1803/R02/V2, dated May 2004. The Umwelt report was used as a basis for the stormwater management design and was amended to reflect the changes to the development layout. Peak flows and water quality were remodelled for Version 3.

Version 3 of this report was submitted as part of the Project Application in August 2007. Subsequent to this, the panel has approved in concept a revised layout by Conybeare Morrison International Pty Ltd, Ref 07020 A3 SK 109, Issue B, dated 27 November 2007. This report, Version 4, has been updated to reflect the changes to the revised development layout. The concept engineering design, Version D has also been updated to address the revised, current layout.

Typically, there is a reduction in the size of stormwater controls for peak flow attenuation and water quality as developable area is reduced. The revised, current layout has a reduced developable area by comparison to the previous layout. This has been after the decision to include an increased open space area of 19,300m^2 within the same site area. Consequently, the minimum stormwater controls designed in the reporting for Version 3 are greater than the minimum stormwater controls required for compliance for Version 4.

The subject land parcel has frontage to Lake Macquarie as shown in **Figure 1**. The aim of this report is to provide a stormwater management design for the proposed development, generally in accordance with Wyong Shire Council requirements. The stormwater controls have been designed in accordance with current best management practices and Water Sensitive Urban Design (WSUD) principles.

Figure 1 – Site Locality (Plan from Google maps)

Whilst this report has been prepared for the Department of Planning, considerable effort has been made to meet all development standards for roads, drainage and infrastructure required by Wyong Shire Council (Council).

Section 2.0 Site Description

The site has common boundaries with Gwandalan Public School and existing residential development to the south, Lake Macquarie to the east, Point Wolstoncroft Sport & Recreation Centre (PWS&RC) to the north and Kanangra Drive to the west. The total area of the site is 26 hectares.

The general site topography consists of variable slopes from very flat at the base of the site adjacent to the lake, transitioning to gentle 3-5% slopes through the middle of the site, gradually increasing up to a maximum of 18% in the northwest corner of the site. Approximately half the site has been underscrubbed or cleared. There are six (6) existing dams on site. It is understood from the Rezoning report that these dams were constructed approximately 20 years ago. Refer to **Sheet 001** in **Appendix A**.

2.1 EXISTING DRAINAGE

Catchment boundary definition has been adopted from the Rezoning report with adjustments reflecting the reduction in the area of the site to be developed. The catchment includes small areas of the immediate surrounds, external to the site. The external catchments that directly affect the part of the site to be developed include:

- Public School Area – 2.50 hectares;
- PWS&RC – 0.03 hectares; and
- Kanangra Drive – 0.728 hectares.

The Rezoning report stated that stormwater from the Public School buildings is controlled by a pipe constructed within the site conveying stormwater to the uppermost dam. There is no easement over this stormwater discharge into the site. The catchment from the PWS&RC is a natural catchment. Runoff from this catchment enters the site uncontrolled. The catchment area of Kanangra Drive is half road only, extending upslope across the school frontage to the intersection of Kanangra Drive with Orana Road. The existing low point of this catchment is at the site frontage adjacent to the existing site access. Refer to **Sheet 501** in **Appendix A**.

There are no formal stormwater controls for the runoff from the existing residential development of Billbabourie Road. The majority of this runoff enters the site downslope of the proposed development. There is no easement over this stormwater discharge into the site.

In summary, the external catchments described above have a total area of 3.258 hectares contributing to the developed catchment.

There are two (2) areas of the site which discharge runoff during storm events to the PWS&RC. The first area is an existing catchment area of 1.54 hectares in the north western corner of the site. This area is within the proposed development area. Most of this area is highly disturbed due to its former use as a small quarry. The second area is approximately 0.04 hectares, at the base of the site, close to the lake. This is an area of disturbed Melaleuca forest that continues into the PWS&RC. This area is outside of the proposed development area. Refer to **Sheet 001** in **Appendix A**.

Section 3.0 Proposed Development

The proposed development seeks to create 187 standard residential lots, generally varying in size from a minimum of 395m^2 up to a maximum of 1500m^2. These lots are proposed in the upper portion of the site. Refer to **Sheets 101-103** of **Appendix A**.

The layout has modified the catchment in the north western corner of the site discharging to the PWS&RC. The catchment of all developable area with potential for hardstand will now be contained within the site. Piped drainage is proposed along the rear of Lots 1 to 9. This will also collect street drainage stormwater from the low point in Road 1. The remaining catchment area of the site discharging runoff during storm events to the PWS&RC has been reduced from 1.54 hectares to 0.27 hectares. This contributing area is Asset Protection Zone that cannot be built on due to bushfire regulations. Overflows greater than the piped drainage capacity, suggested to have capacity for 1:5 year ARI storm event, will continue to flow to the PWS&RC. Refer to Sheets **101 & 501** of **Appendix A**.

Open space allowances of 4,400m^2 and 14,900m^2 have been made within the site area to be developed. The proposed development for this application will include the drainage and treatment of runoff from the Public School. The total contributing area of the development to drainage and stormwater controls is then as follows:

- Site Area – 17.612 hectares (to be developed, including open space)
- Kanangra Drive frontage – 0.728 hectares (external catchment)
- Gwandalan Public School – 2.50 hectares (external catchment)

Hence, the total contributing area across the site to be developed is 20.84 hectares.

Section 4.0 Background Information

The following documents have been used to complete the engineering design requirements:

- Subdivision Concept Plan, Conybeare Morrison International Pty Ltd, Ref 07020 A3 SK 109, Issue B, dated 27 November 2007.
- Engineering Report for Residential Development – Stormwater Management, Concept Engineering Design and Services, 11778/Version 3, August 2007, Asquith & deWitt.
- Geotechnical Investigation, Lot 3 Kanangra Drive, Gwandalan by RCA Australia, Report No. 3438-003/0, August 2003
- "*Stormwater Management Plan for the Residential Rezoning of Lot 3 DP 588206, Kanangra Drive, Gwandalan*", Report No. 1803/R02/V2, dated May 2004, Umwelt (Australia) Pty Limited. (Rezoning report)
- Wyong Shire Subdivision – Development Control Plan No. 66.
- Wyong Shire Wetland - Development Control Plan No 30.
- Wyong Shire Engineering Requirements for Development - Development Control Plan No. 67.
- Wyong Shire Quality Housing - Development Control Plan No. 100.
- Wyong Shire Council's Stormwater Management Plan "Urban Stormwater Quality Management Plan for the Tuggerah Lakes and Coastal Catchments, Wyong Shire Council – July 1999."
- Wyong Council – WSUD DA Process Tools, Draft Prepared by Ecological Engineering, dated June 2007.
- Flood Levels for Lake Macquarie provided by Wyong Shire Council.
- "*Managing Urban Stormwater Soils and Construction*" 4th Edition, Volume 1, March 2004 produced by Landcom (Blue Book).
- Wyong Shire Council - Development Servicing Plan No. 12 Water Supply and Sewerage, The Gwandalan District.
- "*Managing Urban Stormwater: environmental targets*" – Consultation draft – October 2007, Department of Environment & Climate Change NSW.

The Australian Rainfall and Runoff (AR&R) Intensity Frequency Duration (IFD) Data used for this study was obtained from Wyong Shire Council's Engineering Requirements for Development – DCP No. 67. Appendix G contains Rainfall Intensity Table for Gwandalan. AR&R (1987) was referenced to generate the intensities for durations greater than one hour.

Section 5.0 Stormwater Requirements

Council's development control plans covering stormwater requirements for development have been reviewed. The stormwater requirements include peak flow attenuation, regional flooding and water quality, described in **Sections 5.1** to **5.3** respectively. The remaining stormwater requirements for wetlands and watercourses are covered in **Sections 5.4** and **5.5**.

5.1 PEAK FLOW ATTENUATION/FLOODING

Council requirements for peak flow attenuation are that the post development peak flows be less than the existing flows for all storm events up to and including the 1:100 year ARI storm event. DCP No. 67 requires the post development peak flows to be modelled with a minimum value of 50% impervious area for standard residential development and 70% for medium to high density residential development. To be conservative, the post development peak flows from the site post development have been remodelled with 70% impervious area with no allowance for rainwater tanks, refer to **Section 6.1**.

5.2 REGIONAL FLOODING

DCP No. 100 specifies an elevation of 2.7 mAHD to be the minimum floor level for residential development. In general, the floor level is required to have a minimum freeboard of 0.3 metres above the 1:100 year ARI flood level. If underground mine workings have taken place below or adjacent to the site, then additional freeboard may be necessary. Identification as to whether the site is affected by underground workings can be verified with the Mines Subsidence Board.

The Rezoning report states that Council has provided peak flood levels for Lake Macquarie. The flood levels are as follows:

- 1:20 year ARI – 0.97 mAHD;
- 1:50 year ARI – 1.24 mAHD;
- 1:100 year ARI – 1.38 mAHD; and
- PMF – 2.63 mAHD.

The highest observed flood level for Lake Macquarie is 1.2 mAHD in 1949.

From the flood level information provided, it appears that the minimum floor level from DCP No. 100 of 2.7 mAHD has been set to be above the Probable Maximum Flood (PMF) level for Lake Macquarie.

5.3 WATER QUALITY

Council has a range of water quality requirements for the improvement of runoff from proposed development prior to discharge from the site. This includes a requirement for control of water quality during construction, and also performance targets for the permanent controls to be installed for the ongoing improvement of stormwater runoff for the life of the development. This requirement is summarised in Section 7.16 of DCP No. 67, which reads as follows:

> *"All developments in the Shire shall ensure that stormwater discharge from the site satisfies environmental requirements by way of restricting increases in pollutants during and post construction."*

More specifically, the requirements for water quality control during construction are to be in accordance with the 'Blue Book', refer to **Section 6.3**. Requirements for the permanent controls for proposed development are contained in Wyong Shire Council's Stormwater Management Plan (SMP) "Urban Stormwater Quality Management Plan for the Tuggerah Lakes and Coastal Catchments, Wyong Shire Council – July 1999". Chapter 6.1.1 of the SMP outlines the stormwater performance objectives for new development. From Table 6.1.1a, the stormwater performance criteria for 'Subdivisions' are specified as follows:

- Suspended Solids - 90% retention of the annual load. *[Assume to be the Developed annual load with no controls].*
- Nutrients - 50% reduction in annual loads (Total Nitrogen and Total Phosphorus).
- Litter - retain material greater than 50 mm from 25% of the 1 year ARI flow.
- Coarse sediment – retain particles greater than 125µm in diameter from 25% of the 1 year ARI flow.
- Hydrocarbons – no visible oils and greases in discharge from 25% of the 1 year ARI flow.

The above Council requirements exceed the most recent requirements by DECC, which are currently exhibited as a consultation draft. "Managing urban stormwater: environmental targets - Consultation Draft 2007" produced by DECC also provides targets for pollutant removal.

DECC targets are as follows:

- *90% reduction in the average annual gross pollutant load*
- *85% reduction of average annual total suspended solids load;*
- *65% reduction in the average annual total phosphorus load;*
- *45% reduction in the average annual total nitrogen load.*

On a development lot basis, each lot purchaser will be required to comply with DCP 100 for the construction of a dwelling. DCP 100 requires a rainwater tank with a minimum capacity of 5 KL is to be installed with each new dwelling. This exceeds the water reuse requirements for compliance with BASIX for new dwellings. The requirement is to increase water reuse potential by stormwater harvesting, reducing the mains water supply use. The additional benefit of a rainwater tank is the capture of roof water as an incidental 'at source' control for the improvement of water quality. The additional roof water runoff captured minimises the potential of pollutant entrainment and reduces the load on stormwater infrastructure downstream.

MUSIC (Model for Urban Stormwater Improvement Conceptualisation) is the most appropriate and current water quality model available to demonstrate that all requirements have been met. MUSIC was used in the water quality calculations for the Rezoning report. However, since that time, Council has new draft guidelines specifying the base parameters to be used. The guidelines are WSUD DA Process Tools. The modelling of the stormwater treatment train to meet these requirements, is described further in **Section 6.2**.

5.4 DCP NO. 30 - WETLANDS

As discussed in the Rezoning report, the site has been mapped by Council to contain a Wetlands Development Control Plan area at the base of the site. This area is predominantly pasture. It is not clear how the defined area in DCP No. 30 has been determined, since a large portion of the defined area has been pasture for approximately 20 years, and is the same as the adjacent surrounds. Refer to **Sheet 001** of **Appendix A**. From Table 1 of DCP No. 30, the identified area has the following treatment implications:

- **Level of Significance** – Local.
- **Role of Policy** – To ensure that wetland remnants, wetland buffers and lands of nutrient and sediment filtering value are properly protected.
- **Information to be submitted with Development Application** – Statement of Environmental Effects.
- **Consent Authority** – Department of Planning.

The proposed development area is generally clear of the wetland development control plan area mapped by Council. Dam 2, an existing farm dam, is within this area and will be modified and extended to be a constructed wetland.

In summary, the requirements from DCP No. 30 for this area of the site are as follows:

- make the wetland a feature for surrounding residents;
- provide wetland habitat and corridors for continuity;
- use indigenous species for revegetation; and
- maintain sediment and nutrient filtering value.

In accordance with the DCP requirements, Dam 2 will be extended and enhanced to become a feature of the site whilst maintaining sediment and nutrient filtering value in the form of a constructed wetland. Compliance with this requirement is described in **Section 7.3**.

5.5 WATERCOURSES

The management of existing watercourses is regulated by the Department of Water and Energy (DWE). The definition of a watercourse is generally characterised by defined bed and banks with associated riparian vegetation, conveying stormwater from a reasonable catchment area and maintaining continuity with an existing drainage area.

In the south eastern corner of the site area to be developed, a catchment of approximately 2 hectares of the school and existing residential development has discharged concentrated runoff to a gentle depression. The depression originally had no defined bed or banks. The concentration of stormwater and increased runoff has scoured a small creek line into the depression. As a result there is no riparian vegetation associated with the creek line that has been created. From this sequence of events it is considered that the scoured creek line has little or no habitat value to preserve. However, this area has been left as open space, undeveloped, which is a key difference between the layouts for Version 3 and 4 of stormwater reporting. Refer to **Sheet 001** of **Appendix A**.

As described in **Section 2.0**, there are six (6) main existing dams on site. The dams have been influencing flows on the site for sufficient time to be part of the existing flow regime for the site. The Rezoning report describes these links as grassed, dry overland links between the upper dams. The dry overland flow links have no defined bed and banks or associated riparian vegetation. Refer to **Sheet 001** of **Appendix A**.

Section 6.0 Stormwater Management Strategy

The stormwater management strategy for the development of the site is a water sensitive urban design solution adopting current best management practices. In order to meet Council's stormwater requirements for the development of the site as a residential development, it will be necessary to address the issues raised in **Sections 5.1** to **5.4**. Watercourses have been addressed in **Section 5.5**.

The key considerations for the strategy are:

- conveyance of stormwater through the development of the site;
- water quality treatment of stormwater from the development of the site;
- peak flow attenuation of stormwater from the development of the site;
- conveyance of stormwater from the existing surrounds through the site;
- enhancement of the Wetlands Development Control Plan area;
- extent of the regional 1:100 year ARI flood level from Lake Macquarie;
- discharge of stormwater to the lake; and
- Erosion and Sediment Control during construction of the development.

Dam 2 will be retained within the treatment train for the stormwater management strategy. This dam will be reinstated as a constructed wetland at the base of the proposed development. The treatment train will be discussed further in **Sections 6.1** and **6.2**.

6.1 PEAK FLOW MODELLING

The peak flows and flood levels for the 1:100 year ARI rainfall event for the site and contributing catchments were modelled using XP-STORM in the Rezoning report. The post development peak flows were remodelled in Version 3, also using XP-STORM, to reflect the changes to the development layout. The peak flows were modelled on the basis of the modelling parameters from the Rezoning report.

Considering that only the 1:100 year rainfall event is being evaluated for peak detention storages, there has been no further peak flow modelling undertaken for development layout changes between Versions 3 and 4 of the stormwater reporting. This is because it is anticipated that there will be only minor reduction to the peak flows simulated in Version 3. The result is anticipated due to a slightly reduced impervious area in the revised development layout. As a result, the detention storage volume calculated in the modelling to follow for the Version 3 layout will be overestimated by comparison to the detention storage requirements for the revised, current layout for Version 4.

XP-STORM is a one-dimensional hydrodynamic model suitable for modelling peak flows. The XP-STORM model can be used to model stormwater flows in watercourses, culverts and conventional street drainage systems. The model is suitable to calculate overland runoff generated from large natural or developed catchments. The model also has the capacity to predict flood levels as a result of backwater effects. These capabilities indicate that the XP-STORM model is suitable to determine the peak flows and flood levels for the catchment.

The equation used in the XP-STORM model analysis was the Laurenson Equation, that is:

$$S = BQ^{n+1}$$

Where, S = volume of storage (m^3/s)

B = Storage Delay Parameter,

Q = instantaneous rate of runoff (m^3/s),

n = -0.285.

Table 7.2 of the Rezoning report shows that the modelled peak flow for the 1:100 year ARI rainfall event measured at the outlet of the site to Lake Macquarie is 8.25 m^3/s for a critical storm duration of two hours.

Since the extent of development will be less than stated in the Rezoning report, the location for comparison of sufficient peak flow attenuation has been amended. The new location is immediately downstream of the extent of development. The existing peak flow for the 1:100 year ARI rainfall event, measured to the extent of development, is 6.21m^3/s for a critical storm duration of two hours.

Post development peak flows from the overall development were modelled on the assumption of a 70% impervious component for each lot with no allowance for rainwater tanks on the future dwellings. Subcatchments of the model have been weighted to include the open space area as pervious area. The road reserves have been modelled as being 53% impervious. A 30% impervious component has been assumed over the school area, which also contains some existing residential catchment area.

A range of storm durations were simulated to determine the critical storm duration for the overall catchment producing the peak flow from the 1:100 year ARI rainfall event. This is consistent with the approach modelled for the Rezoning report. The simulated developed peak flows measured at the extent of development are presented in **Table 1**.

Table 1 - Storm Durations and Developed Flows for the 1:100 year ARI Rainfall Event

Storm Duration (hours)	0.5	0.75	1	1.5	2	3	6
Peak Flow (m^3/s)	9.13	8.53	9.07	9.21	9.17	6.50	4.21

Table 1 shows that the modelled peak flow for the 1:100 year ARI rainfall event for the developed catchment, with no controls, measured at the extent of development is 9.21 m^3/s for a critical storm duration of 1.5 hours. The results indicate that peak flow attenuation is required in order to comply with Council requirements.

Council requires demonstration by modelling that the post development peak flows will be less than the existing flows for all storm events up to and including the 1:100 year ARI storm event. In order to comply with these requirements, peak flows will be attenuated by detention storage, within Dam 2, the dam to be reinstated as a constructed wetland at the extent of development.

As before, a range of storm durations were simulated for peak flow attenuation to determine the critical storm duration for the main catchment producing the peak flow from the 1:100 year ARI rainfall event. The simulated developed peak flows with attenuation controls measured at the extent of development, outlet of Dam 2 are presented in **Table 2**.

Table 2 - Storm Durations and Developed Flows with Peak Flow Attenuation for the 1:100 year ARI Rainfall Event

Storm Duration (hours)	0.5	0.75	1	1.5	2	3	6
Peak Flow (m^3/s)	5.82	5.74	6.05	6.07	6.17	5.43	4.20

Table 2 shows that the modelled peak flow for the 1:100 year ARI rainfall event for the developed catchment, with attenuation controls and measured at the outlet of the site to Lake Macquarie is 6.17 m^3/s for the critical storm duration of two hours. Modelling indicates that the detention storage required is approximately 2800 m^3. The peak flow from the developed site with this storage is less than the existing peak flow of 6.21 m^3/s.

The detention storage required for peak flow attenuation is described above as approximately 2800 m^3. This is conservative, over estimated to define area requirements for the concept design of the constructed wetland. This is equivalent to a depth of approximately 0.9m over the surface area of the constructed wetland after enlargement of Dam 2. Commencement of storage capacity for detention is above the surcharge level for water quality control.

There will be opportunity to reduce the detention storage requirement from 2800m^3 by detailed design. In particular, piped drainage controls for detention control of runoff from minor storm events will enable this peak storage level to be reduced. Furthermore, there may be opportunity to consider a portion of the void space available in the rainwater tanks of the future dwellings. It is a requirement that the tanks are connected to indoor uses such as toilet flushing and laundry uses. This indoor connection provides a regular and reliable drawdown of the water stored in the tank. As a result, there is space available in each tank to reduce the level of storage required for detention in the constructed wetland. This will be subject to detailed design.

The modelling completed to date is conceptual only, and has been undertaken to demonstrate that peak flow attenuation requirements for the proposed development can be met within the development layout for the major design storm up to and including the 1:100 year ARI storm event. The 1:100 year ARI storm event typically has the largest runoff storage requirements for peak flow attenuation of all storm events. Design of the outlet controls will be required to evaluate the smaller storm events at the detailed design stage of the development, to refine the design and sizing of the constructed wetland to service the development. As described above, this is also an overestimate for the revised, current layout.

6.2 WATER QUALITY MODELLING

As discussed in **Section 5.3**, MUSIC has been used to design and size the permanent water quality controls for the runoff from the proposed development and demonstrate compliance with Council's SMP water quality performance objectives. A treatment train of water quality controls was established and evaluated for effectiveness using MUSIC Version 3. In this version, Version 4, the catchments were modified to reflect the changes to the development layout.

In addition to the water quality treatment for the runoff from the site post development, contributing runoff from external catchments of the Public School area and Kanangra Drive external to the site will also be treated as was previously modelled for Version 3. The total contributing catchment area modelled is approximately 20.84 hectares.

The first control of the treatment train will be the rainwater tanks for each dwelling within the site post development. Although the effect of these tanks has not been modelled, rainwater tanks reduce pollutant entrainment potential, as discussed in **Section 5.3**. The second stage will be perimeter swale drainage. The third stage will be a gross pollutant trap. Gross pollutant traps are for the capture of litter and heavy sediment. There are several proprietary products available that can be installed to meet the removal targets set in Council's SMP. The fourth stage of treatment is Dam 2, which will be reinstated as a constructed wetland. Constructed wetlands provide effective removal of Total Suspended Solids, Total Nitrogen and Total Phosphorus. A diagrammatic representation of the treatment train is shown in **Appendix B**.

The proposed development is now a separable parcel at the upslope end of the site. As such, the proposed development has been modelled to the discharge point from Dam 2, rather than the outlet of the site that was modelled in the Rezoning Report.

The following key parameters, generally in accordance with Council's WSUD DA Process Tools, were adopted:

- Rainfall – Since 6min rainfall data is not available for the site or a station within Council's region, Council's guidelines recommend that 6min rainfall data be used from Sydney Observatory Hill over a 20 year period. A parallel is drawn in the guidelines that on the basis of mean annual rainfall, the data from this station is close to the mean annual rainfall of 1184mm from Wyong Bowling Club. A simulation period of 30 years for the period 1931-1960 was used in this model from Sydney Observatory Hill, on the basis of 6min rainfall data. This period produced a mean annual rainfall of 1193mm which is closely equivalent to the mean annual rainfall from Wyong Bowling Club.

- Soil Characteristics – 'Lowland' characteristics described in Council's document were used in the model.

- Road catchments were separated, in the model, from urban areas, for application of the different pollution generation rates. Urban areas were modelled as 70% impervious and roads as 53% and 61% impervious for the access street and the bus route respectively. The laneway was assumed to be 100% impervious. Note that no

allowance has been made in this modelling for the effect of a 5KL rainwater tank on each lot, as required by Council. Subcatchments were weighted to include the open space areas as pervious areas. The school/existing residential area catchment was treated as 30% impervious.

- Swale drainage treatment nodes have also been entered into the model before outlet to the wetland. These swales will be shallow, taking low flows from road areas only. Refer to **Sheets 101-103** of **Appendix A**.

- Treatment node parameters for the swale, gross pollutant trap and constructed wetland were adopted directly from Council's document.

- A detention time of 73hrs was used for the constructed wetland, marginally above Council's requirement of 72hrs. A seepage rate of 2.5mm/hr was adopted from the geotechnical report. This was a conservative estimate, lower than the rates anticipated. It has been preferred to leave the size of the constructed wetland unchanged from Version 3. This will exceed requirements for Version 4, due to the extent of impervious area being reduced.

The remodelling of the nutrients from the site post development, and the inclusion of the external catchments for treatment train effectiveness of the water quality controls are shown below in **Table 3**.

Table 3 – Water Quality Modelling Results from MUSIC

Pollutant	Development No Controls 'A'	Development with Controls 'B'	Treatment Train Effectiveness (%)	Treatment Train Effectiveness Requirements (%)	
				Council	DECC
Total Suspended Solids (kg/year)	32,700	3,070	**90.6**	90	85
Total Phosphorus (kg/year)	59.3	15	**74.7**	50	65
Total Nitrogen (kg/year)	411	183	**55.5**	50	45

The modelling results in **Table 3** indicate compliance with the SMP performance objectives from **Section 5.3**. **Table 3** shows that the developed pollutant loads have been improved by 90.6%, 74.7% and 55.5% for TSS, TP and TN respectively with the water quality controls in place.

The outcomes of the water quality modelling for the revised development layout indicate that the constructed wetland sized for Version 3, with a surface area of $3000m^2$ and volume of $2200m^3$ exceeds requirements. This will be accommodated at the base of the proposed development by extending Dam 2 to be reinstated as a constructed wetland. All treatment for the proposed development is contained to the swale, GPT and Dam 2 as a constructed wetland, with sufficient water quality and detention controls for the proposed development. Since there is significant area available for this wetland, only a concept sketch of the area requirements is provided. Final detailed design of the constructed wetland for the configuration of the shallow water and deep water zones will be undertaken for the Construction Certificate. Refer to **Sheet 502** of **Appendix A**.

6.3 SOIL AND WATER MANAGEMENT PLAN

Erosion and sediment control, described in a Soil and Water Management Plan is necessary during construction for the protection of receiving waters downstream. Erosion and sediment control measures are temporary, and are required until such time that building and construction areas are landscaped, revegetated and sealed. As described in the Rezoning report, Council generally requires sedimentation dams to be constructed for areas of disturbance greater than two (2) hectares. At this site there are five (5) main existing dams that could be used for erosion and sediment control during construction of each stage.

From the Geotechnical Investigation by RCA states that the soils are a mixture of Type F and Type C. As a result, the sediment basin has been designed for settlement of Type F soils. To be conservative, allowance has been made for disturbance of the overall development, however, the development will be constructed in a series of stages. An overall sediment basin, sized in accordance with "*Managing Urban Stormwater Soils and Construction*" (Blue Book) 4th Edition, Volume 1, March 2004 produced by Landcom, would be approximately $3854m^3$. This sediment basin quantity however would be distributed between the existing dams allocating approximately $770m^3$ per basin and to suit staging. Refer to **Appendix C** for calculation. Refer to **Sheet 601** of **Appendix A**.

Section 7.0 Additional Drainage Requirements

7.1 DRAINAGE FLOWPATHS

In addition to the peak flow attenuation and water quality requirements, stormwater management is required to manage peak flows to be passed safely through the development site. These flows will be conveyed by pathways and roads above piped drainage lines. Energy dissipation will be required at the end of the swales as an inlet structure to the constructed wetland. Refer to **Sheet 502** of **Appendix A.**

The drainage flowpaths, pipes and energy dissipation structure will be sized for the Construction Certificate at the detailed design stage.

In the north west corner of the proposed development, piped drainage will be used to contain runoff from hardstand areas entering the PWS&RC property. A low point in Road 1 at this location is unavoidable, however piped drainage can be constructed for control of runoff collected in the low point and returned to the piped street drainage for discharge to the treatment system. The piped drainage will be designed for capacity of runoff from the 1:5 year ARI storm event, in accordance with Council requirements. Flows in excess of this capacity from larger events, will continue to discharge from the site into the gully within PWS & RC. Refer to **Sheet 101** of **Appendix A.**

There is an existing low point in Kanangra Drive. The low point is on a localised topographical saddle with only half road draining through the site during rainfall events adjacent to the existing entry. As described in Section 2.1, the catchment does extend up to the intersection with Orana Road. This low point has been accommodated for within the design. Refer to **Sheet 102** of **Appendix A**.

The flowpath connection to Lake Macquarie should also be maintained. Dam 2, to be reinstated as a constructed wetland for the proposed development, overflows to Dam 1. Overflows from Dam 1 discharge to the existing harbour. Although Dam 1 is not required for water quality for the development, the existing harbour is the site discharge point and this is currently blocked and silted over. The existing 1:100 year ARI peak flow from the site is 8.25m^3/s. This peak flow should be controlled discharge to Lake Macquarie through the existing outlet. Detailed design for the reshaping of the harbour entrance to pass this peak flow safely should be undertaken. This will be to prevent potential inundation of major storm event flows toward the existing residence and/or uncontrolled discharge through the PWS&RC property. Refer to **Sheet 001** of **Appendix A.**

7.2 FILLING

Council's minimum floor level for development is 2.7 mAHD. The lowest existing ground elevation level within the proposed development area is a level of approximately 4mAHD, within proposed lots 95 and 113. Minor filling is required for the road at this location. This existing ground elevation is well above the 1:100 year ARI peak flood level for Lake Macquarie of 1.38 mAHD. Areas of regrade are described in **Section 8.0**. Refer to **Sheet 102** of **Appendix A.**

7.3 WETLAND DEVELOPMENT CONTROL PLAN AREA

The Wetlands Development Control Plan area in the lower section of the site, as described previously in **Section 5.4,** is predominantly pasture. In accordance with DCP No. 30, the defined area should be a feature for surrounding residents, and be designed to provide nutrient controls for the protection of Wetland Areas (7g) or SEPP 14 areas. At this site, the water quality/nutrient control is for the protection of Lake Macquarie. Dam 2, within the wetland development control plan area, will be reinstated as a constructed wetland. Dam 2 is an old farm dam, not providing any ecological function or feature or standardised nutrient control other than capacity. The reinstatement will involve landscaped enhancement of Dam 2 to be a feature wetland, meeting Council's requirements. The constructed wetland has been sized accordingly for water quality improvement prior to discharge to Lake Macquarie. Refer to Refer to **Sheets 001 & 502** of **Appendix A.**

Section 8.0 Concept Civil Design

The concept civil design for the proposed development has been completed to Council standards. This includes the standard for road widths and grades. The two (2) road reservation widths adopted within the proposed development are 22 metres wide for the bus route 'loop road' and 16.5 metres wide for the access streets. The 'loop road' provides for turning of the school bus. At present there is no provision for bus turning manoeuvres along Kanangra Drive or at the school. The overall road reservation width is in accordance with Council's standard, however, the streetscape of the carriageway, verge and concrete footpaving within the road reserve has been modified. Refer to **Sheet 701** in **Appendix A**.

The carriageway width proposed for the bus route will be 11 metres wide in accordance with Council's standard. The carriageway width for the access streets has been widened to 7.5 metres from Council's standard of 5.5 metres. The widened carriageways of both the access street and entry roads are to accommodate parking within the carriageway. Concrete footpaving 1.2 metres wide has been adopted for both sides of the bus route and one side of the access street. Refer to **Sheet 701** in **Appendix A**.

The verge widths of the bus route and access streets have been modified from Council's standard. The verge of the bus route is to accommodate swale drainage at the base of the proposed development. This is accommodated within a verge width of 7 metres. The remaining verge width of the bus route is 4 metres. The access streets have been further modified to alternate between 3 metre and 6 metre verge widths either side. This is to allow for the carriageway to be variable from the centreline of the road reserve. The 1.2 metre wide concrete footpaving remains within the 6 metre wide verge. Refer to **Sheets 101-103 & 701** in **Appendix A**.

The maximum longitudinal grade of the bus route is along the northern boundary. After preliminary grading of the road alignments, the maximum grade for the bus route is 11%. This is less than Council's maximum grade of 14% for a bus route. Road 3 contains the steepest section for an access street, which is 15%, in compliance with the maximum permissible longitudinal grade for an access street of 15%. Refer to the longitudinal sections in the engineering plan set.

It is proposed to provide upright kerb and gutter and shoulder works of half road construction to Kanangra Drive. This is to provide an 11 metre wide carriageway for Kanangra Drive as a bus route loop. Half road drainage from Kanangra Drive will also be accommodated within the proposed development. Refer to **Sheets 501 & 701** in **Appendix A**.

A laneway has been indicated for access to lots fronting Kanangra Drive. The carriageway of the laneway will be 5 metres wide, one way crossfall with kerb and gutter to one side only. An edge restraint will be used for the upslope edge of the carriageway side. Refer to **Sheet 701** in **Appendix A**.

Preliminary staging of the development has been indicated on **Sheet 001** of **Appendix A**. Erosion and sediment control, water quality and peak flow attenuation can be easily accommodated to suit the proposed staging.

There are areas of the site requiring regrade. This includes the cut through the workings of the derelict quarry that has significantly modified the landform in this area. Adjacent to the northern boundary there is a relatively steep section which has been overcome with tiered retaining walls, each one (1) metre high. This is to improve driveway access to the lots on the southern side of the road and minimise site regrade. Generally site regrade has been shown where the top of batter encroached beyond the building setback. Regrade has been designed with a maximum elevation of one (1) metre above the boundary level. This is to accommodate future driveway access. Refer to **Sheets 101-103** and **Sheet 701** in **Appendix A**.

It is unlikely that fill materials will be required to be imported to site, other than standard gravel materials of subbase and basecourse for road pavement construction. The regrade of the derelict quarry area will produce sandstone that can be reused on site for filling (dams, etc) and also subgrade replacement for road construction if unsuitable subgrade is found during construction. Conventionally this would be imported material for subgrade replacement however the development of this site will be self sufficient for this replacement material. The concept civil design indicates that at this preliminary stage, there will be a net balance of cut to fill on site, with no import or export of material.

Section 9.0 Services

Council has been contacted in relation to water and sewer servicing of the site. Development Servicing Plan No. 12 Water Supply and Sewerage – The Gwandalan District (DSP No. 12) was obtained from Council. This document covers water and sewer servicing for the area.

An existing sewer access chamber is located within the site. DSP No. 12 has provision for an additional 250 lots on our site. This is in excess of our development proposal to create 214 lots over the site. Correspondence with Council officers was obtained for the capacity of the system and to obtain work programs for upgrades. This has assisted with determining staging and costs to upgrade sewer infrastructure external to the site as 'works in kind' in accordance with DSP No. 12. Refer to **Sheet 702** of **Appendix A**.

In accordance with DSP No. 12, lead in water reticulation will be constructed to the site frontage along Cams Boulevarde as 'works in kind'. Provision has been made within DSP No. 12 for the lead in mains to cover bushfire requirements along Kanangra Drive. Refer to **Sheets 702** of **Appendix A**.

Water and sewer reticulation servicing of the development will be designed over the revised layout at the detailed design stage of development.

Energy Australia has been previously contacted for electrical servicing of the development. There is existing high voltage supply (11kV) at the site frontage and nearby adjoining existing residential development. The standard procedure of electrical feasibility design by Energy Australia will be required following acceptance of the proposed development layout.

Section 10.0 Compliance Checklist

The DGRs listed in **Section 1.0** have been addressed. From **Section 6.0**, the key considerations for the design of the stormwater management system have been addressed as follows:

- conveyance of stormwater through the development of the site (**Sections 6.1, 6.2 & 7.1**);
- water quality treatment of stormwater from the development of the site. The constructed wetland at the base of the site sized for Version 3 has remained unchanged. This basin size slightly exceeds the minimum size required for DECC and Council compliance based on servicing the revised, current layout. (**Section 6.2**);
- peak flow attenuation of stormwater from the development of the site – detention storage has remained unchanged from the size determined for Version 3. This is an overestimation of the detention storage required for the revised, current layout (**Section 6.1**);
- conveyance of stormwater from the existing surrounds through the site (**Section 2.1, 3.0, 6.1, 6.2 & 7.2**);
- enhancement of the Wetlands Development Control Plan area (**Section 7.3**);
- extent of the regional 1:100 year ARI flood level from Lake Macquarie (**Section 7.2**);
- discharge of stormwater to the lake (**Section 6.1, 6.2 & 7.1**); and
- Erosion and Sediment Control during construction of the development (**Section 6.3**).

In addition to meeting Council's requirements, the stormwater management strategy is a water sensitive urban design. This is because there are key treatment train components targeting specific water harvesting and improvement of water quality. The added benefit to the community in terms of stormwater is that the development will provide treatment and control for runoff from Kanangra Drive and the public school, an area of approximately 3.23 hectares, that is presently untreated discharge to Lake Macquarie. This will be a positive impact on the water quality of discharge from the site. There is significant area available for the constructed wetland which will also be a wetland habitat area, providing water quality/nutrient control prior to discharge to Lake Macquarie.

Concept civil design has revealed that the site can be developed within acceptable grades for roads and lots.

Servicing of the development for water and sewer is available as part of proposed works within Council's servicing document DSP No. 12 for the Gwandalan District. Electrical reticulation is also available to the site frontage for servicing the development.

Appendix A – Selected Concept Engineering Plans

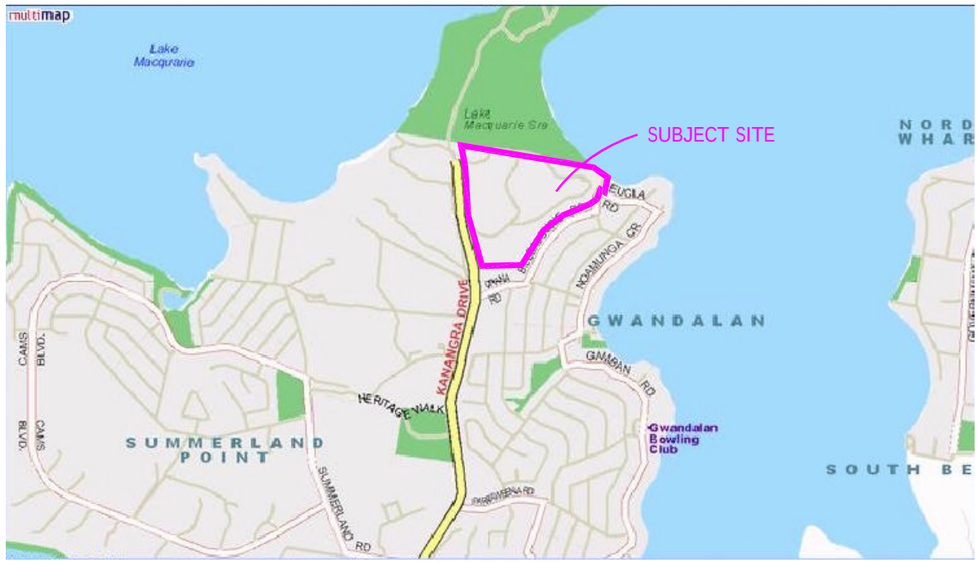
CONCEPT CIVIL ENGINEERING DESIGN PLANS FOR PROPOSED RESIDENTIAL SUBDIVISION

KANANGRA DRIVE, GWANDALAN
WYONG SHIRE COUNCIL

ASQUITH & deWITT PTY LTD
SURVEYING, PLANNING, MAPPING
PROPERTY DEVELOPMENT MANAGERS

CLIENT: ROSE PROPERTY GROUP PTY. LTD.

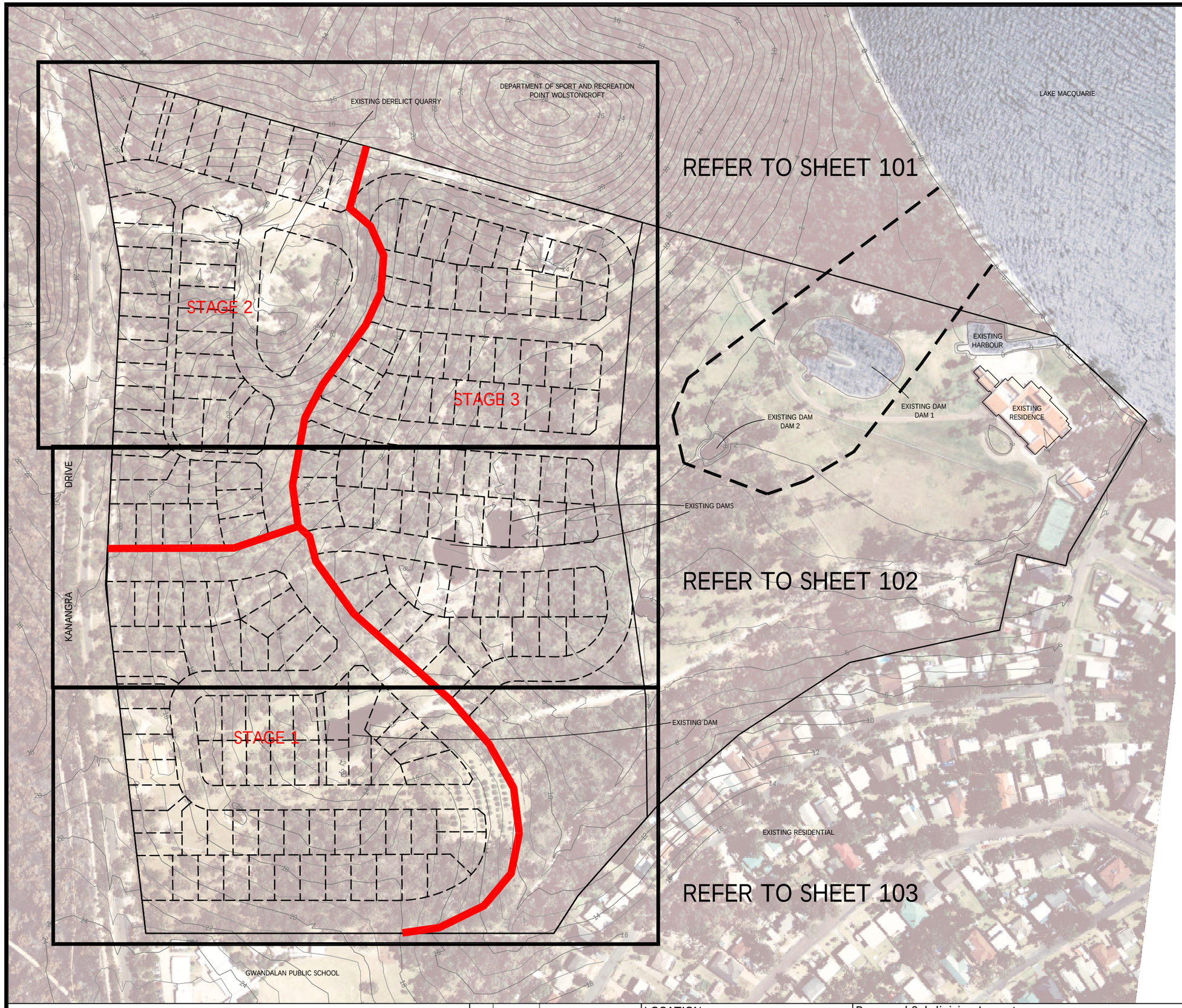
ROSE
Creating a quality way of living



LOCALITY PLAN
(FROM MULTIMAP)

AutoCAD File: N:\11778\Dwg\Eng\11778eng-3d

SHEET	SHEET TITLE	VER.
000	TITLE SHEET, INDEX, LOCATION DIAGRAM & GENERAL NOTES	
001	PROPOSED SUBDIVISION LAYOUT	D
101	DETAIL PLAN 1	D
102	DETAIL PLAN 2	D
103	DETAIL PLAN 3	D
201	LONGITUDINAL SECTION - KANANGRA DRIVE	D
211	LONGITUDINAL SECTION - ROAD 1 (CH.-15.19 - 314.81)	D
212	LONGITUDINAL SECTION - ROAD 1 (CH.314.81 - 644.81)	D
213	LONGITUDINAL SECTION - ROAD 1 (CH.644.81 - CH.921.29)	D
221	LONGITUDINAL SECTION - ROAD 2	D
231	LONGITUDINAL SECTION - ROAD 3	D
241	LONGITUDINAL SECTION - ROAD 4	D
251	LONGITUDINAL SECTION - ROAD 5	D
261	LONGITUDINAL SECTION - ROAD 6 (CH.0 - CH.330)	D
262	LONGITUDINAL SECTION - ROAD 6 (CH.330 - CH.593.43)	D
271	LONGITUDINAL SECTION - ROAD 7	D
281	LONGITUDINAL SECTION - ROAD 8	D
291	LONGITUDINAL SECTION - ROAD 9	D
501	STORMWATER CATCHMENTS	D
502	CONSTRUCTED WETLAND	D
601	SOIL AND WATER MANAGEMENT	D
701	TYPICAL SECTIONS	D
702	LEAD-IN WATER MAIN AND SEWER SERVICING	D



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LEGEND

- SITE BOUNDARY
- PROPOSED BOUNDARY
- MAJOR NATURAL CONTOUR
- MINOR NATURAL CONTOUR
- WETLAND DEVELOPMENT CONTROL PLAN AREA
- STAGE BOUNDARY

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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Proposed Subdivision Layout

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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Original Size A1

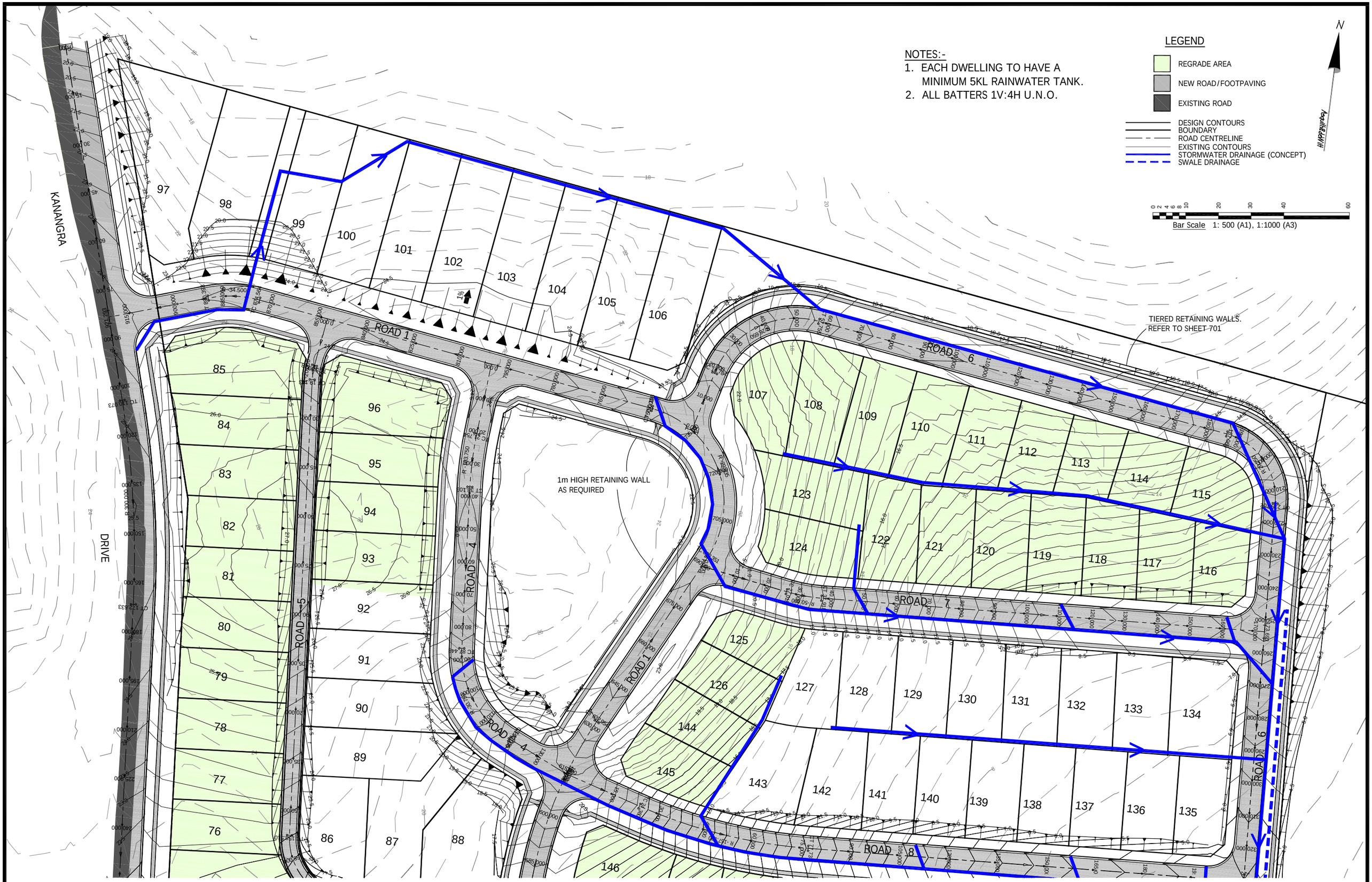
Sheet 001

NOTES:-
1. EACH DWELLING TO HAVE A MINIMUM 5KL RAINWATER TANK.
2. ALL BATTERS 1V:4H U.N.O.

LEGEND
- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD
- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE

N

Bar Scale 1: 500 (A1), 1:1000 (A3)



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LOCATION

KANANGRA DRIVE, GWANDALAN

Detail 1

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
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Job No:	11778

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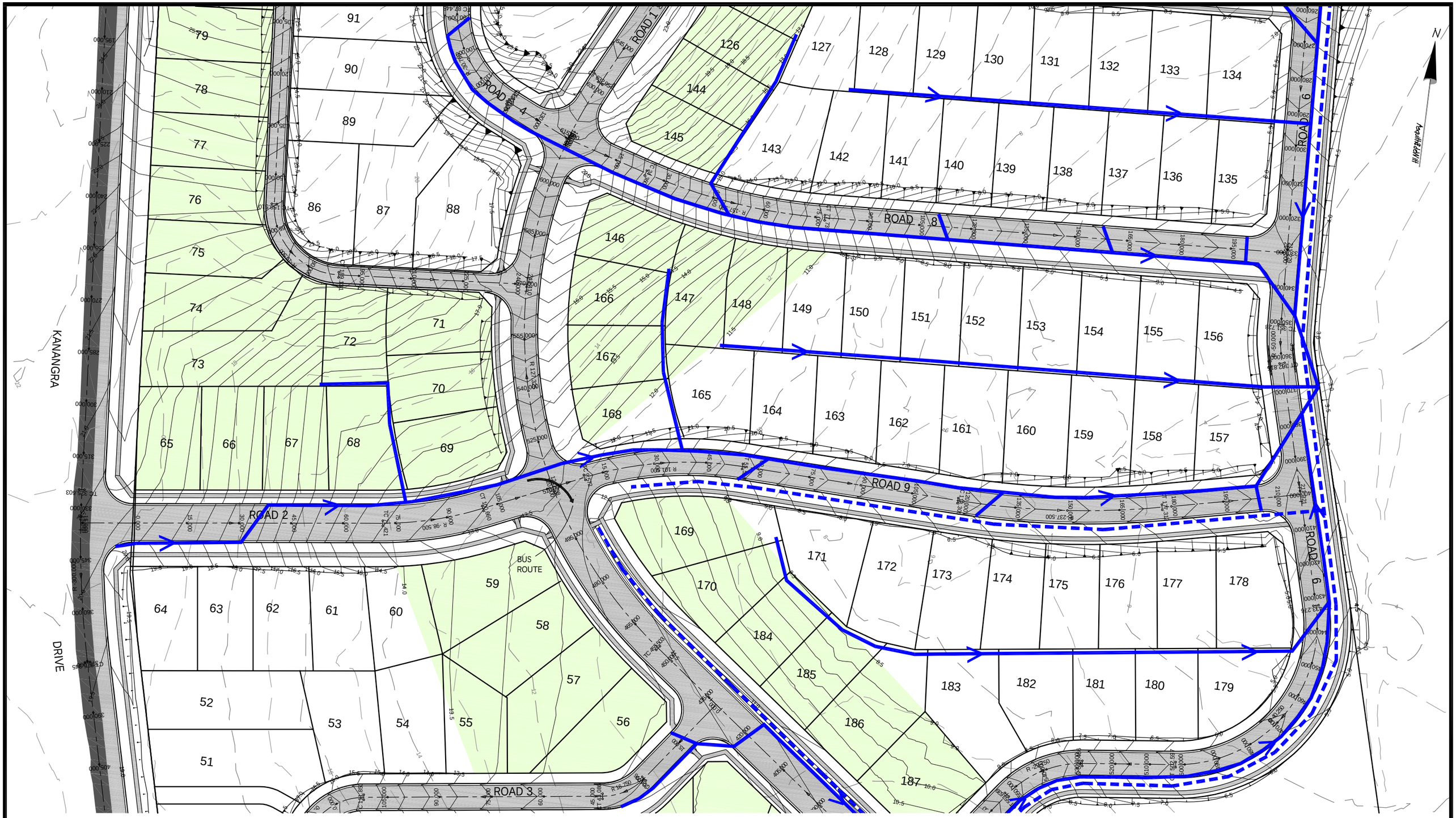

LEGEND

- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE
- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD

NOTES:-

1. EACH DWELLING TO HAVE A MINIMUM 5KL RAINWATER TANK.

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KANANGRA DRIVE, GWANDALAN

Detail 2

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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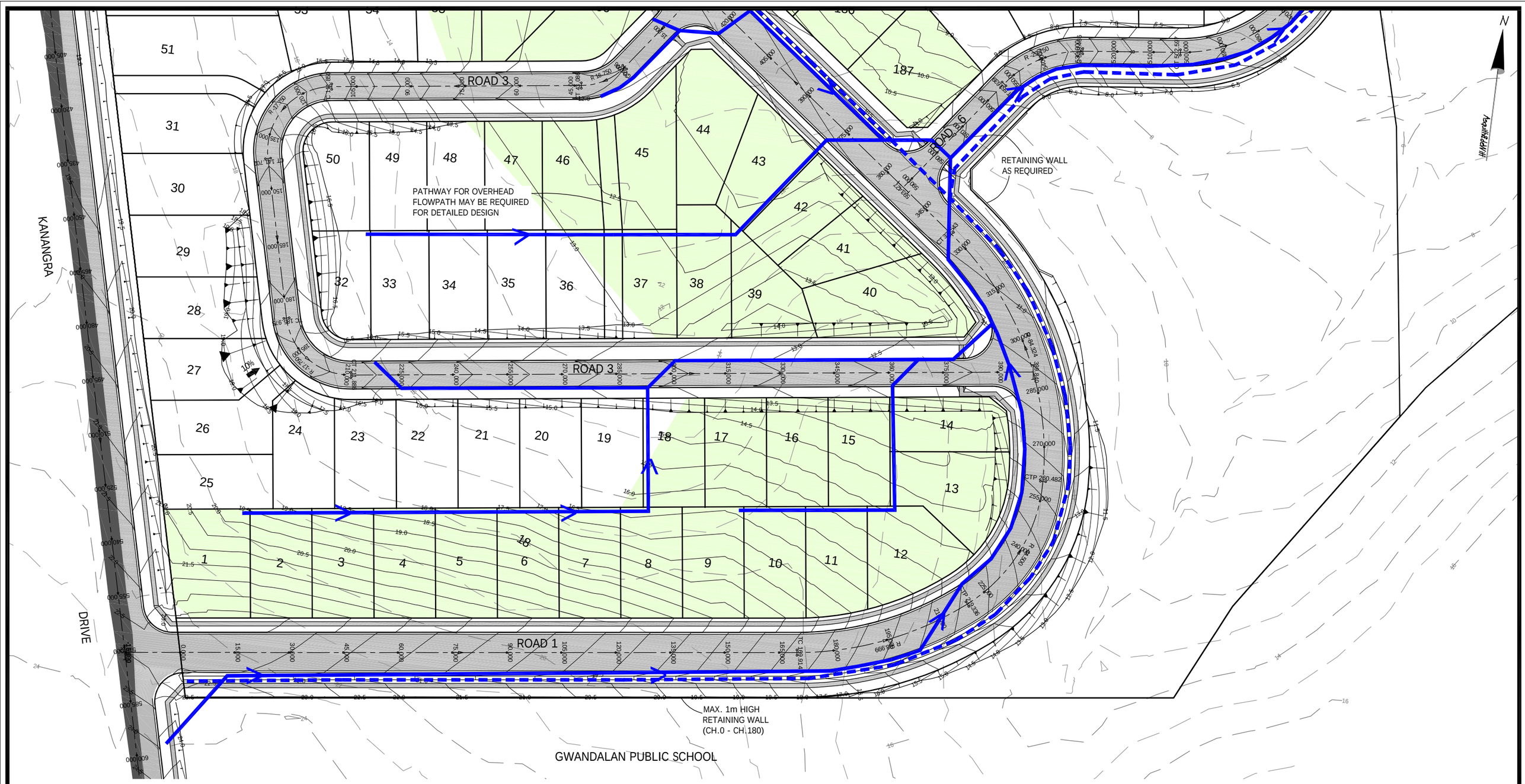
Sheet 102



LEGEND

- REGRADE AREA
- NEW ROAD/FOOTPAVING
- EXISTING ROAD
- DESIGN CONTOURS
- BOUNDARY
- ROAD CENTRELINE
- EXISTING CONTOURS
- STORMWATER DRAINAGE (CONCEPT)
- SWALE DRAINAGE

NOTES:-

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LOCATION

KANANGRA DRIVE, GWANDALAN

Detail 3

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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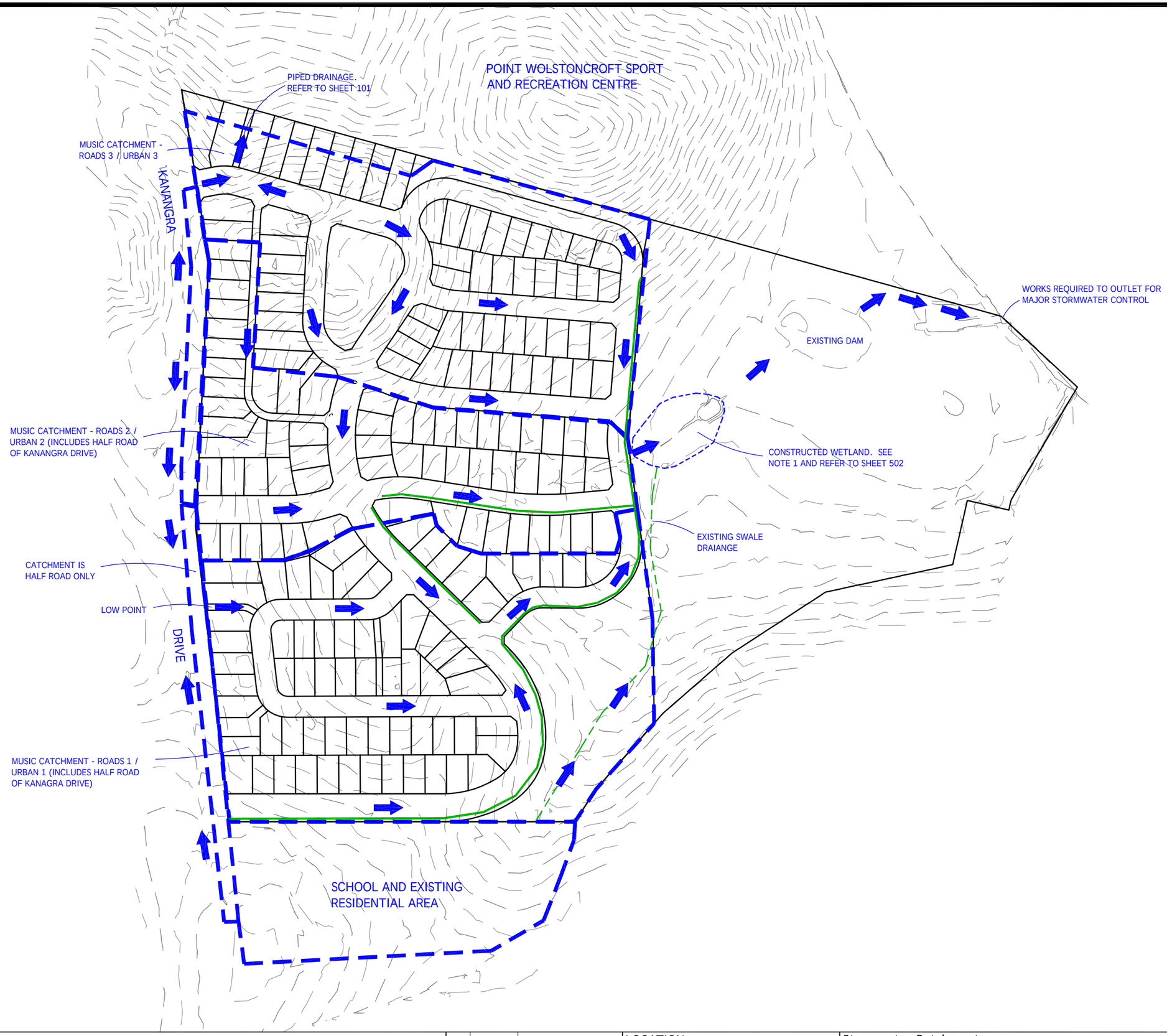
Sheet 103



LEGEND

- BOUNDARIES
- CATCHMENT BOUNDARIES (USED IN MUSIC MODEL)
- SWALE DRAINAGE (LOW FLOWS / ROAD ONLY)
- EXISTING SWALE DRAINAGE
- FLOW DIRECTION

N

NOTES:-

1. THE CONSTRUCTED WETLAND IS THE FINAL CONTROL FOR STORMWATER REQUIREMENTS OF RUNOFF QUALITY AND QUANTITY FROM THE DEVELOPMENT

0 25 50 75 100 150

Bar Scale 1: 1500 (A1), 1: 3000 (A3)

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LOCATION

KANANGRA DRIVE, GWANDALAN

Stormwater Catchments

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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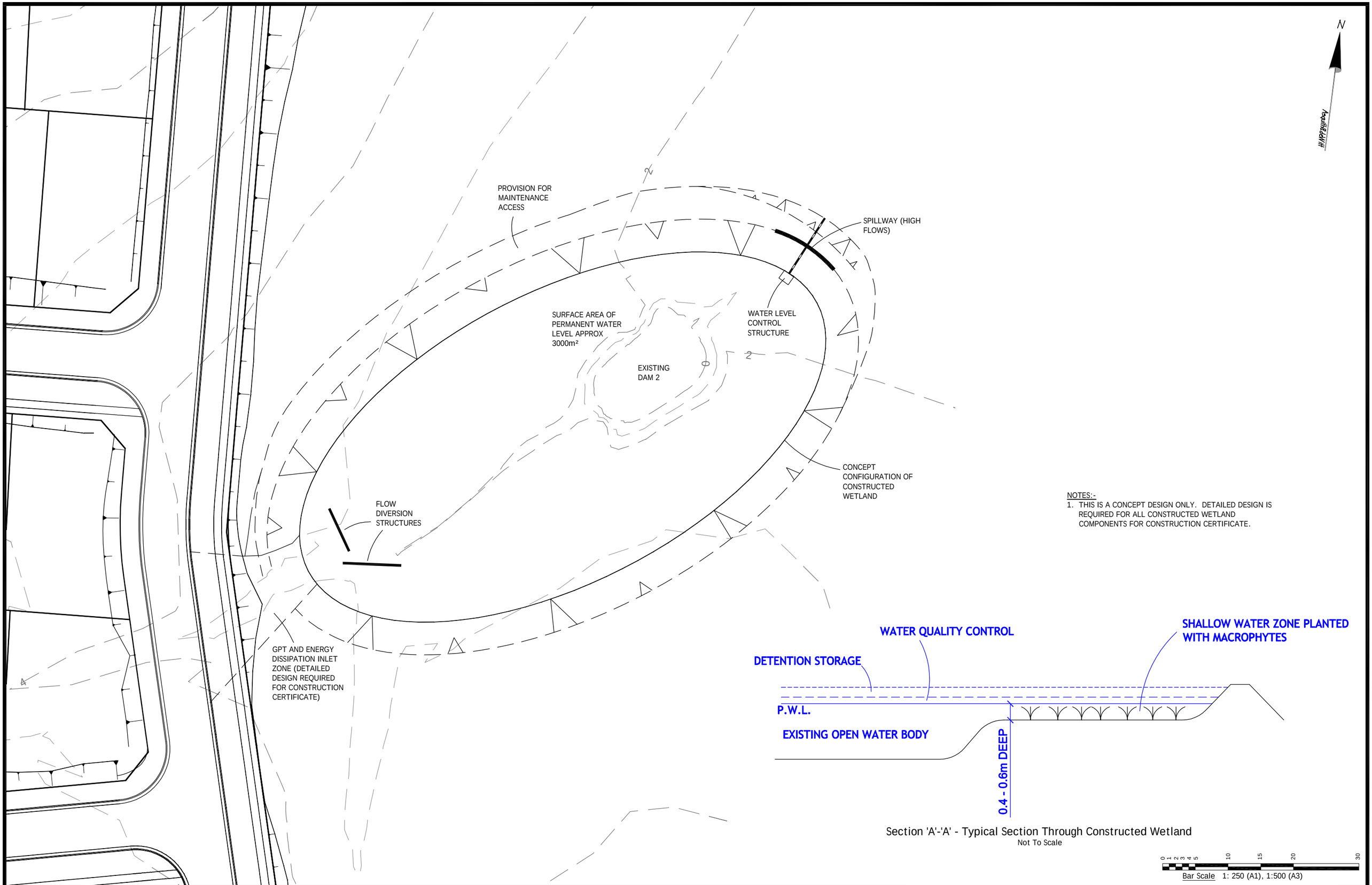
Sheet 501



NOTES:-

1. THIS IS A CONCEPT DESIGN ONLY. DETAILED DESIGN IS REQUIRED FOR ALL CONSTRUCTED WETLAND COMPONENTS FOR CONSTRUCTION CERTIFICATE.

Section 'A'-'A' - Typical Section Through Constructed Wetland
Not To Scale

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LOCATION

KANANGRA DRIVE, GWANDALAN

Constructed Wetland (Concept)

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Des & Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

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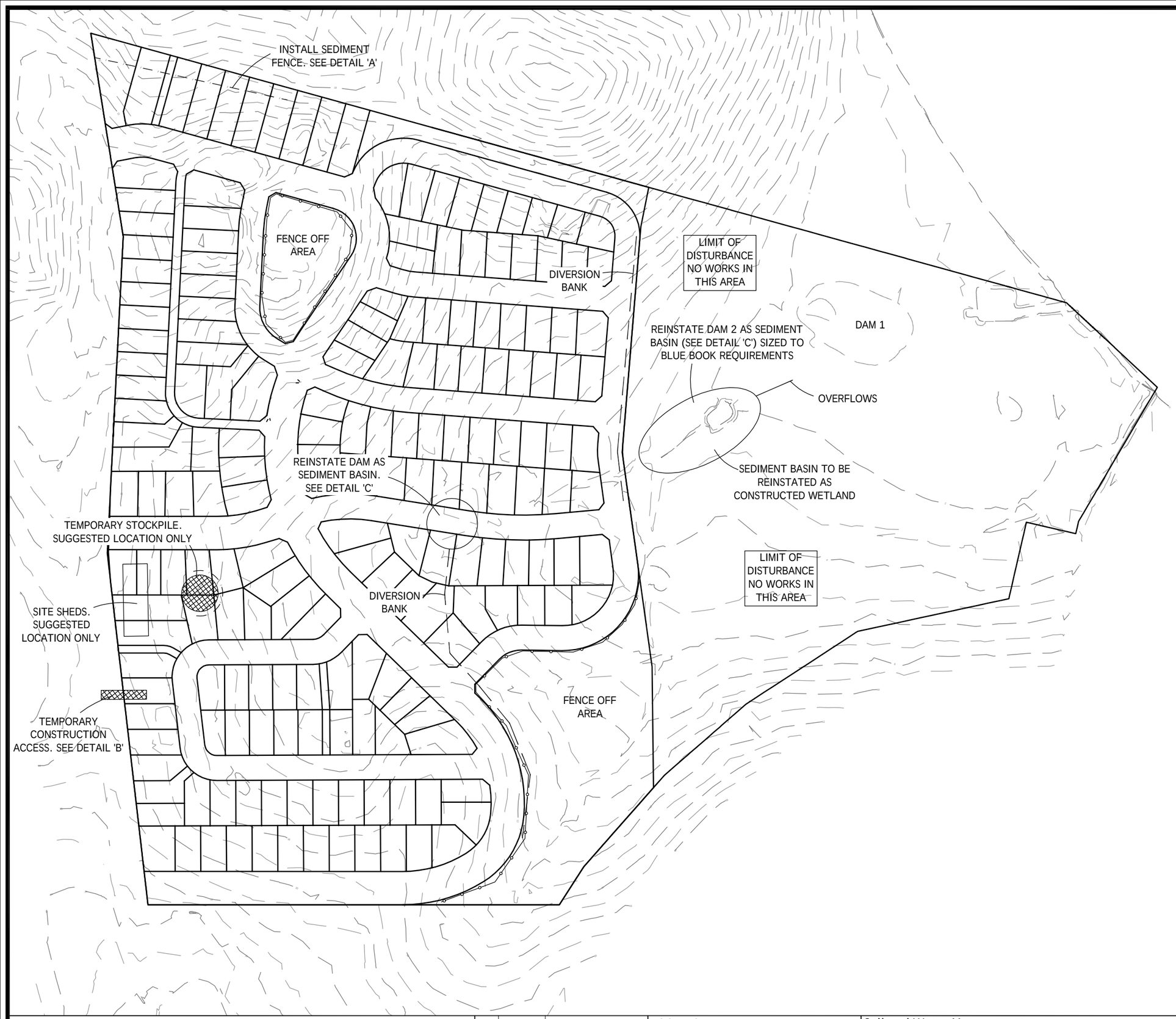
Sheet 502



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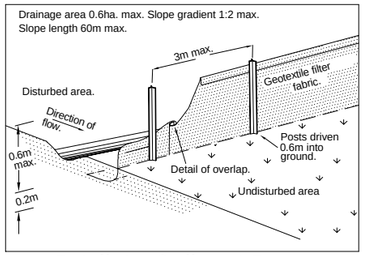
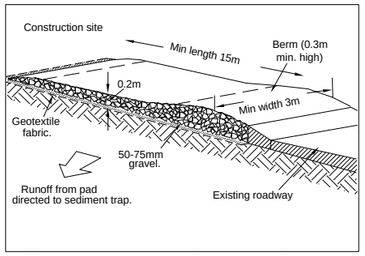
LEGEND

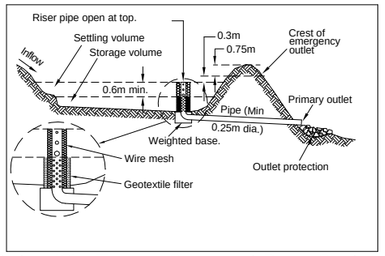
- BARRIER FENCING
- SITE BOUNDARY
- PROPOSED BOUNDARY
- MAJOR NATURAL CONTOUR
- MINOR NATURAL CONTOUR



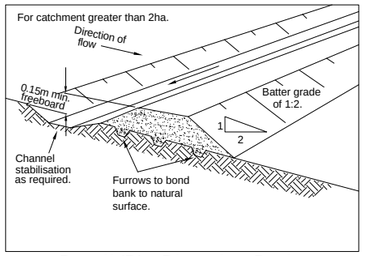
Detail 'A' - Sediment Fence



Detail 'B' - Temporary Construction Access



Detail 'C' - Typical Sediment Basin Section



Detail 'D' - Diversion Drain

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D	12/2007	Amend to New Layout
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LOCATION

KANANGRA DRIVE, GWANDALAN

Soil and Water Management

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	1.0m (Nat)	Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
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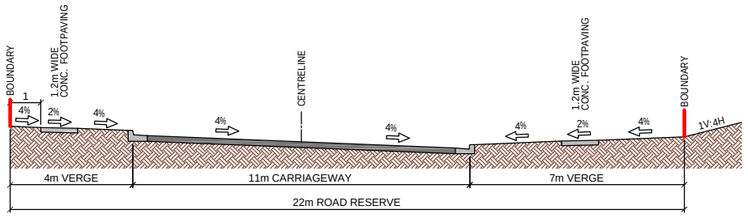
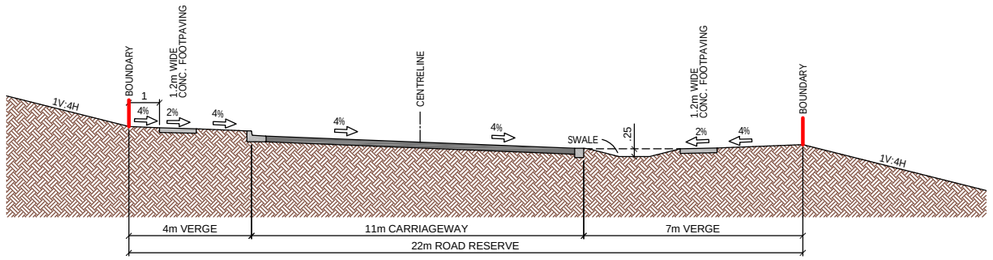
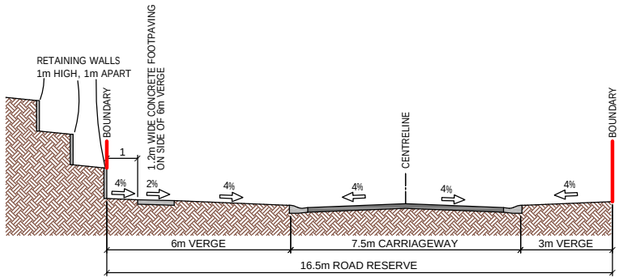


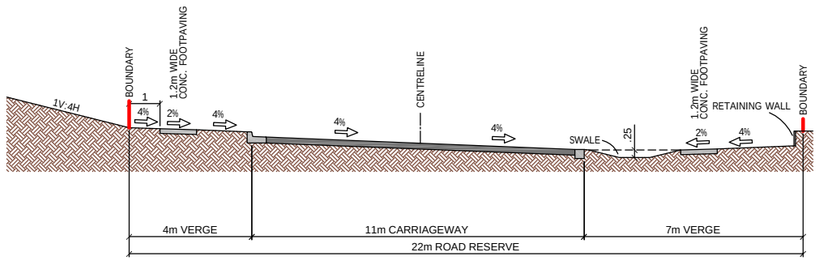
Standard Section - 22m Road Reserve
No Swale Drain



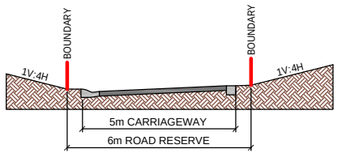
Standard Section - 22m Road Reserve
With Swale Drain



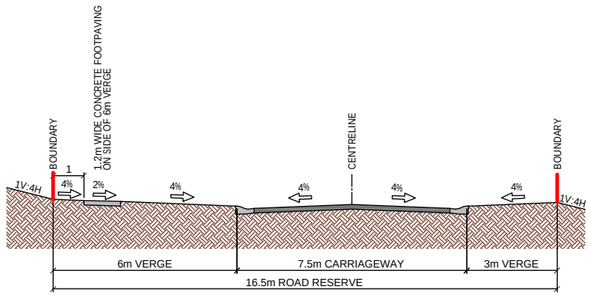
Section - 16.5m Road Reserve
Tiered Retaining Walls



Standard Section - 22m Road Reserve
Retaining Wall

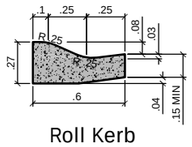


Standard Section - 6m Road Reserve
Lane Way



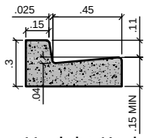
Standard Section - 16.5m Road Reserve

NOTES:-
1. SWALE DRAINS FOR ROAD FLOWS ONLY, LIMITED TO LONGITUDINAL GRADES <5%



Roll Kerb
NTS

Edge Restraint
NTS



Upright Kerb
NTS

0 1 2 3 4 5 7.5 10
Bar Scale 1: 100 (A1), 1: 200 (A3)

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D	12/2007	Amend to New Layout
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LOCATION
KANANGRA DRIVE, GWANDALAN

Typical Sections

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:		Checklist:	MJH

Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
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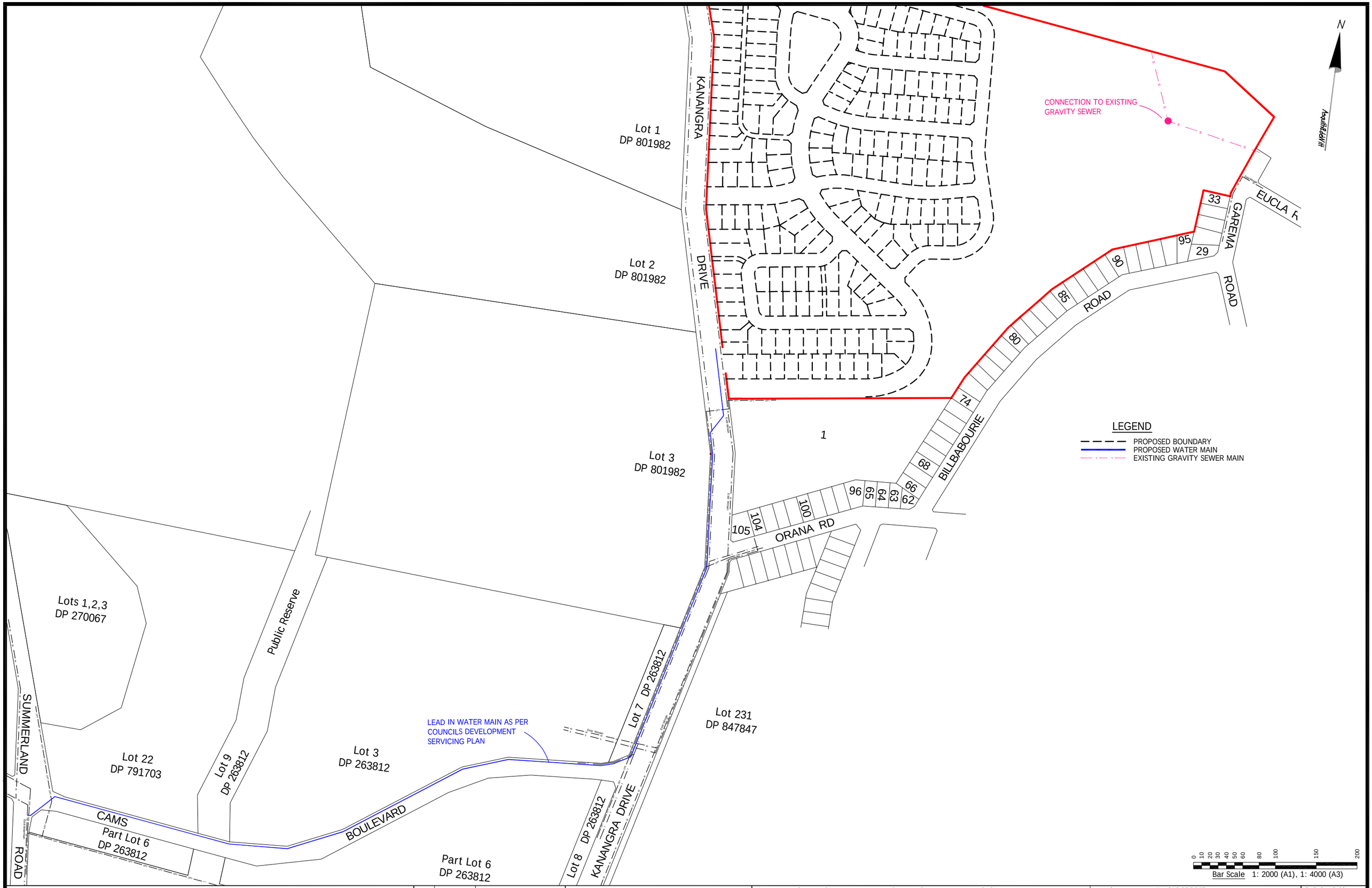
Original Size
A1

Sheet
701



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Ver.	Date	Comment
D	12/2007	Amend to New Layout
C	08/2007	Amend Road 5
B	07/2007	Project Application
A	06/2007	Initial Release

LOCATION

KANANGRA DRIVE, GWANDALAN

Proposed Lead-In Water Main and Sewer Servicing

Council:	Wyong	Projection:	M.G.A.
Datum:	A.H.D.	North Direction:	Grid
Source:	ADW Survey	Plan By:	MJH
Contour Interval:	N/A	Checklist:	MJH

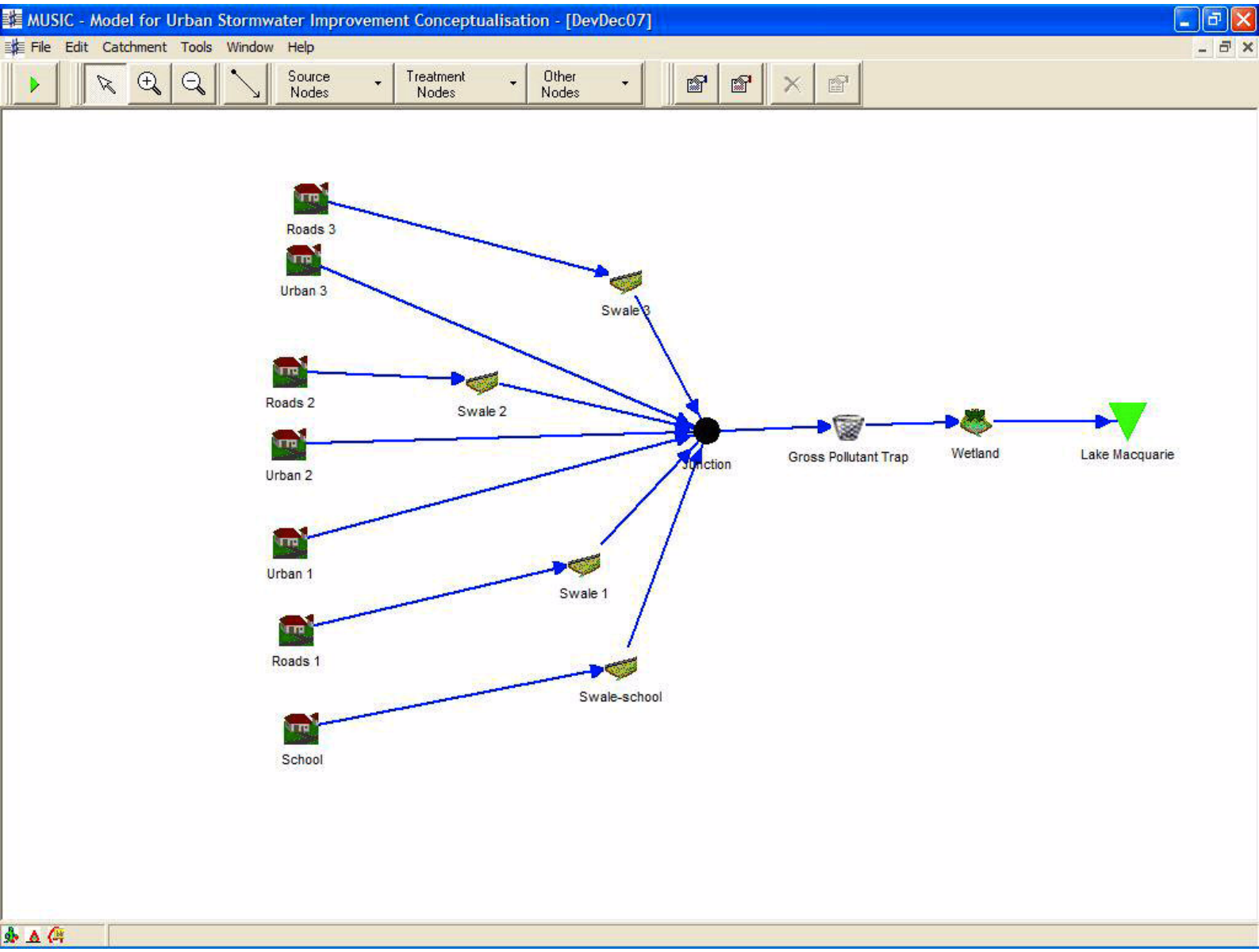
Version:	D (12/2007)
Client:	Rose Property Group Pty. Ltd.
AutoCAD Ref:	N:\11778\Dwg\Eng\11778eng-3d
Job No:	11778

THIS PLAN HAS BEEN PREPARED FOR THE PURPOSE OF PROJECT APPLICATION ONLY AND MAY NOT BE USED FOR ANYTHING OTHER THAN THAT PURPOSE

Original Size A1

Sheet 702

Appendix B – MUSIC Model Details


MUSIC - Model for Urban Stormwater Improvement Conceptualisation - [DevDec07]
File
Edit
Catchment
Tools
Window
Help
Source Nodes
Treatment Nodes
Other Nodes
Roads 3
Urban 3
Swale 3
Roads 2
Swale 2
Urban 2
Junction
Gross Pollutant Trap
Wetland
Lake Macquarie
Urban 1
Swale 1
Roads 1
Swale-school
School

Appendix C – Sediment Basin Calculation

	Description		Typical Value/Source	
	Kanangra Drive, Gwandalan			
	Catchment Site Area (hectares)	18.34		
Type F/D	**Settling Zone**			
	Runoff Coefficient, Cv	0.5	0.5	
	75th %, 5 day Rainfall Event	26.8	Wyong	Table 6.3a, pg 6-24
	Settling Zone Volume	**2458**		m3
	Sediment Zone			
	Disturbed Site Area (hectares)	18.34		
	Rainfall Erosivity Factor, R	3000		Appendix B, Newcastle B-11
	Soil Erodibility Factor, K	0.059		Appendix A, Figure A3
	Slope Length Gradient Factor, LS	2.53	300m@5%	Table A1, pg A-9
	Erosion Control Practice Factor, P	1.3	1.3	Table A2, pg A-11
	Cover Factor, C	1	1	Figure A5, pg A-12
	Sediment Zone Volume	**1396**		m3
	Total Storage required (overall)			
	Settling + Sediment	3854		m3
	This is equivalent to	**770m3**	**per existing dam**	