Pittwater Council
Construction Certificate No: CC 0545/06

Site Details: 109 & 111 Orchard Street, Warriewood

Legal Description: Lot 3 & 4, DP 734891 & Lot 2, DP 715324

Type of Development: Building Work

Description: Construction of a private access way

COPY

Associated Development Consent No: N0457/05 Dated: 04/04/2006
Modified: 22/12/06

Building Code of Australia Classification: Class 10b

Details of plans, documents or Certificates to which this Construction Certificate relates:

- Working Drawing No 4670-01 E (16/10/06), 4670-02 D (21/07/06), 4670-03 E (18/10/06), 4670-04 E (16/10/06), 4670-05 E (21/07/06), 4670-06 D (21/07/06), 4670-07 E (16/10/06), 4670-08 E (16/10/06), 4670-09 E (16/10/06), 4670-10 D (21/07/06), 4670-11 D (21/07/06), 4670-12 D (21/07/06), 4670-13 A (21/07/06), prepared by Patterson Britton & Partners Pty Ltd
- Certification from Patterson Britton & Partners Pty Ltd, dated 22/11/06
- Pittwater Council Approval (works in public road reserve), dated 19/10/06
- Form No 2 Geotechnical Risk Management, prepared by Jack Hodgson Consultants Pty Ltd / M Tooker, dated 28/11/06
- Waste Management Plan, prepared by Patterson Britton & Partners Pty Ltd, dated 21/07/06
- Pittwater Council Approval (consent operative), dated 02/11/06
- Pittwater Council Approval (construction phase – traffic management plan), dated 16/08/06
- Construction Phase – Traffic Management Plan, prepared by Patterson Britton & Partners Pty Ltd, dated 21/09/06

I hereby certify that the above plans, documents or Certificates satisfy:

- The relevant provisions of the Building Code of Australia, and
- The relevant conditions of Development Consent No: N0457/05

And, that work completed in accordance with the documentation accompanying the application for this certificate (and any modifications as verified by me and shown on that documentation) will comply with the requirements of the Environmental Planning and Assessment Regulation, referred to in section 81A(5) of the Environmental Planning and Assessment Act, 1979.

Issued By: Wayne Treble
Accreditation Number: Dept of Planning P0100
Pittwater Council Consultant
Building Surveyor **Date of Endorsement: 9 January 2007**

Note: You are reminded that pursuant to provisions of Clause 81A, you must nominate whether Council or an accredited certifier will be the principal certifying authority, also you must give notice to Council of your intention to commence work at least two days beforehand.

Pittwater Council

ABN 61 340 837 871 **Telephone** (02) 9970 1111 **Facsimile** (02) 9970 7150
Postal Address: P.O. Box 882, Mona Vale NSW 1660, DX 9018 Mona Vale

pittwaterlga.com.au **e-mail:** pittwater_council@pittwater.nsw.gov.au

Environmental Compliance
8am to 5.30pm Mon - Thurs, 8am to 5pm Fri
Phone 9970 1111

9 January 2007

D M & V Bubalo
107 Orchard Street
WARRIEWOOD NSW 2102

COPY

Dear Wally

Re: Construction Certificate CC0545/06
Property: 109 & 111 Orchard Street, Warriewood

Please find enclosed your approved Construction Certificate and stamped plans.

Did you know that work is unable to commence until such time as a completed Notification of Commencement Form has been submitted to Council at least two (2) days prior to starting work? Not to do so is a breach of the Environmental Planning and Assessment Act, which would result in a Penalty Infringement Notice (on-the-spot fine) being issued to you and the builder.

To assist you please find enclosed a "Notification of Commencement and Principal Certifying Authority Service Agreement" form to enable you to appoint Pittwater Council as your Principal Certifying Authority (PCA).

If appointed as the PCA, Council would engage the services of The Certification Group to carry out the various inspections as indicated in Part 6 of the enclosed "Notification of Commencement and Principal Certifying Authority Service Agreement" form and ultimately issue an Occupation Certificate for your development. Appointment and inspection fees are also detailed in the enclosed form.

Council will endorse your completed "Notice of Commencement and Principal Certifying Authority Service Agreement" form and return a copy to the applicant with advice as to the required critical stage and other inspections to be carried out on behalf of Council.

Council is committed to providing a quality service and would value your business in being appointed as the Principal Certifying Authority for your development.

Yours faithfully

Development Compliance Group

Per:

11 JAN 2007

This form is valid from
1st July 2006 to 30 June 2007

Pittwater Council
PO Box 882
Mona Vale NSW 1660
Tel: (612) 9970 1111
Fax: (612) 9970 7150

NOTIFICATION OF COMMENCEMENT & PRINCIPAL CERTIFYING AUTHORITY SERVICE AGREEMENT

under Environmental Planning and Assessment Act 1979 sections 81A (2) (b) (ii) or (c), or (4) (b) (ii) or (c), 86 (1) and (2)

About this form

- Use this form to appoint Pittwater Council as the Principal Certifying Authority (PCA) to carry out nominated inspections of the building / subdivision works and to issue the required Occupation Certificate
- This form must be submitted to Pittwater Council a minimum of two (2) days prior to the commencement of works.

Who can complete this form?

- The owner of the property or the person having the benefit of the development consent.
  ***Note**: The builder or other contractor cannot complete this form unless they are also the owner of the property.*

Applicant's Checklist

- Read this document ❑
- Complete pages 1, 2 & 3 ❑
- Sign on page 8 ❑
- Attach a copy of Owner Builder Permit or Home Owner Warranty Insurance Certificate. ❑

Payment of fees

- Critical Stage Inspection fees (refer to Part 6e of this form) must be paid at the time of booking the inspection.

This form is valid from
1st July 2006 to 30 June 2007

1. DEVELOPMENT INFORMATION

1a) DEVELOPMENT CONSENT

Development Application No: N0457/05	Determination Date: 04/04/2006

1b) CONSTRUCTION CERTIFICATE

Construction Certificate No: CC0545/06	Date of Issue: 09/01/2007

1c) DEVELOPMENT DETAILS

Type of Work: ☐ New Building ☐ Additions / Alterations ☐ Subdivision	Brief description of development:

1d) SITE DETAILS

Unit/Suite:	Street No:	Street:		
	109 & 111	Orchard Street		
Suburb: Warriewood			Lot No: 2 & 3	Deposit /Strata Plan: 715324 & 734891

1e) VALUE OF PROPOSED DEVELOPMENT

Estimated value of proposed works: $ .....

1f) DATE WORK IS TO COMMENCE

Minimum notice of two (2) days is required to be given prior to commencement of works.

Date of commencement: .....

2. APPLICANT DETAILS

***Note**: The builder or other contractor cannot complete this form unless they are also the owner of the property.*

Name (owner):	
Postal Address:	Phone (H/B): ..... Mobile: ..... Email: ..... Fax: .....

This form is valid from
1st July 2006 to 30 June 2007

3. PRINCIPAL CERTIFYING AUTHORITY

PITTWATER COUNCIL

PO Box 882
Mona Vale NSW 1660

Ph: 9970 1111
Fax: 9970 7150

4. COMPLIANCE WITH DEVELOPMENT CONSENT

Have all conditions to be addressed prior to the commencement of works been satisfied?

❑ YES ❑ NO (see Note below)

Note: If NO work must not commence.
Please be aware that failure to address these conditions may leave you liable and in Breach of the Environmental Planning and Assessment Act 1979 (as amended). Penalties may include an on-the-spot fine and/or legal action.

If you are uncertain as to these requirements please contact Council's Development Compliance Group.

5. WHO WILL BE DOING THE BUILDING WORKS?

❑ Owner Builder
Owner Builders Permit No:.....

Copy of Owner Builders permit attached: ❑ YES

If you are an Owner-Builder for the residential building work exceeding $5000 you must apply for a permit at NSW Office of Fair Trading, 1 Fitzwilliam Street, Parramatta NSW 2150 Australia. Tel: 61 2 98950111 Fax: 61 2 9895 0222.

OR

❑ Licensed Builder
Builder's License Number .....

Name of Builder:.....	Phone:.....
Contact person:	Mobile: .....
Address:	Fax: .....
.....	.....

Insurance Company:
.....

Insurance Certificate attached:
❑ Yes
❑ No – statement attached & signed by each owner of the property that the reasonable market cost of the labour & materials to be used is less than $12,000.

If you are using a licensed builder for residential building work exceeding $12,000 you must obtain Home Building Act Insurance. A certificate of insurance must be provided with this application.

This form is valid from
1st July 2006 to 30 June 2007

6. RESPONSIBILITIES OF THE PRINCIPAL CERTIFYING AUTHORITY (PCA)

6a) Quality of Service:
Pittwater Council will carry out PCA and inspection services in a professional manner and in accordance with the requirements of the Environmental Planning & Assessment Act 1979 and Council's Code of Conduct.

6b) Site Signage:
Pittwater Council will erect a sign on the site to advise the general public of the contact details of the PCA. The sign will be erected during the Commencement Inspection, on Council's acceptance of appointment as PCA.

6c) Inspections:
Pittwater Council officers will undertake the Critical Stage Inspections of the work during construction and prior to issuing an Occupation Certificate to ascertain compliance of specified stages of construction with the Development Consent, Construction Certificate, Building Code of Australia & relevant standards of construction. On appointment as the PCA, Pittwater Council will notify the applicant in writing of the Critical Stage & other Inspections.

6d) Critical Stage and other inspections:
The following stages of construction are required to be inspected by Council (as indicated by a ✓ in the relevant box).
Note:Council's Development Compliance Officer will complete this section of the form.

Office Use Only

☑ Footing Inspection (prior to placement of concrete)

☑ Slab and other Steel Inspection (prior to placement of concrete)

☐ Frame Inspection (prior to fixing floor, wall & ceiling linings)

☐ Wet Area Waterproofing Inspection (prior to covering)

☑ Stormwater Inspection (prior to backfilling of trenches)

☐ Swimming Pool Safety Fence Inspection (prior to placement of water)

☑ Final Inspection (all works completed and prior to occupation of the building)

Office Use Only

***Note**: Should the building works be completed in parts & not all aspects of a Critical Stage Inspection be ready, additional inspections maybe required – with a further inspection fee payable.*

Eg: If two slabs are prepared at separate times, two separate inspection bookings and fees are required.

6e) Critical Stage and other inspection fees:
An inspection fee is required for each inspection identified in Part 6d of this form.
A separate inspection fee is required for each Critical Stage Inspection. Should works be either incomplete or incorrect at the time of inspection a further separate reinspection fee will be required.

Each inspection fee must be paid at the time of requesting the inspection.

Critical Stage or other Inspection Fee current to 30 June 2007	**$210**	(Code: HINR)
Final Inspection Fee Scale current to 30 June 2007	**$280**	(Code: FOCC)

Please note that a failure to give correct notification of required inspections may result in the issuing of a Penalty Infringement Notice (PIN or on-the-spot fine) and/or a Notice and Order by Council and may result in refusal to issue an Occupation Certificate.

6f) Inspection Results:
Pittwater Council will provide written confirmation to the applicant of the inspection results and indicate if satisfactory or if additional works are required prior to reinspection.

7. RESPONSIBILITIES OF THE APPLICANT

7a) Inspections:
A minimum of forty-eight (48) hours notice (excluding weekends and public holidays) must be given to Council to enable the specified stages of construction to be inspected as identified in Item 6 of this agreement.

Should an inspection be missed, the applicant must advise Council in writing (as soon as practicable after the event) of that fact, the circumstances causing the inspection to be missed and supporting documentation for Council's consideration. In such cases, the inspection fee, which would normally have been required, must still be paid.

The applicant must ensure that the Principal Contractor (Builder/Owner Builder) is advised of the required inspections and that the directions of Council's Development Compliance Officers are to be observed to ensure compliance with the Development Consent, Construction Certificate, Building Code of Australia and the terms of this agreement.

7b) Booking of Inspections:
The applicant shall request an inspection via Pittwater Council's Inspection Booking Hotline on **9970 1300**. A minimum of forty-eight (48) hours notice must be provided to Council to arrange for completion of the inspection.

At the time of requesting the inspection, Pittwater Council will confirm an inspection time and day, name of inspecting officer and mobile contact number.

Building works must **not** proceed to the subsequent stages of construction prior to obtaining a satisfactory inspection from Council for each stage of construction specified in Item 6d of this agreement.

7c) Site Signage:
The applicant is responsible to maintain the PCA signage provided by Pittwater Council at the site until the work is completed.

The applicant is responsible to ensure that the Owner Builder or Principal Contractor (Builder) provide a rigid durable sign at the site, visible from the public place and maintained at the site until the work is completed. Such a sign shall display: (a) the name, address and telephone number of the person; (b) an after-hours emergency telephone number for the person and (c) stating "Unauthorised Entry to the Site is Prohibited".

7d) Compliance with the Development Consent and Construction Certificate:
All works must be carried out in accordance with the terms and conditions of Council's Development Consent and the Construction Certificate and relevant provisions of the Building Code of Australia and Environmental Planning and Assessment Act 1979.

Development Consent and a Construction Certificate must be obtained for any amendments or variations to the development, prior to the commencement of the amendment or variation.

Works not in accordance with the approval and Building Code of Australia may result in the refusal to issue an Occupation Certificate. Council may also serve a Notice and Order to comply with the approval and/or the institution of legal proceedings.

7e) Structural Engineering and Other Specialist Details:
The following details are to be forwarded to the PCA prior to commencement of the relevant stage of construction (as identified by a ✓). The details are to be prepared by a suitably qualified person to confirm compliance with the relevant provisions of the BCA and Australian Standards:

Note: Council's Development Compliance Officer will complete this section of the form.

Office Use Only

No ticked:

Office Use Only

- ☐ Timber framing details including bracing and tie-downs
- ☐ Roof construction or roof truss details
- ☐ Termite control measures
- ☐ Glazing details
- ☐ Mechanical ventilation details
- ☐ Wet area construction details
- ☐ Details of fire resisting construction
- ☐ Details of essential fire and other safety measures
- ☐ Sound transmission and insulation details
- ☐ Details of compliance with development consent conditions

This form is valid from
1st July 2006 to 30 June 2007

7f) Certification of Works:

To ensure compliance with the Construction Certificate and Building Code of Australia (BCA), the applicant is to provide certification, verifying that the following specialist matters (identified by a ✓) have been carried out.

Each certification must:

- reference the approved Construction Certificate number, property address, relevant provisions of the BCA, Australian Standards and approved drawings.
- be prepared by an accredited certifier or other suitably qualified & experienced person to the satisfaction of Pittwater Council.

Note: Council's Development Compliance Officer will complete this section of the form.

☑ Survey detailing building setbacks, reduced levels of floors & ridge by a registered surveyor

☐ Shoring and support for adjoining premises and structures by a structural engineer

☐ Contiguous piers or piling by a structural engineer

☐ Underpinning works by a structural engineer

☑ Structural engineering works by a structural engineer on all structural building elements –(i.e footings, slabs, floor, wall & roof framing)

Office Use Only

☐ Retaining walls by a structural engineer

☑ Inspection and approval of all subsurface drains by the Geotechnical engineer before backfilling is completed

☑ Inspection and approval of all fill material by the Geotechnical engineer before backfilling is completed

☑ Stormwater drainage works by a hydraulic engineer and surveyor

☐ Landscaping works by the landscaper

☐ Condition of trees by an Arborist

☐ Mechanical ventilation by a mechanical engineer

☐ Termite control and protection by a licensed pest controller

☐ Waterproofing of wet areas by a licensed waterproofer or licensed builder

☐ Installation of glazing by a licensed builder

☐ Installation of smoke alarm systems by a licensed electrician

☐ Plumbing and Drainage Contractors certificate indicating that sewer/waste water system has been installed and completed in accordance with the Sydney Water requirements.

☐ Completion of construction requirements in a bush fire prone area by a competent person

☐ Completion of requirements listed in the BASIX Certificate by a competent person

☐ Fire resisting construction systems by a competent person

☐ Smoke hazard management systems by a competent person

☐ Essential fire safety and other safety measures by a competent person (Form 15a)

Office Use Only

- ☐ Completion of Bushland Management requirements by a suitably qualified person.
- ☐ Installation of Waste Water Management System by a suitably qualified person
- ☐ Installation of the inclined lift by a suitably qualified person
- ☐ Installation of sound attenuation measures by an acoustic engineer

7g) Occupation Certificate:
A *Final* Occupation Certificate must be obtained from the PCA prior to the occupation or use of a new building (or part of a building) or prior to the change of an existing building use/classification. An inspection fee is to be paid to the PCA in accordance with the fee scale in Part 6e of this agreement.

An application may be made to the PCA for an *Interim* Occupation Certificate, which will be considered in accordance with the provisions of the Environmental Planning and Assessment Act 1979 and conditions of development consent.

Only the Principal Certifying Authority can issue an Occupation Certificate and the Environmental Planning and Assessment Act 1979 contains penalty provisions for failing to obtain a required Occupation Certificate.

An application for an *Interim* or *Final* Occupation Certificate must be accompanied by a final or interim *fire safety certificates* as required by the EP&A Regulations, Clauses 80E or 80F for buildings other than Class 1 and 10.

7h) Miscellaneous requirements:
The applicant is required to ensure that valid public liability insurance cover to the value of $10,000,000 (minimum) is held by the applicant and/or builder.

The applicant is required to notify Council, in writing, of any change in the details or address of the applicant or head contractor.

Pittwater Council may cancel the agreement if there is a breach of the agreement.

8. YOUR SIGNATURE

I accept the terms and conditions of this service agreement, including the associated payment of fees and appoint Pittwater Council as the Principal Certifying Authority for the subject development.

Signature:..... Date: .....

9. COUNCIL'S AGREEMENT TO APPOINTMENT

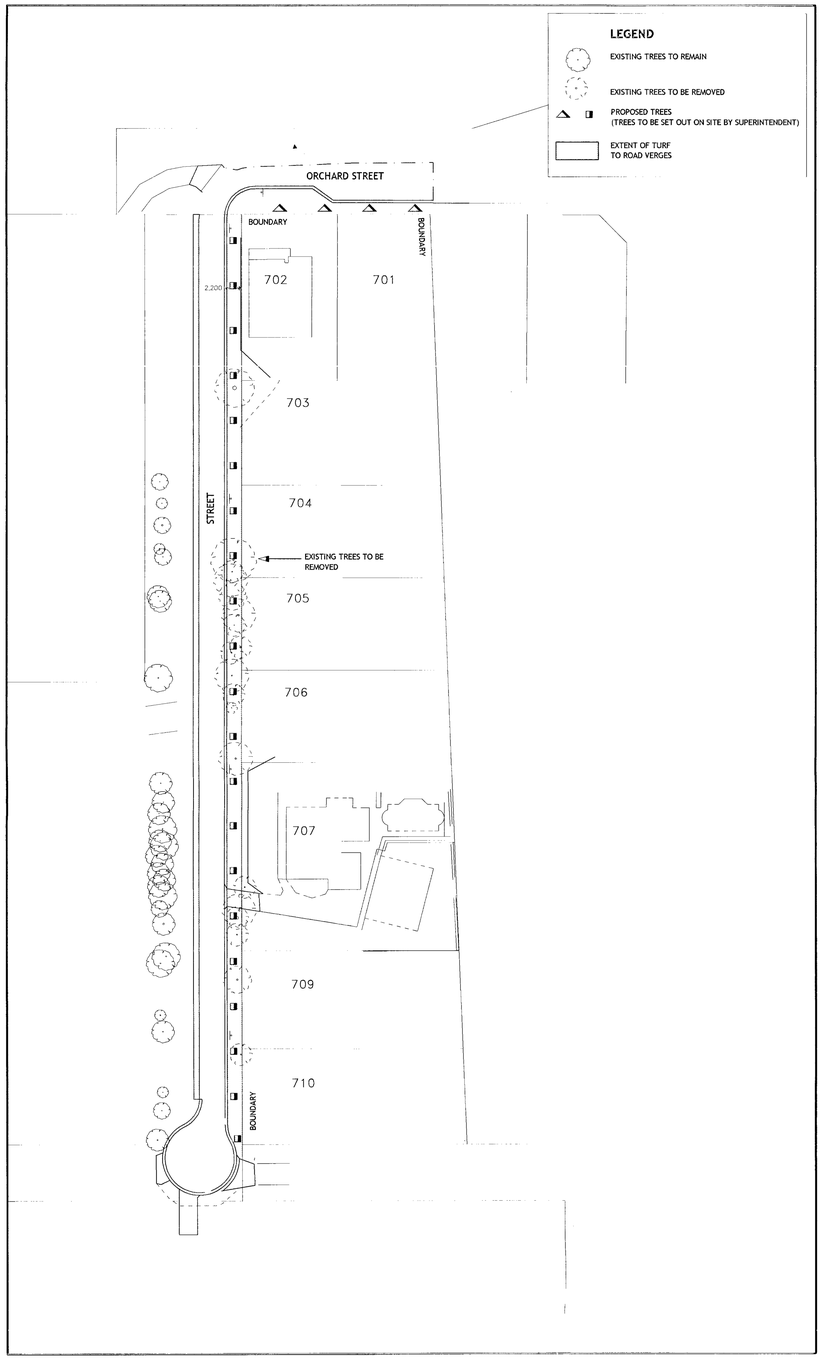
The relevant details in Parts 6d, 7e & 7f of this agreement have been completed and I acknowledge the appointment of Pittwater Council as the Principal Certifying Authority.

Officer's name: ..... on behalf of Pittwater Council

Officer's signature: ..... Date: .....

PRIVACY AND PERSONAL INFORMATION PROTECTION NOTICE

Purpose of collection:	To enable Council to act as the Principal Certifying Authority for the development.
Intended recipients:	Pittwater Council staff
Supply:	The information is required by legislation
Consequence of Non-provision:	Your application may not be accepted, not processed or rejected for lack of information
Storage:	Pittwater Council will store details of this form in a register that can be viewed by the public.
Retention period:	Hard copies will be destroyed after 7 years and electronic records will be kept indefinitely.
	Please contact Council if this information you have provided is incorrect or changes.



SPECIFICATION NOTES

SITE PREPARATION / SOIL WORKS
ALL EXISTING TREES MARKED FOR RETENTION SHALL BE PROTECTED FOR THE DURATION OF THE BUILDING WORKS. REMOVE FROM SITE ALL PERENNIAL WEEDS SUCH AS OXALIS, ONION WEED AND THE LIKE.

NO REGRADING IS TO BE CARRIED OUT WITHIN THE DRIPLINE OF THE TREES TO BE RETAINED. WHERE EXCAVATION IS NECESSARY USE HAND METHODS TO AVOID DAMAGE TO THE ROOT SYSTEM. DO NOT CUT ROOTS GREATER THAN 50MM. CUT ROOTS CLEANLY WITH A SAW AND DO NOT SEAL THE WOUND.

TREE PROTECTION
PROTECT ALL EXISTING TREES AS NOTED ON THE DRAWINGS FOR THE DURING OF THE BUILDING WORKS.

TAKE ALL NECESSARY PRECAUTIONS, INCLUDING THE FOLLOWING:

Tree Protection fence:
INSTALL A TREE PROTECTION FENCES AT THE MAXIMUM RADIUS ALLOWABLE TO ACCOMMODATE THE PROPOSED DEVELOPMENT. MAINTAIN THE FENCE FOR THE DURATION OF THE BUILDING WORKS.

CONSTRUCT THE FENCE 1.8 M HIGH WITH CHAINWIRE MESH ON STEEL POSTS. ALL AREAS WITHIN THE PERIMETER OF THE FENCE ARE TO BE COVERED TO A DEPTH OF 100MM WITH WOODCHIP MULCH.

Temporary irrigation:
INSTALL A TEMPORARY IRRIGATION SYSTEM TO ALL TREES TO BE RETAINED. INSTALL DRIP EMITTERS ON POLY LATERALS. THE IRRIGATION SYSTEM IS TO BE CONTROLLED BY A GALCON OR SIMILAR AUTOMATIC CONTROLLER.

Harmful materials:
DO NOT STORE, STOCKPILE, DUMP OR OTHERWISE REPLACE UNDER OR NEAR TREES, BULK MATERIALS AND HARMFUL MATERIALS INCLUDING OIL, PAINT, WASTE CONCRETE, CLEARINGS, BOULDERS AND THE LIKE. DO NOT PLACE SPOIL FROM EXCAVATIONS AGAINST TREE TRUNKS, EVEN FOR SHORT PERIODS. PREVENT WIND-BLOWN MATERIALS SUCH AS CEMENT FROM HARMING TREES AND PLANTS.

Damage:
PREVENT DAMAGE TO TREE BARK. DO NOT ATTACH STAYS, GUYS AND THE LIKE TO TREES.

Work under trees:
DO NOT REMOVE TOPSOIL FROM WITHIN THE DRIP LINE OF TREES UNLESS OTHERWISE SPECIFIED, IF IT IS NECESSARY TO EXCAVATE WITHIN THE DRIP LINE, USE HAND METHODS SUCH THAT ROOT SYSTEMS ARE PRESERVED INTACT AND UNDAMAGED.

Roots:
DO NOT CUT TREE ROOTS EXCEEDING 50 MM DIAMETER UNLESS PERMITTED BY THE SUPERINTENDENT. WHERE IT IS NECESSARY TO CUT TREE ROOTS, USE A CHAIN SAW OR SIMILAR MEANS SUCH THAT THE CUTTING DOES NOT UNDULY DISTURB OR ROCK THE REMAINING ROOT SYSTEM. IMMEDIATELY AFTER CUTTING, APPLY AN APPROVED BITUMINOUS FUNGICIDAL SEALANT TO THE CUT SURFACE TO PREVENT THE INCURSION OF ROT OR DISEASE.

Compacted Ground:
AVOID COMPACTION OF THE GROUND UNDER TREES. IF THE GROUND UNDER TREES HAS BEEN UNDULY COMPACTED DURING THE WORK UNDER THE CONTRACT, FOR EXAMPLE BY THE OPERATION OF HEAVY CONSTRUCTIONAL PLANT, LOOSEN THE SOIL BY CORING.

SOIL WORKS
THOROUGHLY CULTIVATE THE SUBSOIL TO A DEPTH OF 200MM. SUPPLY AND INSTALL THE FOLLOWING SOIL MIX:

SOIL DEPTH	
TURF	150MM
PLANTING	300MM
SOIL MIX	
BLACK LOAM	60%
COARSE WASHED RIVER SAND	40%

ORGANIC LAYER 50 MM DEEP
CULTIVATE A 50MM LAYER OF ORGANIC ADDMIX INTO THE TOP 100MM OF SOIL MIX

Addmix composition	
TREATED HARDWOOD SAWDUST	30%
PINE PARK FINES	40%
COMPOSTED MANURE	30%

TREE PLANTING AREAS TO BE MOUNDED 100 MM ABOVE THE EXISTING GROUND LINE TO IMPROVE DRAINAGE FROM PLANTING HOLES. TREE HOLES TO BE EXCAVATED 2 TIMES LARGER THAN THE ROOTBALL AND BACKFILLED WITH SOIL MIX AS SPECIFIED ABOVE.

MULCH
SUPPLY AND PLACE 75 MM LAYER OF HARDWOOD HORTICULTURAL GRADE MULCH, (GRADED IN SIZE 15 MM X 15MM X 15MM, FREE FROM WOOD SLIVERS). SET DOWN 25MM FROM ADJACENT PAVING.

TURFED AREAS
APPLY SHIRLEYS NO17 LAWN FERTILISER TO SOIL APPLIED IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. TURF SHALL BE:
- COUCH BUFFALO WITH AN EVEN THICKNESS OF 30MM.

DO NOT LET TURF DRY OUT. LIGHTLY TOP DRESS TURF 6 WEEKS AFTER LAYING WITH 10MM IMPORTED TOPSOIL. THATCH TO BE LAID WITH STAGGERED JOINTS , FLUSH WITH PATHWAY LEVELS.

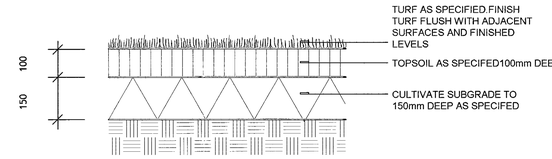
PLANT MATERIALS
ALL PLANTS SHALL BE TRUE TO TYPE, OF HEALTHY GROWTH DISEASE FREE NURSERY STOCK AND NOT DISPLAYING RESTRICTED GROWTH PATTERNS. SHOULD THERE BE A REQUIREMENT FOR SUBSTITUTIONS THEY SHALL NOT CHANGED WITHOUT PRIOR APPROVAL OF THE LANDSCAPE ARCHITECT. NO VARIEGATED STRAIN SHALL BE USED. ALLOW FOR SLOW RELEASE FERTILISER TO ALL PLANTS APPLIED AT THE MANUFACTURERS RECOMMENDED RATE TO BE SAME OR SIMILAR TO OSMOCOTE.

STAKES AND TIES
DURABLE HARDWOOD , STRAIGHT, SIZE SHALL BE 50X50X1800 WITH TIES SPACED APPROXIMATELY 300MM APART. DRIVE STAKES 600MM INTO THE GROUND ON THE WINDWARD SIDE OF THE PLANT. TIES SHALL BE 50MM HESSIAN WEBBING FIXED IN A FIGURE OF EIGHT PATTERN.

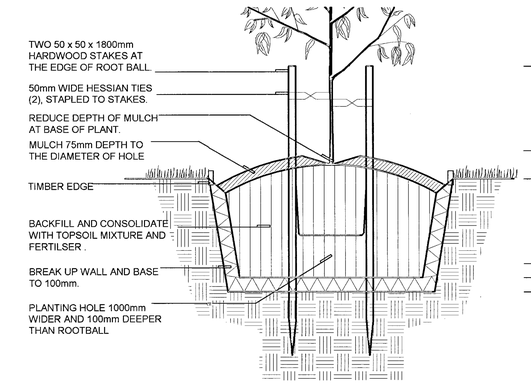
PLANT ESTABLISHMENT PERIOD
FROM THE DATE OF PRACTICAL COMPLETION , THERE SHALL BE A PERIOD OF 52 WEEKS FOR THE PLANTING ESTABLISHMENT PERIOD. ANY FAILED PLANTS SHALL BE REPLACED WITH THE SAME TYPE AND SPECIES, THE MULCHED SURFACES SHALL BE MAINTAINED IN A NEAT AND TIDY CONDITION, STAKES AND TIES SHALL BE ADJUSTED AS REQUIRED AND THE TURF SHALL BE REGULARLY MOWED TO MAINTAIN A HEALTHY GROUND COVER. A CONSTANT WATER REGIME SHALL BE MAINTAINED TO ENSURE HEALTHY GROWTH OF ALL PLANT MATERIAL.

PLANT SCHEDULE

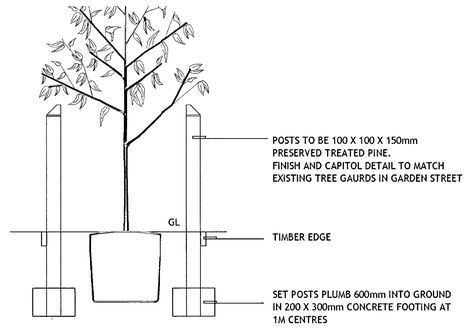
	BOTANICAL NAME	COMMON NAME	No.	STAKING	SIZE
	Trees				
◨	*Angophora costata*	Smooth Barked Ap	21	YES	100L
△	*Eucalyptus haemastoma*	Scribbly Gum	4	YES	100L



1 TURF DETAIL
SCALE 1:10



2 100 LITRE STREET TREES
SCALE 1:20



3 TREE GAURDS
SCALE 1:20

2595/06

18 JAN 2007

REV.	DATE	AMENDMENTS	REV.	DATE	AMENDMENTS
A	OCT 05	FOR APPROVAL			

KYORA LANDSCAPES
Professional Landscape Design and Construction
Lic. No. 1191820
ABN. No 17435110096

Title: LANDSCAPE PLAN

Client: V,D AND M BUBALO

Project: 7 & 7A ORCHARD STREET

Scale: 1:1000

Issue: A

Drawing No: 05004

FILE COPY

level 4
104 Mount Street
North Sydney 2060

PO Box 515
North Sydney 2059
Australia

telephone: (02) 9957 1619
facsimile: (02) 9957 1291
email: reception@patbrit.com.au
ABN 89 003 220 228

Patterson Britton
& Partners Pty Ltd

consulting engineers

Newcastle Office
8 Telford Street
Newcastle East 2300

PO Box 668
Newcastle 2300
Australia

telephone: (02) 4928 7777
facsimile: (02) 4926 2111
email: mail@newcastle.patbrit.com.au

lt467002mjs-bubalo cert letter.doc

PITTWATER COUNCIL COPY
CC 0545/06

W, D and M Bubalo
107 Orchard Street
WARRIEWOOD NSW 2102
Fax 9970 8454

CC The Certification Group
Attention Mr Wayne Treble
Fax 9944 6330

Rec
10 JAN 2007

Wednesday, 22 November 2006

Attention: Mr Wally Bubalo

Dear Sir

107 ORCHARD STREET, WARRIEWOOD – ROAD AND SUBDIVISION WATER MANAGEMENT CERTIFICATION

I refer to your request to provide a summary of the engineering documents produced by Patterson Britton & Partners (*PBP*) to date for both the access road and subdivision DA's at the above address.

It is understood that the above clarification is required to assist in the assessment of your Construction Certificate (*CC*) applications by the Certification Group (*ie on behalf of Pittwater Council*). In this regard we refer to the two letters from the Certification Group dated 8th November, 2006 (*Ref ADD INFO. 0546.06 and ADD INFO. 0545.06*).

In terms of engineering/water management related CC requirements:

- DA N0457/05 was utilised to determine CC requirements for the Access Road (*refer to **Appendix F***); and
- DA N0152/02 was utilised to determine CC requirements for the subdivision (*refer to **Appendix G***)

In summary, PBP have produced the following engineering related documentation to date:

1. Access Road design drawings – CC Issue (*refer to **Appendix A***);
2. Subdivision stormwater management design drawings – CC Issue (***refer to Appendix B***);
3. CC Stage Water Management Report (*refer to **Appendix C***);
4. Waste Management Plan – CC Issue (*refer to **Appendix D***); and
5. Traffic Management Plan – CC Issue (*refer to **Appendix E***).

In addition, PBP utilised the services of Geotechnique Pty Ltd to assist in geotechnical considerations for the proposed access road (*refer to report at **Appendix F***).

Based on the above documentation and in response to the Certification Group correspondence dated 8th November, 2006 we confirm the following:

Access Road DA Conditions (DA N0457/05) – CC 0545/06

- Condition B1 is understood to be satisfied by PBP document at **Appendix D** (*ie waste management plan*);
- We confirm a shared trench arrangement is proposed as shown on the Drawings at **Appendix A** to locate all new utility services for the lots below ground and clear of landscaping in accordance with Condition B3;
- Condition C5 is understood to be satisfied by PBP document at **Appendix A** (*ie detailed road design drawings);*
- Conditions C1 is understood to be satisfied by PBP document at **Appendix A** (*ie detailed road design drawings);*
- We herby certify that the engineering design and plans for road and drainage works comply with the requirements of Conditions C1, C2 and C3 – Michael Shaw CPEng MIEAust (*1126270*) NPER (*compliance with Condition C4*); and
- For assistance in compliance with Conditions C9 and C10 see attached Geotechnical report at **Appendix H**.

Subdivision DA Conditions (DA N0152/02) – CC 0546/06

- Condition B25, B26, B27 and B28 are understood to be satisfied by PBP document at **Appendix A** (*ie detailed road design drawings);*
- We herby certify that the engineering design and plans for road and drainage works comply with the requirements of Conditions B26, B27 and B28 – Michael Shaw CPEng MIEAust (*1126270*) NPER (*compliance with Condition B28a*);
- Condition B29 is understood to be satisfied by PBP document at **Appendix B** (*Drawing 4670-01-06*). Note we confirm all silt fences are proposed to be contained wholly within 107 Orchard St – see mark up on Drawing *4670-01-06*;
- Condition B29a is also understood to be satisfied by the above document (ie *Drawing 4670-01-06 at **Appendix B**);*
- Condition B29b is understood to be satisfied by PBP document at **Appendix E** (*ie traffic management plan*) and **Appendix B**;
- We herby certify that the water management report at **Appendix C** and associated plans complies with the requirements of Conditions B30, and B31 – Michael Shaw CPEng MIEAust (*1126270*) NPER (*compliance with Condition B32*);
- The drawings at **Appendix A** show that the works comply with Condition D31; and
- We confirm a shared trench arrangement is proposed as shown on the Drawings at **Appendix A** to locate all new utility services for the lots below ground and clear of landscaping in accordance with Condition D44.

Patterson Britton
& Partners Pty Ltd

We trust this information is satisfactory. Should you have any further enquiries, please do not hesitate to contact either Michael Shaw or myself on (02) 9957 1619.

Yours faithfully
PATTERSON BRITTON

Mark Tooker
Principal

Review / Verification by Date

.....

Pittwater Council

ABN 61 340 837 871 **Telephone** (02) 9970 1111 **Facsimile** (02) 9970 715(
Postal Address: P.O. Box 882, Mona Vale NSW 1660, DX 9018 Mona Vale

pittwaterlga.com.au **e-mail:** pittwater_council@pittwater.nsw.gov.au

Ross McWhirter, Project Leader - Warriewood Infrastructure
8am to 5pm Mon - Fri
Phone 9970 1207 Mobile 0419 629 007

19 October 2006

W D Bubalo
7 Orchard Street
WARRIEWOOD NSW 2102

Dear Sir,

Re: Engineering Plans for Orchard Street and Access Road

This correspondence refers to Clause C1 (second paragraph) of Consent No. N0457/05, and Clause B26 (second paragraph) of Consent No. N0152/02 requiring engineering plans and specifications within the public road reserve to be submitted and approved by Council prior to the issue of any Construction Certificate.

This advice refers to Orchard Street Access Road, Warriewood Civil Road Design prepared by Patterson Britton & Partners Pty Ltd: -

Drawing No. 4670, Sheet: -
01 Issue E, 02 Issue D, 03 Issue E, 04 Issue E, 05 Issue E, 06 Issue D, 07 Issue E, 08 Issue E, 09 Issue E, 10 Issue D, 11 Issue D, 12 Issue D and 13 Issue A.

The Plans are satisfactory subject to the following:

- All Engineering Plans to be certified by an experienced Civil Engineer who is NPER accredited by the Institution of Engineers (Australia), in accordance with Condition C4 of Consent No. N0457/05 and Condition B28a of Consent No. N0152/02.

Yours faithfully

James Payne
MANAGER - URBAN INFRASTRUCTURE

PITTWATER COUNCIL
CC 0545/06

10 JAN 2007

level 4
104 Mount Street
North Sydney 2060

PO Box 515
North Sydney 2059
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Patterson Britton
& Partners Pty Ltd

consulting engineers

Waste Management Plan

DA No. N0457/05 and N0152/02
Construction of Private Accessway and Subdivision of 7 Orchard St into 10 lots

7 Orchard St, Warriwood Valley, NSW for WD & M Bubalo

This waste management plan has been prepared in accordance with Appendix 4 of the Warriewood Valley Urban Land Release DCP 29 to demonstrate the following:

1. The volume and type of waste to be generated;
2. How waste is to be stored and treated on site;
3. How residual waste is to be disposed of; and
4. How ongoing waste management will operate.

1. Description of Proposed Works

It is proposed that the existing property at 7 Orchard Rd, Warriewood Valley be subdivided into 10 individual lots and all associated infrastructure required to service the lots be constructed. In summary, this would entail the following works:

- Half width road construction along the private access road frontage of the lots as per PBP design Drawings contained in **Appendix A**;
- Half width reconstruction of the Orchard Road frontage as per PBP design Drawings contained in **Appendix A**;
- Provision of all utility infrastructure (*ie gas, telecommunications, water, sewer and power*) to serve the proposed new lots and to maintain connection to existing lots;
- Provision of all required stormwater management systems as per PBP report titled "*Warriewood Valley 7&7A Orchard St (Part of Sector 10) - Water Management Report Construction Certificate Stage*" (Issue 1 September 2005) and associated PBP design Drawings contained within **Appendix B**;
- Bulk earthworks within the new lots; and
- Demolition of existing structures within the new lots.

2. Volume and Type of Waste to be Generated by the Development

The major component of waste to be generated by the proposed works is related to bulk earthworks activities.

Bulk earthworks will be undertaken simultaneously within both the lots and proposed roadways (*ie on the lots and within Orchard Rd and the private accessway).*

In summary, the proposed roadworks will result in a net surplus of cut material which will have to be transported from the site to be disposed at an appropriate landfill facility (*ie Kimbriki*). Special fill material will also have to be brought into the site for construction of the road (*ie from Kimbriki*). However, within the proposed lot areas, cut and fill works will generally be undertaken without the need to import or export material from the site. Some of the suitable spoil generated by the proposed roadworks will also be used to fill areas within the lots themselves.

A summary of the proposed bulk earthworks for the site is as follows:

- Lots – minor regrading (*generally balanced cut and fill*), use of cut material from road works as fill for batters on western edge of lots and minor filling on southern lots;
- Road cut works – approximately 1000m^3, of which 700m^3 is assumed to be clean and would be stockpiled for reuse on the lots as mentioned above. The remaining 300m^3 would need to be removed from the site and disposed of at Kimbriki;
- Road fill works – approximately 600m^3 of material is required for the batters on the east side of the road, 100m^3 would be used to fill the southern lots and 400m^3 of special fill (*ie base-course and sub-base material*) is required to be imported to construct the roads themselves;
- Hence, an estimated 300m^3 is proposed to be trucked out from the site and 400m^3 is proposed to be trucked in.

The 300m^3 of material to be removed from the site would consist of the old AC pavement and inert but unsuitable/uncompactable fill. The 400m^3 to be imported to the site would consist of recycled roadbase and basecourse material from Kimbriki.

In addition to the above, the following waste material is also likely to be generated as part of the roadworks:

- General Contractors waste (*ie litter, offcuts etc*); and
- Effluent from portable on site toilets.

For the minor demolition works to be undertaken on the lots themselves, the following waste products are likely to be produced:

- Bricks;
- Concrete;
- Timber;
- Asbestos sheeting; and
- Vegetation.

3. Waste Management Plan

A summary of the proposed waste management plan for the proposed construction and ultimate stages of the project is as follows:

- It is proposed to promote waste minimisation for both the construction and ultimate stages of the development. This will be achieved by using at source waste separation, use of recycled materials in construction and disposal of materials to facilities that separate and sell for reuse (*ie Kimbriki tip*);

- Topsoil stripped from the areas of proposed road construction and lot earthworks will be stored on site, treated for weeds and reused again as topsoil at completion of all works;
- Any good quality roadbase and/or basecourse material found beneath the existing road will be separated and stored on site for potential reuse beneath the new roadways;
- Any hardwood timbers within the existing structures to be demolished will be separated and stored onsite for reuse. Those timbers not used will be taken to Kimbriki tip (*an approved recycling facility*) for reuse by others;
- Any existing concrete slabs to be demolished will be separated and taken to Kimbriki tip (*an approved recycling facility*) for processing and reuse as roadbase or aggregate;
- Any existing bricks obtained from demolition of existing structures will be separated and taken to Kimbriki tip (*an approved recycling facility*) for processing and reuse as drainage aggregate;
- Any Asbestos contained within the existing structures on site will be removed in accordance with the appropriate health guidelines and disposed of at an approved facility *(ie Kimbriki tip)*;
- Any proposed waste storage containers utilised during the construction phase will be stored wholly within the development site (*ie not in the public road reserve*);
- On site portable toilet waste will be removed from the site and disposed of at an approved facility;and
- General contractors waste will be removed from the site and disposed of at an approved facility.

No substantial ongoing waste management issues are envisaged from the proposed works in the post construction phase other than quarterly removal of gross pollutants from the proposed street drainage litter baskets to be located near the southern end of the new accessway. This material would be disposed of at an approved facility.

This DA only involves subdivision of the lots and no ongoing waste management issues are envisaged to arise from the empty lots, until housing is constructed, which is not part of this DA.

We trust this information is satisfactory. Should you have any further enquiries, please do not hesitate to contact either Michael Shaw or myself on (02)9957 1619.

Yours faithfully
PATTERSON BRITTON

Mark Tooker
Principal

Review / Verification by Date

21/7/06

Wayne Treble

From: nathan_huon@pittwater.nsw.gov.au
Sent: Thursday, 2 November 2006 10:46 AM
To: wayne@thecgroup.com.au
Subject: DA N0152/02

Wayne,

As per our disucssion Council confirms that the deferred commencemnt condition on consent N0152/02 has ben satisfied and the consent is operative.

For your information Ross McWhirter has confirmed via a file note on Council's datatworks records system the following:

The letter to Barry L. Doyle dated 12 September 2005 provides evidence that the Deferred Commencement condition of Consent No. N0152/02 has been satisfied. The water management for the subdivision is to be in accordance with the Water Management Report prepared by Patterson Britton and Partners Pty Ltd. The report requires the stormwater from the site to be disposed through the stormwater drainage system constructed by Stockland. The necessary drainage infrastructure, easements and S88B Instruments are in place to cater for the 7 Orchard Street subdivision.
Ross McWhirter
PROJECT LEADER WARRIEWOOD INFRASTRUCTURE

Regards

Nathan Huon
Project Manager (Land Release Projects)

Pittwater Council

ABN 61 340 837 871 Telephone (02) 9970 1111 Facsimile (02) 9970 7150
Postal Address: P.O. Box 882, Mona Vale NSW 1660, DX 9018 Mona Vale

pittwateriga.com.au e-mail: pittwater_council@pittwater.nsw.gov.au

Business Hours:
8.00am to 5.30pm, Monday to Friday

DA No: N0152/02

5 October 2006

MILEVA BUBALO
107 ORCHARD STREET
WARRIEWOOD NSW 2102

Dear Sir/Madam

Extension of Development Consent for subdivision of one lot into ten lots.

7 ORCHARD STREET, WARRIEWOOD NSW 2102.

Please be advised that an extension of the above Development Consent has been granted to 20/10/2007.

Yours faithfully

Anna Williams
PRINCIPAL DEVELOPMENT OFFICER

Pittwater Council

ABN 61 340 837 871 Telephone (02) 9970 1111 Facsimile (02) 9970 7150
Postal Address: P.O. Box 882, Mona Vale NSW 1660, DX 9018 Mona Vale

http://www.pittwaterlga.com.au e-mail: pittwater_council@pittwater.nsw.gov.au

Ross McWhirter, Project Leader - Warriewood Infrastructure
8am to 5pm Mon - Fri
Phone 9970 1207 Mobile 0419 629 007

12 September 2005

Barry L. Doyle
64 Cassia Street
DEE WHY NSW 2099

Dear Sir,

Re: 7 Orchard Street, Warriewood

Reference is made to your letter dated 23 March 2005 and Council's letter dated 30 March 2005 concerning stormwater drainage for Sector 10.

Council advises that the completed stormwater drainage works in Stages 4 and 5 of Sector 10 to facilitate external drainage of the subdivision at 7 Orchard Street have been completed and are satisfactory. The subdivision certificates also provide the drainage easements and Section 88B Instrument requirements necessary for stormwater drainage of 7 Orchard Street. Accordingly, Council has released the Subdivision Certificates for Stages 4 and 5.

Yours faithfully

R. McWhirter

Ross McWhirter
PROJECT LEADER - WARRIEWOOD INFRASTRUCTURE

cc. Stockland Development Pty Ltd

Sydney
WATER

Case Number: 76708

V & D & M Bubalo
c/- Byrne & Associates Pty Ltd

Dear Applicant

REVISED NOTICE OF REQUIREMENTS
for
SECTION 73 SUBDIVIDER/DEVELOPER COMPLIANCE CERTIFICATE
(Sydney Water Act 1994, Part 6, Division 9)

This Notice of Requirements letter supersedes the Notice letter issued on 9 May 2005

Developer:	**V & D & M Bubalo**
Your reference:	**20516**
Development address:	**7 Orchard Street Warriewood**
Development description:	**Residential subdivision of one lot into ten (10) Torrens Title lots**
Consent No:	**N0152/02 by Pittwater Council of 31 March 2005.**
Your application:	**31 March 2005**

Your attention is drawn to the requirements in this Notice that must be met before a Section 73 Subdivider/ Developer Compliance Certificate (the Certificate) can be issued. **This Notice is given by Sydney Water on 26 May 2006 and the requirements are to apply for a year from that date** after which the requirements will be updated on reapplication.

You must engage your current or another authorised Water Servicing Coordinator (the Coordinator) to manage the design and construction of the Water and Sewer works that you must provide, at your cost, to service your development. Upon your meeting of this and all other requirements, the Certificate will be issued to you by your Coordinator.

For a list of authorised Coordinators, either see **www.sydneywater.com.au** and refer to *Developing Your Land* under *Building Developing and Plumbing*, or call **13 20 92.** Coordinators may provide you with **a quote or advice regarding costs for their and other supplier's services/ works as well as** other Sydney Water costs.

The Coordinator generally will be the single point of contact between you and Sydney Water and can answer any questions in the first instance you may have on Sydney Water's developer process and developer charges.

SUMMARY OF REQUIREMENTS TO OBTAIN A CERTIFICATE:

You must:

1. **Engage a Coordinator prior to signing the enclosed Agreement.**
2. **Sign both copies of the enclosed Agreement and lodge with the Coordinator.**
3. **Consequent to signing the Agreement, build Water and Sewer works at your cost, pay associated charges and note advice on existing service availability.**

PITTWATER COUNCIL
CC 0545/06

Ka
10 JAN 2007

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SUMMARY OF REQUIREMENTS¶

4. **Pay a total of $75,981 in charges identified in Section 4.**

   Please Note:

   - **You need to obtain a Tax Invoice before you can pay this charge in person at a Sydney Water Customer Service Centre (located in the City, Wollongong and Katoomba). If you require an invoice, please contact your Coordinator.**

5. **Complete any special requirements detailed in Section 5.**

DETAILED REQUIREMENTS

1. **Water Servicing Coordinator**

You must engage an authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development.

2. **Major Works Agreement.**

After you engage a Coordinator, you will need to sign and lodge **both copies** of the enclosed Major Works Agreement with your nominated Coordinator. The agreement identifies the responsibilities of Sydney Water, the Coordinator and you (the Developer) for your development's Water and Sewer construction. After execution by Sydney Water, one copy will be returned to your authorised Coordinator.

Note: *The authorisation of the Coordinator must be current at all times throughout the project.*

3. **Water and Sewer works.**

The water and sewer works you construct and pay for under the Agreement entered into must include extensions to Sydney Water's systems to ensure each lot in your development has:
- a frontage to a watermain to enable a separate connection and meter.
- a sewer main with a connection point within the boundary of each lot.

Sydney Water's specific requirements for your project are:

Water

An extension to the existing 100mm CICL diameter water main in Orchard Street is required to service lots 703 to 710. As the proposed water main is to be laid in a proposed Right of Carriageway, you will need to create an easement over the main in favour of Sydney Water. Details regarding the easement creation are set out in this letter in item 5 under Special Conditions.

Lot 701 and 702 have frontage to the existing 100mm CICL diameter water main in Orchard Street.

*Each lot will require a separate 20mm connection, 20mm water service and 20mm water meter.

Currently the existing property (with three flats/dwellings) is connected to the existing water main via a 25mm connection and served by a 40mm water meter. *This set-up will need to be adjusted to reflect the above arrangement for torrens title lots. Each of the existing dwellings will need to be reconnected to the existing/proposed water mains. A copy of your licensed plumbers signed Plumbing and Drainage Compliance Certificate will need to be submitted to Sydney Water when the work is satisfactory completed.

PITTWATER COUNCIL
DA 0545/06

10 JAN 2007

Sewer

An extension to the existing 150mm PVCP sewers (constructed by the adjoining developer) to enable each lot of the subdivision to have a point of connection within their respective property boundaries. Each lot must have separate sewer house service lines wholly within their boundaries.

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

- **Future Adjustments**

If the watermain/ sewer main located in the footway/ your property is found, after the issue of this notice, to require adjustment or deviation this work must be undertaken in conjunction with the abovementioned extension. The conditions of this notice will apply including engagement of a Coordinator, signing of an agreement, and completion at no cost to Sydney Water **prior to the issue of the Certificate** (see also section on building plan stamping). After the design has been completed and its nature and complexity considered, Sydney Water may require your lodgement of an appropriate security that will be refunded upon completion.

Note: If construction must take place on neighbouring properties, written consent to enter for design/construction purposes must be obtained from the relevant property owners and tenants using Sydney Water's Permission to Enter form(s). Your Coordinator has copies of the form(s) that are also available on the Internet at the address as above and can negotiate on your behalf. All items on the form(s) must be addressed including payment of compensation and consideration of design and construction alternatives to avoid/minimise impacts. You will be responsible for all costs of mediation necessary to resolve disputes with affect property owners/tenants. Please allow sufficient time for entry issues to be concluded.

In providing these works to Sydney Water you will need to pay project management, survey, design and construction costs **directly to your suppliers.** These costs may include Sydney Water charges for:

- Watermain shutdown and disinfection
- Connection of new mains to Sydney Water system(s)
- Design and construction audit fees
- **Contract administration on project finalisation**
- Creation or modification of Sydney Water interests in land (eg. easements)
- Further application fees for staged developments
- Redress under Sydney Water's Customer Contract.

Your Coordinator can advise you about these costs and how they may be quoted.

4. Developer charges.

Development Servicing Plan (DSP)	Basis of Calculation	Charge ($) for Applicable period (26/05/06-30/06/06)	Charge ($) for Applicable Period (01/07/06-25/05/07)
Warringah Water DSP Area	**Residential** Development Density >0-20 dwellings per ha band 10 dwellings @ $871 = $8,710 **Less Credit of $2,613 for previous payment/ use plus Upsizing** Development Density >0-20 dwellings per ha band 10 dwellings @ $192 = $1,920 **Less Credit of $576 for previous payment/ use**	**$ 6,097** **$ 1,344**	**$TBA** **$TBA**
Warriewood Sewer DSP Area	**Residential** Development Density >0-20 dwellings per ha band 10 dwellings @ $6,765 = $67,650 **Less Credit of $0 for previous payment/ use plus Upsizing** Development Density >0-20 dwellings per ha band 10 dwellings @ $89 = $890 **Less Credit of $0 for previous payment/ use**	**$67,650** **$ 890**	**$TBA** **$TBA**
Reticulation Recovery 13623WW	37 metres of 150mm PVCP sewer. The adjoining developer laid two sewer 'lead-outs' to service your property.	**$16,027**	**$TBA**
DEVELOPER CHARGES TOTAL: *[OFFICE USE- Invoice Charges total- Developer $73,747 and Upsizing $ 2,234]*		**$92,008**	**$TBA**

Notes:

New IPART Determination:

- Sydney Water has commenced its five-yearly review of developer charges in accordance with IPART Determination No. 9 2000. Developer charges will be revised to take into account Sydney Water's latest capital expenditure projections as well as current development forecasts. The revised developer charges and associated DSPs will be placed on public exhibition for 30 working days in April/ May 2006. You will have the opportunity to comment on the new charges during this time. The new developer charges will then take effect from 1 July 2006.
- **Some of the new charges may significantly decrease, others may increase and additional charges may be introduced**. Consequently it may be to your advantage to consider when you will make payment. That is;

➢ If payment is made before 1 July 2006, then Sydney Water must apply the charges quoted in this Notice; or

➢ If payment is made on or after 1 July 2006, then;

- If the new charges have **decreased** you will only have to pay the new lower charges that will be advised to you when you seek to make payment; or
- If the new charges have **increased and/or additional charges introduced** then Sydney Water will apply the old lower charges, plus any CPI increase, for the remainder of the applicable period of this Notice. After that time, Sydney Water is required to apply the new higher and/ or additional charges when you re-apply.

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PENRITH COUNCIL COPY
CC 0596/06
10 JAN 2007

Sydney Water is unable to advise possible new charges until the DSPs are exhibited in April/ May 2006, or to advise firm new charges until registration of the DSPs with IPART in June 2006. Contact your Coordinator for advice on charges during this period.

Annual CPI adjustment from 1 July:

- If you do not pay the charges identified in column 3 of the above table by 30 June (and as advised above), the total will be adjusted for inflation (based on the weighted average of the capital cities CPI for the 12 months to the end of the previous March) from 1 July for the balance of the 12 month period. The charge from 1 July is only shown in column 4 if the inflation figure is known.

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Also:

- **DSP charges** are a contribution towards the cost of systems (eg pipelines & treatment plants), which serve your development. They have been calculated using base developer charges that cannot be changed or waived by Sydney Water having been established in Plan(s), available on request, and registered with the Independent Pricing and Regulatory Tribunal (IPART) under its relevant Determination. For further details, and a copy of the IPART Act 1992 including section 31 that refers to arbitration rights, see the IPART web site www.IPART.nsw.gov.au. Costs of arbitration, if appropriate, are borne equally by you and Sydney Water irrespective of outcome.
- These charges are directly payable to Sydney Water.
- **You must pay your DSP charge before you will be given permission to connect your development to Sydney Water's water/sewer systems.**
- **Reticulation Recovery Charges** recover part of the cost of works that have been provided by Sydney Water or other developers that benefit your development. This charge has been calculated before your detailed designs are completed. If later design investigation shows your development will be connected to other main/s, the Reticulation Recovery charge may be varied and/or you may need to construct other works.

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5. Special requirements

- **Creation of easement over water main**

Each water main to be constructed for purpose of the ***approval*** in land other than a dedicated public road or pathway must have an appropriate easement in favour of Sydney Water created at your cost.

Your Design Consultant must take this requirement into account when preparing the design for the works.

A ***compliance certificate*** in respect of the ***approval*** will not be granted until:-

(a) the water main(s) have been constructed; and
(b) adequate drainage facilities have been provided to allow for the flushing of the main by Sydney Water without the discharge of water onto private property (Sydney Water's rights in this regard must be incorporated in the Easement documentation); and
(c) a survey has been carried out, at your cost, prior to backfilling of trenches, to define the centreline of each water main; and
(d) all plans and documents relating to the easement have been approved by Sydney Water; and
(e) payment of Sydney Water's related costs have been made; and
(f) the required security has been lodged with Sydney Water in respect of each easement pending its registration.

Specific details with respect to each easement to be created may be obtained from Sydney Water's Group Property, 5th Floor, 115-123 Bathurst Street, Sydney, 2000.
Ph: (02) 9350-5670 or (02) 9350-5647.

- **Provide a copy of the Plumbing and Drainage Compliance Certificate**

It will be necessary to provide a signed copy of the above Certificate to Sydney Water following the capping of the existing 25mm drilling, disconnection of the 40mm water meter and the reconnection of the existing dwellings to the existing/ proposed water mains. This work will need to be carried out by a licensed plumber.

GENERAL INFORMATION

- **Stamping and approval of your engineering and building plans.**

While NOT a requirement for the Certificate, you are reminded that, on development of each lot, building plans must be stamped and approved at either:

- a Quick Check agency (for an agency list either see www.sydneywater.com.au, refer to Quick Check under *Building Developing and Plumbing* or call 13 20 92); or
- a Sydney Water Customer Service Centre.

Approval is required as construction/building works (eg earthworks, roadworks, drainage, landscaping, excavation, foundation works) may impact on existing Sydney Water assets (eg water, sewer and stormwater mains). Approval of the plans may take up to 21 days and the results may affect the construction/building activities.

Approval is required as construction/building works (eg earthworks, roadworks, drainage, landscaping, excavation, foundation works) may impact on existing Sydney Water assets (eg water and sewer mains). Approval of the plans may take up to 21 days and the results may affect these activities.

POSSIBLE FUTURE COSTS

Requirements in this Notice relate to your Certificate application and may not cover all aspects of Sydney Water's involvement with your development. During design and construction of your development other Sydney Water fees/requirements may be necessary, including:

- construction/building plan stamping fees including fees to ensure the protection of Sydney Water assets
- plumbing and drainage inspection costs for private service lines (including property service connection and/ or disconnection and inspection fees)
- council fire fighting requirements (if not catered for by your current Sydney Water main). You should investigate fire fighting facility requirements for your development as soon as possible, including a standard pressure inquiry to Sydney Water if needed.

END OF NOTICE

level 2
104 Mount Street
North Sydney 2060

PO Box 515
North Sydney 2059
Australia

telephone: (02) 9957 1619
facsimile: (02) 9957 1291
reception@patbrit.com.au
ABN 89 003 220 228

Patterson Britton
& Partners Pty Ltd

consulting engineers

Newcastle Office
8 Telford Street
Newcastle East 2300

PO Box 668
Newcastle 2300
Australia

telephone: (02) 4928 7777
facsimile: (02) 4926 2111
mail@newcastle.patbrit.com.au

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WD & M Bubalo
7 Orchard Street
Warriewood NSW 2102

PITTWATER COUNCIL CONSENT
CC 0545/06

Friday, 21 July 2006

Attention: Mr W Bubalo

Rh
10 JAN 2007

Dear Sir

DA N0457/05 & N0152/02 ORCHARD ST, WARRIWOOD – CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN

As requested following is the proposed construction phase traffic management plan for both the lot and accessway/Orchard Rd works proposed at the above site.

1. Description of Works

It is proposed that the existing property at 7 Orchard Rd, Warriewood Valley be subdivided into 10 individual lots and all associated infrastructure required to service the lots be constructed. In summary, this would entail the following works:

- Half width road construction along the private access road frontage of the lots as per PBP design Drawings contained in **Appendix A**;
- Half width reconstruction of the Orchard Road frontage as per PBP design Drawings contained in **Appendix A**;
- Provision of all utility infrastructure (*ie gas, telecommunications, water, sewer and power*) to serve the proposed new lots and to maintain connection to existing lots;
- Provision of all required stormwater management systems as per PBP report titled "*Warriewood Valley 7&7A Orchard St (Part of Sector 10) - Water Management Report Construction Certificate Stage*" (Issue 1 September 2005) and associated PBP design Drawings contained within **Appendix B**; and
- Bulk earthworks within the new lots.

2. Proposed Earthworks

Bulk earthworks will be undertaken simultaneously within both the lots and proposed roadways (*ie on the lots and within Orchard Rd and the private accessway).*

In summary, the proposed roadworks will result in a net surplus of cut material which will have to be transported from the site to be disposed at an appropriate landfill facility (*ie Kimbriki*).

Special fill material will also have to be brought into the site for construction of the road (*ie from Kimbriki*). However, within the proposed lot areas, cut and fill works will generally be undertaken without the need to import or export material from the site. Some of the suitable spoil generated by the proposed roadworks will also be used to fill areas within the lots themselves.

A summary of the proposed bulk earthworks for the site is as follows:

- Lots – minor regrading (*generally balanced cut and fill*), use of cut material from road works as fill for batters on western edge of lots and minor filling on southern lots;
- Road cut works – approximately 1000m^3, of which 700m^3 is assumed to be clean and would be stockpiled for reuse on the lots as mentioned above. The remaining 300m^3 would need to be removed from the site and disposed of at Kimbriki;
- Road fill works – approximately 600m^3 of material is required for the batters on the east side of the road, 100m^3 would be used to fill the southern lots and 400m^3 of special fill (*ie base-course and sub-base material*) is required to be imported to construct the roads themselves;
- Hence, an estimated 300m^3 is proposed to be trucked out from the site and 400m^3 is proposed to be trucked in.

3. Estimated Truck Movements and Proposed Route

The proposed destination for all waste disposal and supply of all new road construction materials is the Kimbriki Recycling and Waste Disposal Facility on Mona Vale Rd at Tumbledown Dick.

Assuming 20t trucks are used for the works, it is estimated that 20 truck movements per day over 3 days (*ie during Council stipulated working hours only of 7am to 5pm Monday – Friday and 7am to 1pm on Saturdays. No works to be undertaken on Sunday or Public Holidays*) would be required during the material disposal phase of the works and 20 truck movements per day for 4 days for the road fill import phase of the works. If road fill material is able to be stockpiled on the site during the excavation phase for the roadworks, then the number of truck movements could potentially be reduced by half with trucks dropping off waste and picking up base-course/sub-base material in the same trip.

Hence, the estimated worst case truck movements is predicted to be 20 trucks per day over 7 days, however it is suspected that the actual movements will be considerably less.

Figure 1 shows the proposed truck route to and from the site to Kimbriki. This route has been selected as Council have advised that no truck movements are permitted along Garden St south of Mullet Creek and on Mona Vale Road between Tumbledown Dick and Mona Vale.

4. Maintaining Access to all Existing Lots in Orchard Road During The Works

So as to provide continued access to all existing properties during the works, a construction phase traffic management plan has been developed as shown in **Drawing 4670-13** at **Appendix A**.

In summary the road works would be undertaken in two phases. The first phase would entail construction of parts of the accessway to the east of the existing bitumen pavement and the southern half of the orchard Road frontage. This would allow continued access to all existing

properties via the existing bitumen road. Following completion of the phase 1 works, all traffic would then be transferred to the new road constructed in Phase 1 whilst the areas to the west of the phase 1 works are completed.

Temporary traffic management signage, barricades and fencing would be used during both phases of the works as shown in **Drawing 4670-13** at **Appendix A** so as to maintain safety during the works.

5. Sediment, Erosion and Dust Control

A sediment and erosion control strategy for the proposed road works is shown on **Drawing 4670-12** at **Appendix A.**

A sediment and erosion control strategy for the proposed lot works is shown on **Drawing 4670-01-06** at **Appendix B.**

Manual watering down of exposed earthworks areas would be undertaken for the purposes of dust control. In addition, all loads transported from the site would be covered and all fencing used around the perimeter of the works would incorporate a geotextile cover to assist in capture of dust.

We trust this information is satisfactory. Should you have any further enquiries, please do not hesitate to contact either Michael Shaw or myself on (02) 9957 1619.

Yours faithfully
PATTERSON BRITTON

Mark Tooker
Principal

Review / Verification by Date

21/7/06

PITTWATER COUNCIL
CC 05456

10 JAN 2007

FIGURES

FIGURE 1

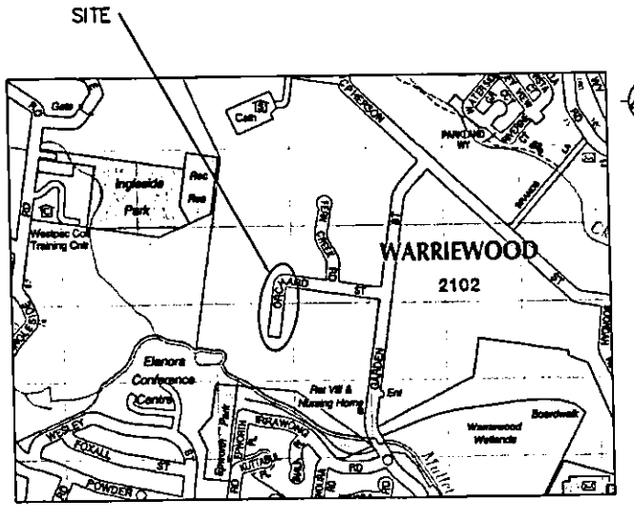
PITTWATER COUNCIL CONSTRUCTION CERTIFICATE
Number: CC 0796/06
This is a copy of submitted plans, documents or Certificates associated with the issue of the Construction Certificate.
Endorsed by: KR
Date: 10 JAN 2007

7 ORCHARD STREET
CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN
-PROPOSED TRUCK ROUTE

SOURCE: Sydway
J4670_02/FIG1_ManagementPlan.jpg

APPENDIX A

ORCHARD STREET ACCESS ROAD, WARRIEWOOD
CIVIL ROAD DESIGN
for
V, D AND M BUBALO



LOCALITY PLAN
NTS

KA
10 JAN 2007

PITTWATER COUNCIL
DA 0576/06

DRAWING LIST:

4670-01	TITLE SHEET, LOCALITY PLAN AND DRAWING LIST
4670-02	GENERAL NOTES & SPECIFICATIONS (SHEET 1 OF 2)
4670-03	GENERAL NOTES & SPECIFICATIONS (SHEET 2 OF 2) AND SHARED SERVICE TRENCH DETAIL
4670-04	SITE PLAN AND LONGITUDINAL SECTION
4670-05	CUL-DE-SAC KERB DEVELOPMENT AND ACCESS ROAD TYPICAL SECTION
4670-06	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 1 OF 3
4670-07	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 2 OF 3
4670-08	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 3 OF 3
4670-09	PROPOSED SURFACE CONTOURS AND PAVEMENT DESIGN
4670-10	STORMWATER DRAINAGE PLAN
4670-11	STORMWATER DRAINAGE LONGITUDINAL SECTIONS
4670-12	EROSION AND SEDIMENT CONTROL PLAN
4670-13	CONSTRUCTION PHASE TRAFFIC MANGEMENT PLAN

DRG STATUS : FOR CONSTRUCTION

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: TITLE SHEET, LOCALITY PLAN AND DRAWING LIST

Drawing No. 4670-01
Issue D
Cad File No. 4670-01
Xref.(s)

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GENERAL NOTES

1. ALL WORKS SHALL BE IN ACCORDANCE WITH PITTWATER COUNCILS AUS-SPEC CONSTRUCTION SPECIFICATION, DETAILS SHOWN ON THESE DRAWINGS, AND TO THE DIRECTIONS OF THE PROJECT MANAGER.

2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS AND WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.

3. ALL SET OUT DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.

4. DURING CONSTRUCTION THE WORKS SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING AND BATTERS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

5. ALL MATERIALS AND WORKMANSHIP USED IN THE CONSTRUCTION OF THIS DESIGN SHALL BE IN ACCORDANCE WITH ALL RELEVANT CURRENT AUSTRALIAN STANDARDS.

6. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

7. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA. THE ACCURACY IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. ALL CLEARANCES AND APPROVALS SHALL ALSO BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY PRIOR TO THE COMMENCEMENT OF WORK

8. THE CONTRACTOR SHALL OBTAIN SETOUT CO-ORDINATES FROM THE SUPERINTENDENT, AND ARRANGE ALL SURVEY SETOUT BY A REGISTERED SURVEYOR

9. ALL NEW AND EXHUMED SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS WITHIN THE SITE SHALL BE BACKFILLED WITH DGB20 MATERIAL TO SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENSITY RATIO. SUBJECT TO PRIOR APPROVAL FROM RELEVANT AUTHORITY

10. ON COMPLETION OF SERVICES INSTALLATION, ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AREAS, GRASSED AREAS AND ROAD PAVEMENTS.

11. WHERE NEW WORK ABUTS EXISTING, THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE FREE FROM ABRUPT CHANGES, IS OBTAINED.

12. CARE TO BE TAKEN WHEN EXCAVATING NEAR ENERGY AUSTRALIA, INTEGRAL ENERGY, TELSTRA AND AGL SERVICES. NO MECHANICAL EXCAVATION TO BE UNDERTAKEN OVER POWER, TELSTRA AND AGL SERVICES HAND EXCAVATE IN THESE AREAS. LIAISE WITH RELEVANT AUTHORITY AS REQUIRED.

13. THE CONTRACTOR SHALL NOT DISTURB ANY EXISTING SURVEY BENCH MARKS OR REFERENCE MARKS (UNLESS INDICATED FOR REMOVAL) WITHOUT LANDS DEPT APPROVAL IN WRITING.

14. THE CONTRACTOR TO FENCE AND SECURE SITE.

15. PUBLIC ROAD WORKS
THE CONTRACTOR'S ATTENTION IS DRAWN TO THE REQUIREMENTS OF PITTWATER COUNCIL. WHERE THE WORKS ARE LOCATED IN A ROAD RESERVE OR CROSSES THE PAVEMENT OF A PUBLIC ROADWAY OR FOOTWAY, THE CONTRACTOR SHALL OBTAIN A PERMIT COVERING THE NECESSARY WORKS AND COMPLY WITH ALL THE CONDITIONS COVERING THE ISSUE OF SUCH PERMIT. A CHARGE IS MADE FOR PERMITS ISSUED IN RESPECT OF PAVEMENT OPENINGS. THE CONTRACTOR SHALL OBTAIN DETAILS FROM COUNCIL. PAY ALL FEES, MEET ALL REQUIREMENTS AND CARRY OUT ALL LIAISON AT NO EXTRA COST. ALL PAVEMENT SURFACING IS TO BE UNDERTAKEN BY THE CONTRACTOR. ALL PAVEMENT REINSTATEMENT TO BE UNDERTAKEN BY THE CONTRACTOR. ALL TO PITTWATER COUNCIL'S STANDARDS AND APPROVAL.

16. PAVEMENT DESIGN REPORT BY GEOTECHNIQUE, JANUARY 2005 – THE CONTRACTOR SHALL ENSURE THAT THEY ARE FAMILIAR WITH THE CONTENTS OF THIS REPORT.

17. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT SO THAT AT ANY TIME ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL-WEATHER ACCESS OR SUBJECTED TO ADDITIONAL OR POLLUTED STORM WATER RUNOFF DURING THE PERIOD OF CONSTRUCTION.

18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO COUNCIL'S INFRASTRUCTURE, SUCH REPAIR OR REINSTATEMENT TO BE CARRIED OUT IMMEDIATELY TO THE SATISFACTION OF COUNCIL.

19. THE CONTRACTOR IS TO PREPARE AND IMPLEMENT A TRAFFIC MANAGEMENT PLAN TO COUNCIL'S STANDARDS AND APPROVAL FOR ALL WORKS.

20. SITE SURVEY UPON WHICH DESIGN HAS BEEN BASED PREPARED BY BYRNE & ASSOCIATES, DECEMBER 2004.

SAFETY

1. ATTENTION IS DRAWN TO THE OCCUPATIONAL HEALTH AND SAFETY ACT (2000), WHICH REQUIRES THAT EMPLOYERS ENSURE THE HEALTH, SAFETY AND WELFARE OF THEIR EMPLOYEES.

2. THE CONTRACTOR MUST, AT ALL TIMES, EXERCISE ANY OTHER NECESSARY AND REASONABLE PRECAUTIONS APPROPRIATE TO THE NATURE OF THE WORK AND THE CONDITIONS UNDER WHICH THE CONTRACT IS TO BE PERFORMED FOR THE SAFETY OF ALL PERSONS ON THE WORK SITE, OR IN THE VICINITY.

QUALITY ASSURANCE

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN A QUALITY ASSURANCE SYSTEM MEETING THE REQUIREMENTS OF AS 9002. THE QUALITY SYSTEM SHALL BE SUCH THAT RECORDS ARE KEPT OF ALL ASPECTS AND STAGES OF THE WORK.

2. THE RECORDS FOR EACH CONSTRUCTION TASK SHALL BE STAGED AND ITEMISED TO THE SATISFACTION OF THE CONTRACTOR ADMINISTRATOR. THE PROFORMAS FOR RECORDS SHALL BE SUBMITTED TO THE CONTRACTOR ADMINISTRATOR FOR APPROVAL AND WORK SHALL NOT COMMENCE UNTIL SUCH APPROVAL HAS BEEN GIVEN.

3. DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ACCURATE AND UP TO DATE RECORDS AND SHALL MAKE SUCH RECORDS AVAILABLE TO THE CONTRACTOR ADMINISTRATOR IF REQUESTED. FAILURE TO MAINTAIN RECORDS AS SPECIFIED WILL RESULT IN THE CONTRACTOR RE-INSPECTING COMPLETED WORKS IF INSTRUCTED TO DO SO BY THE CONTRACTOR ADMINISTRATOR.

4. AT THE COMPLETION OF EACH STAGE OF THE WORKS THE CONTRACTOR SHALL CERTIFY THAT THOSE WORKS HAVE BEEN UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATION AND INSTRUCTIONS ISSUED DURING THE COURSE OF THE CONTRACT.

EXISTING SERVICES AND FEATURES

1. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.

2. MAINTAIN EXISTING STORMWATER DRAINAGE FLOWS THROUGH THE SITE AT ALL TIMES. MAKE DUE ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.

3. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL OBTAIN THE SUPERINTENDENT'S APPROVAL FOR HIS PROGRAMME FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.

4. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES AS REQUIRED TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.

5. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO THE ADJACENT RESIDENCES. THE CONTRACTOR IS TO GAIN APPROVAL OF THE SUPERINTENDENT FOR THE TIME OF INTERRUPTION.

GENERAL STORMWATER NOTES

1. ALL STORMWATER WORKS ARE TO BE UNDERTAKEN GENERALLY IN ACCORDANCE WITH AS 3500 STORMWATER DRAINAGE.

2. UNLESS OTHERWISE APPROVED ALL DRAINAGE PIPES SHALL BE CLASS "2" SPIGOT AND SOCKET RCP PIPES WITH RUBBER RING JOINTS.

3. CONTRACTOR TO SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION TO DISSIMILAR PIPEWORK.

4. ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL BE CEMENT RENDERED WITH A NON-SHRINK EPOXY GROUT TO ENSURE A SMOOTH FINISH.

5. PRECAST PITS SHALL NOT BE USED. ALL DRAINAGE PITS TO BE CAST INSITU. LINTELS MAY BE PRECAST TO SUIT PROPOSED PITS.

6. STEP IRONS AT SPACINGS OF 0.3m ARE TO BE PROVIDED IN DRAINAGE PITS MORE THAN 1.2m DEEP.

7. PROVIDE 3.0M LENGTH OF 100DIA SUBSOIL DRAINAGE PIPE WRAPPED IN FABRIC SOCK AT UPSTREAM END OF EACH PIT.

8 ALL CONCRETE USED IN DRAINAGE PITS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 40MPa.

9. THE EXCAVATED TRENCH WIDTH FOR PIPE LAYING MUST BE AT LEAST 300mm WIDER THAN THE OUTER DIAMETER OF THE PIPE. PIPES ARE TO BE LAID CENTRALLY WITHIN THE EXCAVATED TRENCH.

10. ALL PIPES ARE TO BE LAID ON A MINIMUM BEDDING OF 75mm OF SAND GRADED IN ACCORDANCE WITH AS 3500.3. BEDDING SHALL BE COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY.

11. BACKFILL FOR STORMWATER PITS AND PIPES SHALL BE COMPACTED TO AT LEAST 95% (98% UNER ROADS) OF THE MAXIMUM DRY DENSITY AND GRADED IN ACCORDANCE WITH AS 3500.3.

12. BACKFILL MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO PLACING AND COMPACTION.

GENERAL STORMWATER NOTES (cont.)

13. THE CONTRACTOR SHALL ENSURE THAT ANY EXISTING STRUCTURES LOCATED ADJACENT TO EXCAVATED TRENCHES ARE SUPPORTED OR PROTECTED TO PREVENT DAMAGE TO OR MOVEMENT OF THESE STRUCTURES

14. UNLESS SPECIFIED ALL DRAINAGE GRATES TO BE HEAVY DUTY GALVANISED MILD STEEL TO AS 3996.

15. CHASES SHALL BE FORMED WHERE NECESSARY TO PREVENT SOCKETS, FLANGES OR THE LIKE FROM BEARING ON THE TRENCH BOTTOM OR THE UNDERLAY.

16. MATERIAL SHALL BE PLACED IN THE PIPE SURROUND IN LAYERS NOT MORE THAN 200mm LOOSE THICKNESS AND COMPACT WITHOUT DAMAGING OR DISPLACING THE PIPEWORK.

GENERAL COMPACTION NOTES

1. FOUNDATION MATERIAL DEEMED BY THE SUPERINTENDENT AS UNSUITABLE TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.

2. UNLESS OTHERWISE APPROVED OR SPECIFIED. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING:
A) FREE FROM ORGANIC AND PERISHABLE MATTER
B) MAXIMUM PARTICLE SIZE 75MM
C) PLASTICITY INDEX BETWEEN 2% AND 20%
D) CBR > 10%

3. SELECT FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200MM LOOSE THICK LAYERS AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR – 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289E3.1 OF NOT LESS THAN THE FOLLOWING STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289E1.1:

LOCATION STANDARD DRY DENSITY
–AREAS OF SERVICE TRENCHES 98%
–ROAD AND CARPARKS 100%
–LANDSCAPED AREAS 90%

4. THE CONTRACTOR SHALL PROGRAMME THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS. ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT HIS COST.

5. COMPACTION CONTROL TESTING SHALL BE CARRIED OUT BY AND AT THE COST OF THE CONTRACTOR TO CONFORM WITH LEVEL 1. AS DEFINED IN AS3798–1996.

CONCRETE NOTES

GENERAL

G1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600 AND THE SPECIFICATION. KEEP A COPY OF THE DOCUMENTS ON SITE.

G2. VERIFY ALL SETTING OUT DIMENSIONS WITH THE SUPERINTENDENT AND/OR THE SURVEYOR.

CONCRETE

C1. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH AS3600 CURRENT EDITIONS WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

C2. CONCRETE USED IN THE WORKS SHALL BE EITHER MASS CONCRETE OR REINFORCED CONCRETE AS NOTED ON THE DRAWINGS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

PROPERTY	REINFORCED CONCRETE	MASS CONCRETE
EXPOSURE CLASSIFICATION	B2	B2
MIN 28 DAY COMPRESSIVE STRENGTH	40 MPa	32 MPa
CEMENT TYPE	GENERAL PURPOSE	GENERAL PURPOSE
CEMENT CONTENT (MIN.)	350kg/m3	300kg/m3
WATER / BINDER RATIO (MAX.)	0.45	0.55
CLEAR COVER TO REINFORCEMENT (MIN.)	45 mm	45 mm
SURFACE FINISH – FORMED	CLASS 2	CLASS 2
– UNFORMED	WOOD FLOAT	WOOD FLOAT
MAXIMUM COARSE AGGREGATE SIZE	20 mm	20 mm

C3. NO 'BRECCIA' TYPE AGGREGATE IS TO BE USED.

C4. CEMENT TO BE TYPE SL TO AS3972 MAX CONCRETE SHRINKAGE TO BE 600UM TO AS1012.

C5. NO ADMIXTURES ARE TO BE USED WITHOUT THE APPROVAL OF THE ENGINEERS.

C6. CURE ALL CONCRETE USING AN APPROVED METHOD IN ACCORDANCE WITH ACSE SPECIFICATION. CURING COMPOUNDS TO COMPLY WITH AS3799. PVA BASED CURING COMPOUNDS ARE NOT ACCEPTABLE.

CONCRETE NOTES (cont.)

C7. THE FINISHED CONCRETE SHALL BE DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. CONCRETE SHALL BE COMPACTED WITH MECHANICAL VIBRATORS

C7. THE FINISHED CONCRETE SURFACE SHALL BE FREE OF CRACKS HAVING A CRACK WIDTH EQUAL TO OR GREATER THAN 0.1 mm AT TIME OF PRACTICAL COMPLETION. IF CRACKING EXCEEDS THIS LIMIT, THE CONTRACTOR SHALL MAKE GOOD THE CRACKS TO THE SATISFACTION OF THE SUPERINTENDENT WHICH MIGHT COMPRISE REPLACEMENT OF CONCRETE ELEMENT OR SEALING THE CRACKS WITH SILANE/SILICA FUME GEL OR OTHER WORKS.

C8. TESTING AND ASSESSMENT FOR COMPLIANCE OF CONCRETE SHALL BE CARRIED OUT BY THE CONTRACTOR IN ACCORDANCE WITH AS 3600. SUBMIT ALL RESULTS TO THE SUPERINTENDENT.

C9. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. PLASTIC TIPPED MILD STEEL CHAIRS SHALL NOT BE USED. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

C10. MAINTAIN COVER TO REINFORCEMENT AT CHAMFERS, DRIP GROOVES, REGLETS, ETC.

C11. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE SUPERINTENDENT.

C12. CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE SUPERINTENDENT.

C13. DURING AND IMMEDIATELY FOLLOWING POURING, THE CONCRETE SHALL BE PROTECTED FROM WIND AND SUN. AWNINGS AND WIND BREAKS ARE TO BE UTILISED FOR THIS PURPOSE.

C14. CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 7 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 14 DAYS FOLLOWED BY A GRADUAL DRYING OUT. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC. DO NOT USE APPLIED CURING AGENTS.

C15. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

FINISHING

F1. THE CONCRETE SHALL BE SCREEDED TO THE REQUIRED CROSS SECTION PROFILE FREE OF DEPRESSIONS AND HIGH AREAS TO SATISFY THE REQUIREMENTS OF AN INITIAL FINISH.

F2. FINAL FINISHING INCLUDES FLOATING AND TEXTURING THE PAVEMENT AND SHALL COMMENCE ONLY AS SOON AS THE WATER SHEEN HAS LEFT THE PAVEMENT SURFACE AND NOT IN ANY AREA WHERE THERE IS FREE SURFACE WATER.

FORMWORK

FW1. UNLESS NOTED OTHERWISE ALL CONCRETE FORMWORK SHALL BE CLASS '2' FINISH

FW2. THE DESIGN CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE CONTRACTOR.

FW3. DESIGN AND CONSTRUCTION AND STRIPPING TIMES SHALL COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE NOTED OR APPROVED BY THE SUPERINTENDENT.

FW4. DURING CONSTRUCTION SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORT SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LIVE LOADS.

FW5. THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT THE PRIOR APPROVAL OF THE SUPERINTENDENT.

PITTWATER COUNCIL CONSENT
CC 0545/06

10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
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A.C.N. 003 220 229

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS SHEET 1 OF 2

Drawing No. 4670-02
Issue D
Cad File No. 4670-02
Xref.(s)

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ASPHALTIC CONCRETE NOTES

1. GENERAL
A) MINERAL AGGREGATES TO COMPLY WITH CLAUSE 2.1 – MATERIALS OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
B) MINERAL FILLER TO COMPLY WITH AS2357–1980 MINERAL FILLERS FOR ASPHALT AND CLAUSE 2.1.2 – FILLER OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
C) BITUMEN BINDER SHALL COMPLY WITH CLAUSE 2.1.3 – BINDER OF RTA SPECIFICATION R116 – "ASPHALT (DENSE AND OPEN GRADED)".

2. MIX PROPORTIONS
A) JOB MIX – 10mm & 14mm (AS SPECIFIED ON DRAWINGS) NOMINAL SIZE AGGREGATE MINIMUM BITUMEN CONTENT (%) BY MASS OF TOTAL MASS – 5.1%.
B) MIX STABILITY – BETWEEN 19KN AND 36KN AS DETERMINED BY RTA TEST METHODS T606 AND T607.
C) AIR VOIDS IN COMPACTED MIX – BETWEEN 4% AND 7% OF THE VOLUME OF THE MIX.
D) VOIDS FILLED IN BINDER – 65–80% OF AIR VOIDS IN THE TOTAL MINERAL AGGREGATE FILLED BY BINDER IN ACCORDANCE WITH RTA TEST METHOD T606 AND T607.

3. PAVEMENT PREPARATION
A) THE EXISTING SURFACE TO BE SEALED SHALL BE DRY AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER.
B) ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK–COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE.

4. TACK COAT
A) THE WHOLE OF THE AREA TO BE SHEETED WITH ASPHALTIC CONCRETE SHALL BE LIGHTLY AND EVENLY COATED WITH RAPID SETTING BITUMEN COMPLYING WITH RTA SPECIFICATIONS 3252, 3253, 3254, 3256 AND 3269. APPLICATION RATE FOR RESIDUAL BITUMEN SHALL BE 0.15 TO 0.30 LITRES/SQUARE METRE. APPLICATION SHALL BE BY MEANS OF A MECHANICAL SPRAYER WITH SPRAY BAR.

5. SPREADING
A) ALL ASPHALTIC CONCRETE SHALL BE SPREAD WITH A SELF PROPELLED PAVING MACHINE.
B) THE ASPHALTIC CONCRETE SHALL BE LAID AT A MIX TEMPERATURE AS SHOWN BELOW:

ROAD SURFACE TEMPERATURE IN SHADE (°C)	MIX TEMPERATURES (°C)
5–10	NOT PERMITTED
10–15	150
15–25	145
OVER 25	140

C) ASPHALTIC CONCRETE SHALL NOT BE LAID WHEN THE ROAD SURFACE IS WET OR WHEN COLD WINDS CHILL THE MIX TO ADVERSELY AFFECT SPREADING AND COMPACTION.

6. JOINTS
A) THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM.
B) THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER.

7. COMPACTION
A) ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS.
B) INITIAL ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C.
C) SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 80OC USE PNEUMATIC TYRED ROLLER.
D) MINIMUM CHARACTERISTICS VALUE OF RELATIVE COMPACTION OF A LOT WHEN TESTED IN ACCORDANCE WITH CLAUSE 4.8 – COMPACTION OF RTA SPECIFICATION 116 "ASPHALT (DENSE AND OPEN GRADED)" SHALL BE 95%.

8. FINISHED PAVEMENT PROPERTIES
A) FINISHED SURFACES SHALL BE SMOOTH DENSE AND TRUE TO SHAPE AND SHALL NOT VARY MORE THAN 10MM FROM THE SPECIFIED PLAN LEVEL AT ANY POINT AND SHALL NOT DEVIATE FROM THE BOTTOM OF A DRARY 3M STRAIGHT EDGE LAID IN ANY DIRECTION BY MORE THAN 5MM.

9. THE PROPOSED 1m WIDE ROAD SHOULDER AT THE WESTERN EDGE OF THE NEW ROAD IS TO BE STABILISED WITH A FLUSH SEAL FINISH ONLY.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO THE STANDARD RECOMMENDED BY THE NSW DEPARTMENT OF HOUSING'S "BLUE BOOK" TITLE "MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION", 4TH EDITION, MARCH 2004.

2. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL INFORM THEIR STAFF OF THEIR OBLIGATIONS UNDER THIS EROSION AND SEDIMENT CONTROL SECTION.

3. SILT SOCKS AND GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED AT ALL DRAINAGE INLET PITS.

4. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION.

5. ALL SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED AFTER EACH RAINFALL EVENT FOR STRUCTURAL DAMAGE AND ALL TRAPPED SEDIMENT TO BE REMOVED TO THE APPROPRIATE STOCKPILE.

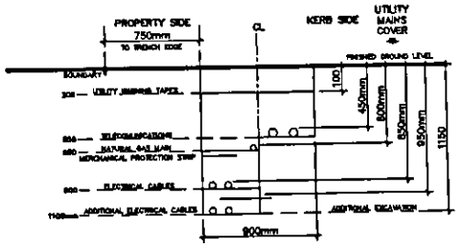
6. STABILISE ALL COMPLETED ROAD BATTERS WITH HYDROMULCH.

CONSTRUCTION MATERIALS

1. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KINDS, AND, UNLESS OTHERWISE SPECIFIED, SHALL CONFORM TO THE RELEVANT AUSTRALIAN STANDARDS.

2. SUFFICIENT NOTICE SHALL BE GIVEN BY THE CONTRACTOR TO THE SUPERINTENDENT TO ENABLE ANY MATERIALS THAT ARE BROUGHT ON THE SITE TO BE EXAMINED. ALL MATERIALS ARE TO BE SUITABLY STACKED TO FACILITATE EXAMINATION.

3. WHERE THE CONTRACTOR SUPPLIES MATERIALS OF A MIXED OR POOR QUALITY, THE SUPERINTENDENT SHALL HAVE THE POWER TO REQUIRE THE CONTRACTOR TO PICK OUT AND STACK THOSE MATERIALS WHICH IN HIS OPINION ARE SUITABLE FOR THE WORKS, AND TO HAVE THOSE UNSUITABLE REMOVED FROM THE SITE OF THE WORKS.



WIDTH OF TRENCH MAY BE REDUCED TO 600mm WITH 1 x TELECOMMUNICATIONS PROVIDER. LOCALISED WIDENING IS REQUIRED FOR PITS AND PILLARS

TYPYCAL SHARED SERVICE TRENCH FORMAT
NTS

0536/06
KC
1.0 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL–DE–SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		16.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS SHEET 2 OF 2
AND SHARED SERVICE TRENCH DETAIL

Drawing No. 4670-03
Issue D
Cad File No. 4670–02
Xref.(s)

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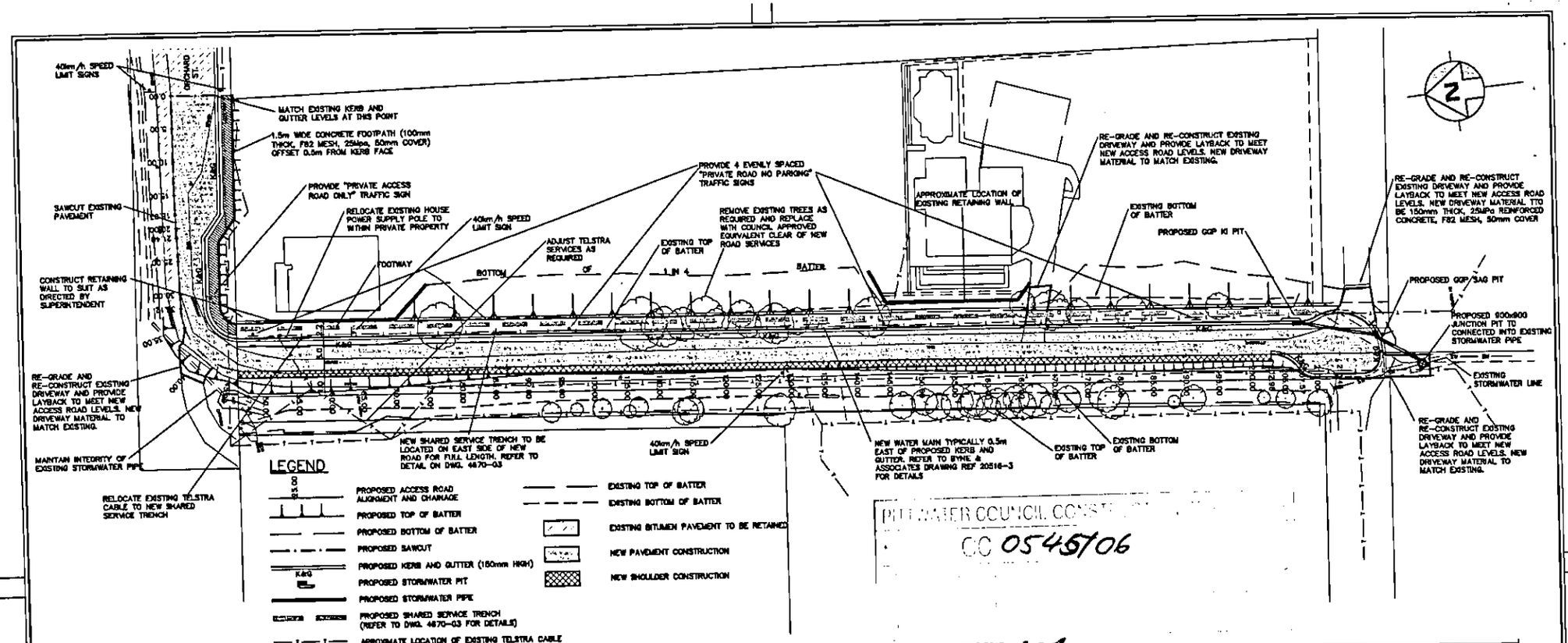

ACCESS ROAD LONGITUDINAL SECTION

SCALE HORIZONTAL 1:300
SCALE VERTICAL 1:150

HORIZONTAL 0 10 20 30m (1:300 (A1) 1:600 (A3))
VERTICAL 0 5000 10000 15000mm (1:150 (A1) 1:300 (A3))

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B-1	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Client: W. D. AND M. BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: SITE PLAN AND ACCESS ROAD LONGITUDINAL SECTION

Drawing No. 4670-04
Issue D
Cad File No. 4670-04
Xref.(s)

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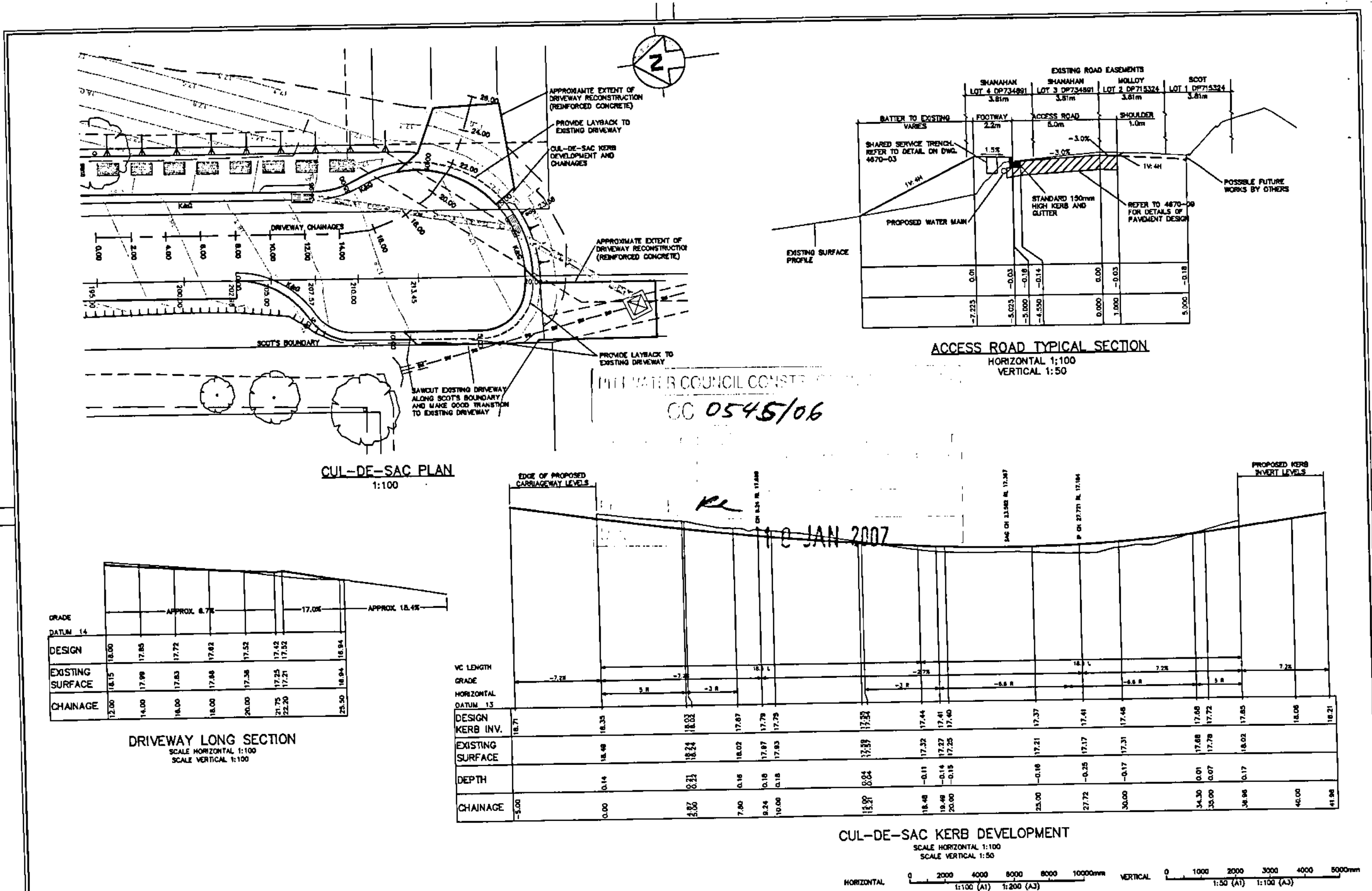

PITTWATER COUNCIL CONST...

CC 0545/06

10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
E	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
D	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B-1	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: CUL-DE-SAC KERB DEVELOPMENT AND ACCESS ROAD TYPICAL CROSS SECTION

Drawing No. 4670-05
Issue E
Cad File No. 4670-05
Xref.(s)

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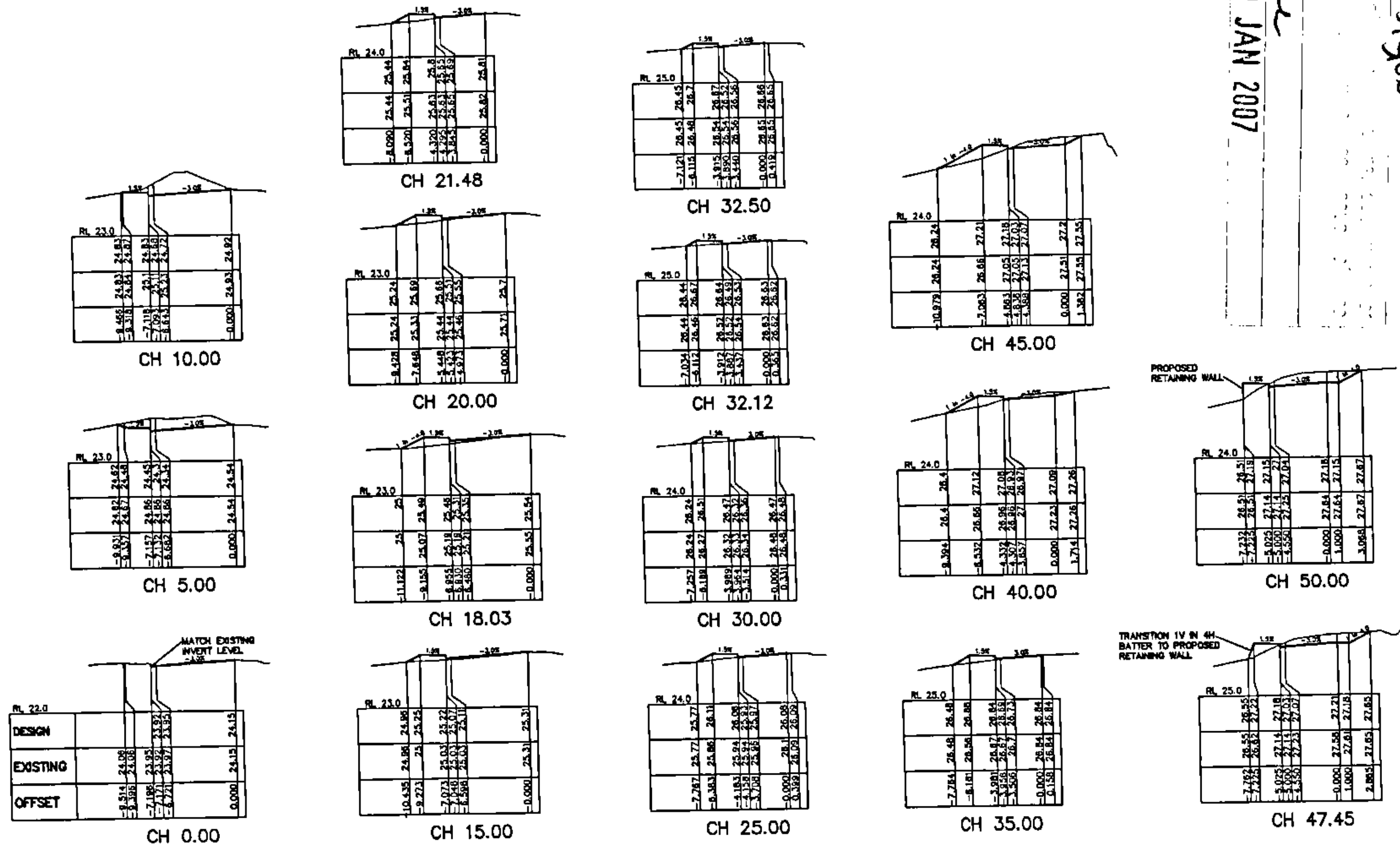

10 JAN 2007

HORIZONTAL 0 5000 10000 15000 20000mm 1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm 1:100 (A1) 1:200 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		23.01.05

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Patterson Britton & Partners Pty Ltd
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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: ACCESS ROAD DESIGN CROSS SECTION SHEET 1 OF 3

Drawing No. 4670-06

Issue D

Cad File No. 4670-06

Xref.(s)

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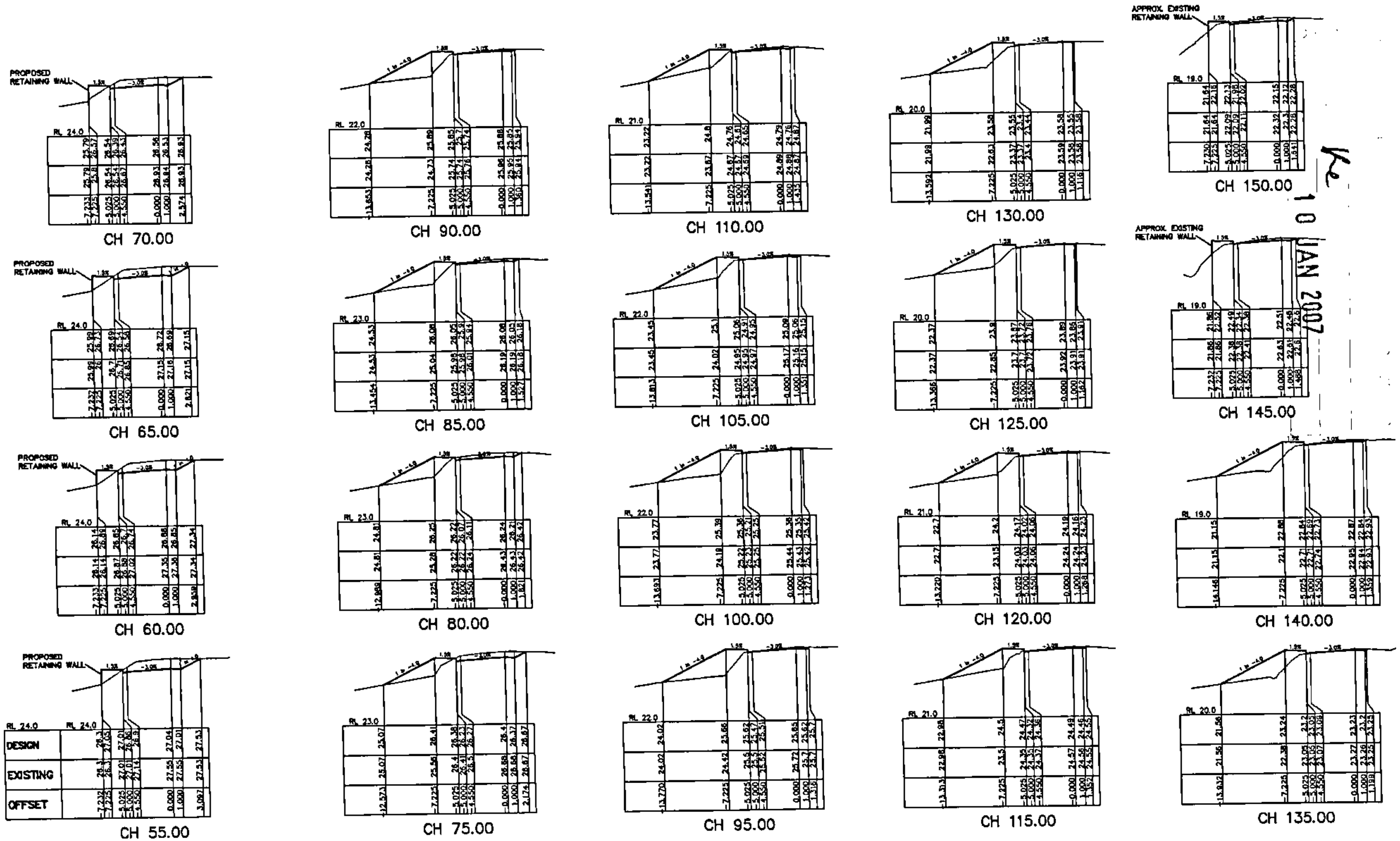

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VERTICAL 0 2000 4000 6000 8000 10000mm 1:100 (A1) 1:200 (A3)

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consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: ACCESS ROAD DESIGN CROSS SECTION SHEET 2 OF 3

Drawing No. 4670-07
Issue D
Cad File No. 4670-06
Xref.(s)

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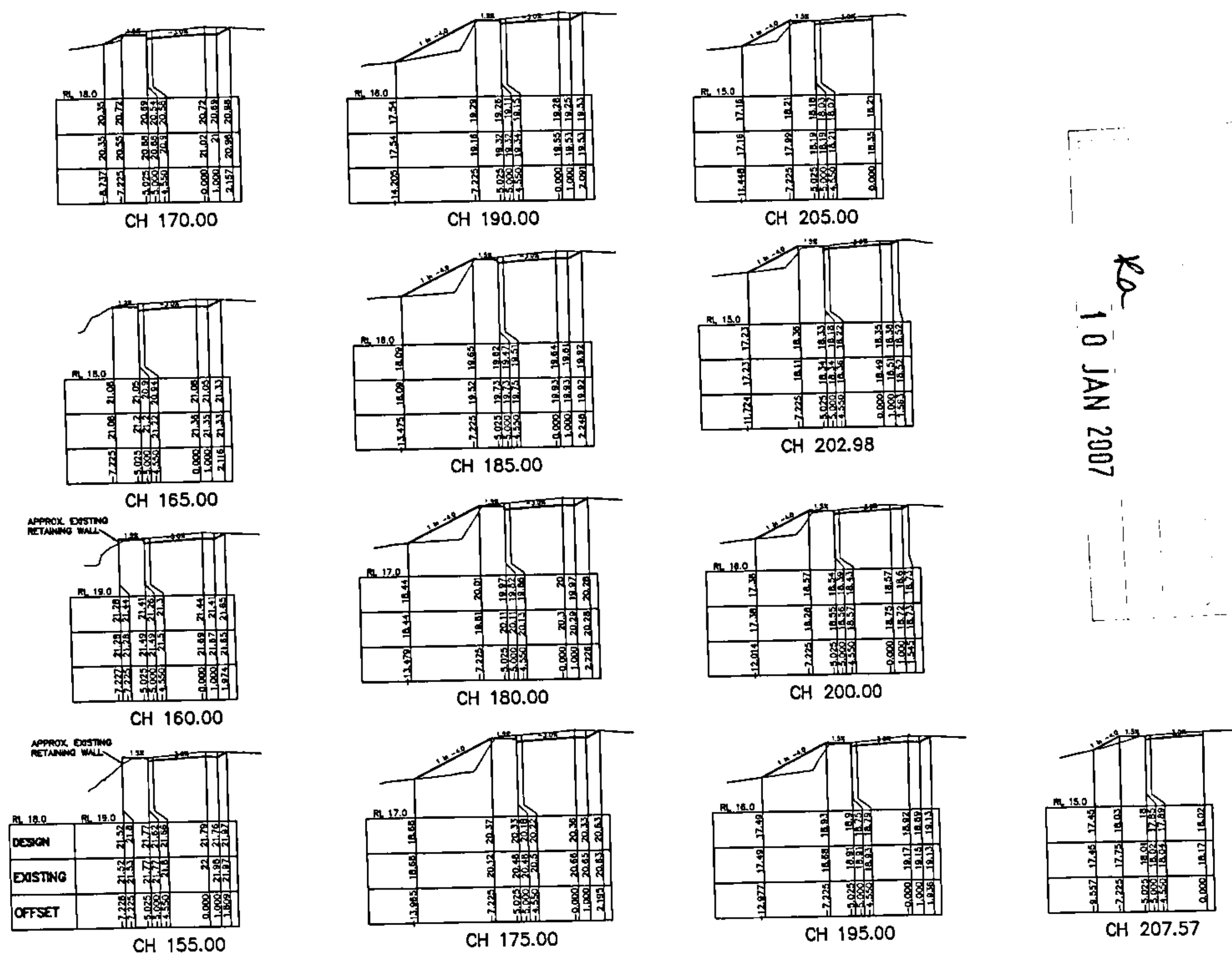

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VERTICAL 0 2000 4000 6000 8000 10000mm 1:100 (A1) 1:200 (A3)

DRG STATUS : FOR CONSTRUCTION

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A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: ACCESS ROAD DESIGN CROSS SECTION SHEET 3 OF 3

Drawing No. 4670-08
Issue D
Cad File No. 4670-08
Xref.(s)

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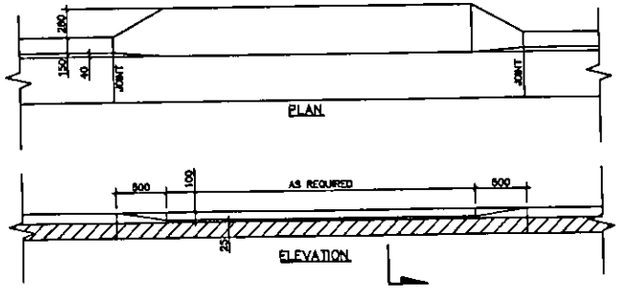
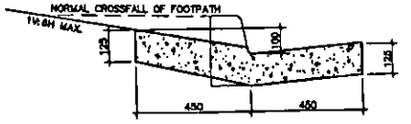
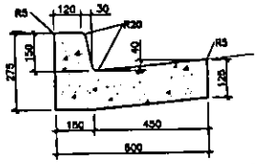


STANDARD VEHICULAR CROSSING
1:25

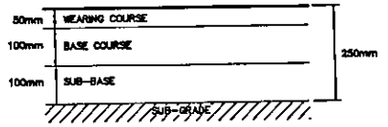


SECTION 1
1:10

STANDARD GUTTER CROSSING (LAYBACK)

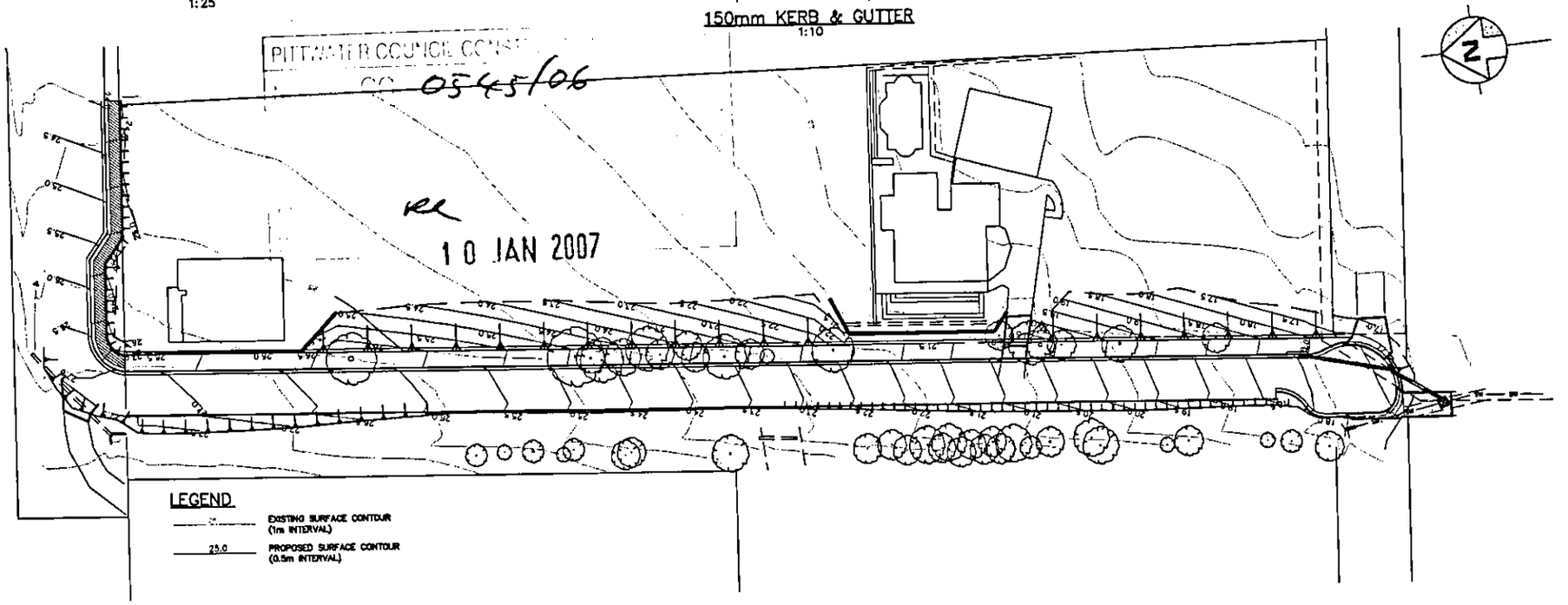


150mm KERB & GUTTER
1:10



TYPICAL ROAD PAVEMENT DETAIL

NOTE
1. THE BASE COURSE MATERIAL CAN BE DGB20 OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGB20 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION. THE SUB-BASE MATERIAL CAN BE CRUSHED SANDSTONE OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGS40 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION.
2. THE MINIMUM COMPACTION DRY DENSITY RATIO'S ARE AS FOLLOWS (AS1289.5.4.1-1993):
   - BASECOURSE 98% MODIFIED
   - SUB-BASE 95% MODIFIED
   - SUB-GRADE 100% STANDARD OR DENSITY RATIO OF 85%
3. PAVEMENT WEARING COURSE TO CONSIST OF A 30mm THICK LAYER OF AC14 OVERLAIN BY A 20mm THICK LAYER OF AC10.
4. FOR DETAILS OF THE REQUIRED ROAD PAVEMENT REFER TO PAVEMENT DESIGN REPORT PREPARED BY GEOTECHNIQUE PTY LTD, 14th JANUARY 2005.



PROPOSED SURFACE CONTOURS
1:300

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		06.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		15.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Client: V, D AND M BUSALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: PROPOSED SURFACE CONTOURS AND PAVEMENT DESIGN

Drawing No. 4670-09
Issue D
Cad File No. 4670-09
Xref.(s)

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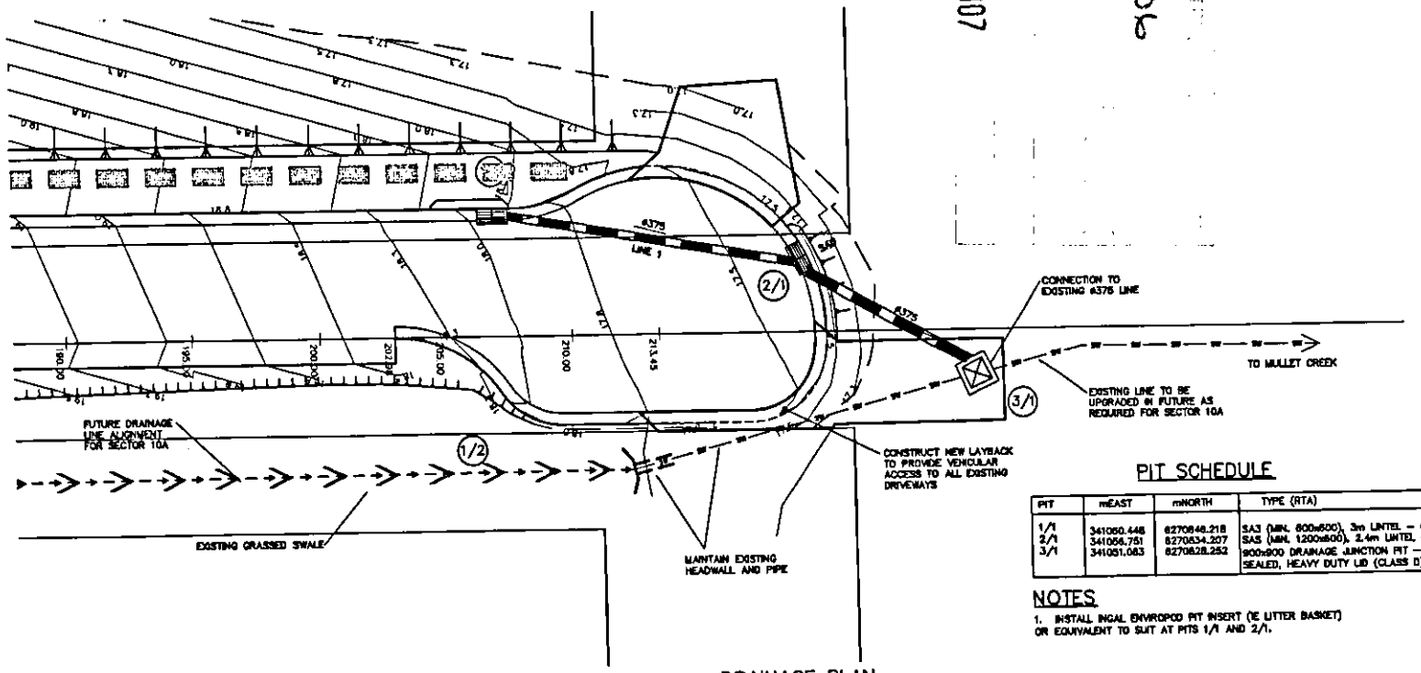

PIT SCHEDULE

PIT	mEAST	mNORTH	TYPE (RTA)
1/1	341050.448	6270648.218	SA3 (MIN. 600x600), 3m LINTEL – ON GRADE
2/1	341056.751	6270634.207	SA5 (MIN. 1200x600), 2.4m LINTEL – SAG
3/1	341031.083	6270628.252	900x900 DRAINAGE JUNCTION PIT – JUNCTION SEALED, HEAVY DUTY LID (CLASS D).

NOTES

1. INSTALL INGAL ENVIROPOD PIT INSERT (IE LITTER BASKET) OR EQUIVALENT TO SUIT AT PITS 1/1 AND 2/1.

DRAINAGE PLAN
1:100

0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : TENDER, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		16.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V. D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: STORMWATER DRAINAGE PLAN

Drawing No. 4670-10
Issue D
Cad File No. 4670-10
Xref.(s)

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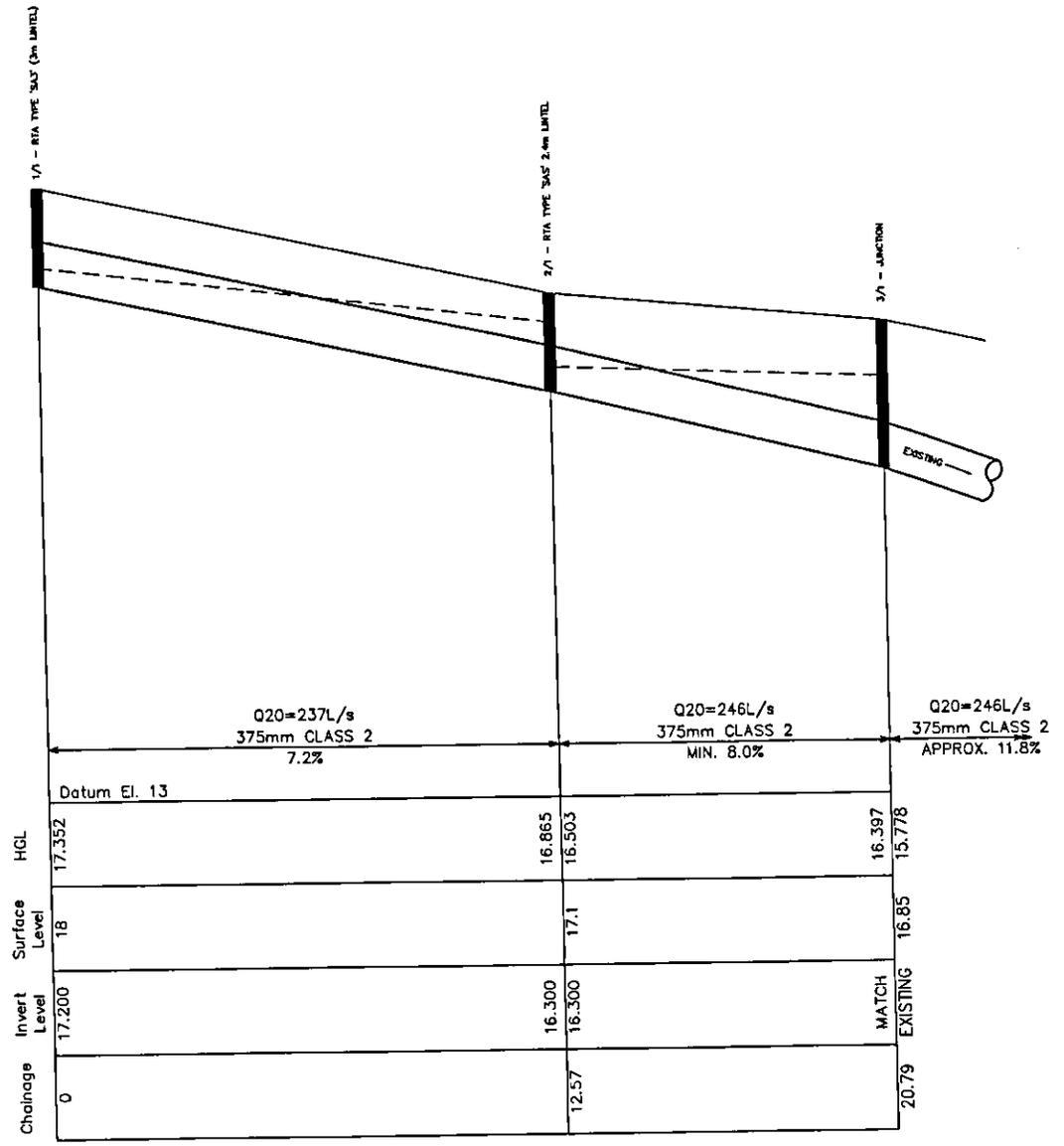

NOTES

1. FLOWS SHOWN ARE FOR A 20yr ARI EVENT.

NOT TO SCALE

10 JAN 2007

05/45/06

DRG STATUS : FOR CONSTRUCTION

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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email reception @pbsd.com.au
A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: STORMWATER DRAINAGE LONGITUDINAL SECTIONS

Drawing No. 4670-11
Issue D
Cad File No. 4670-11
Xref.(s)

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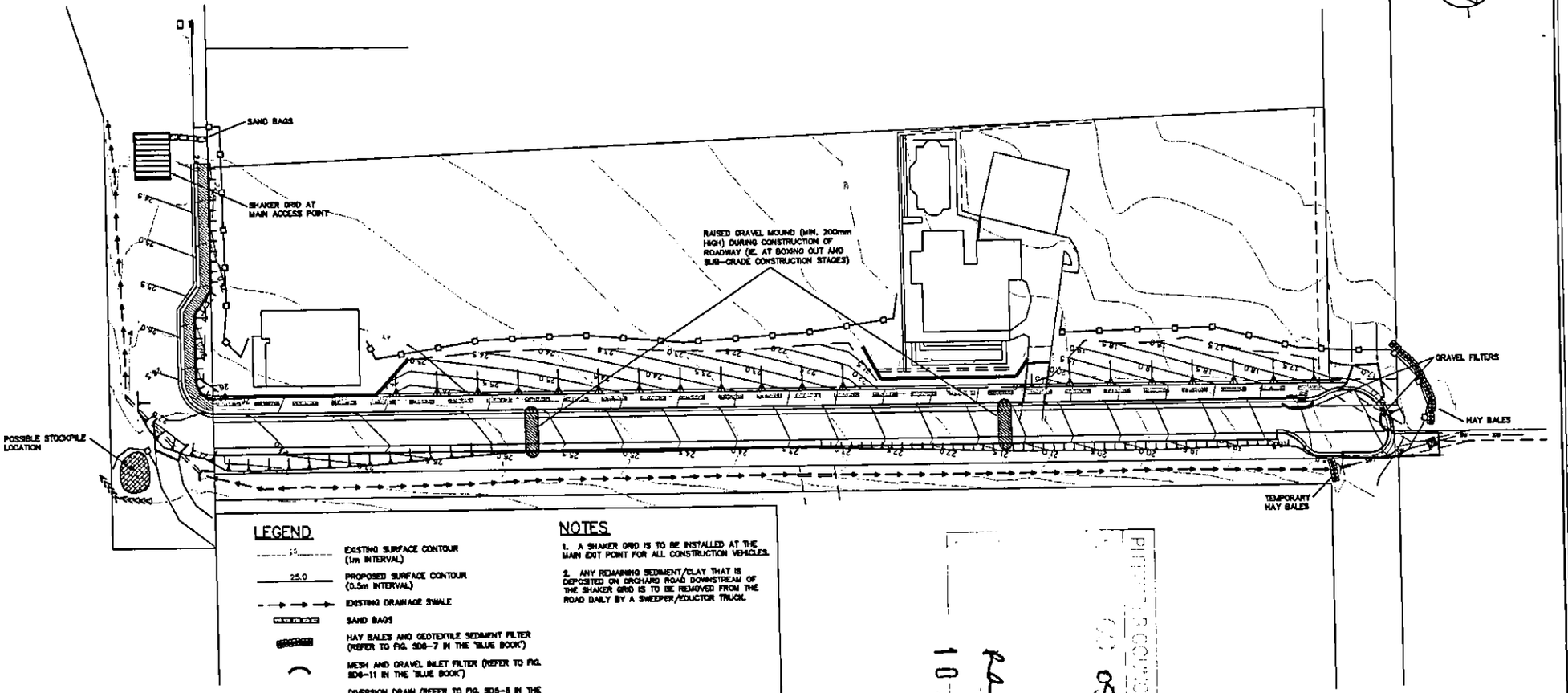
A1



LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- 25.0 PROPOSED SURFACE CONTOUR (0.5m INTERVAL)
- EXISTING DRAINAGE SWALE
- SAND BAGS
- HAY BALES AND GEOTEXTILE SEDIMENT FILTER (REFER TO FIG. SD6-7 IN THE 'BLUE BOOK')
- MESH AND GRAVEL INLET FILTER (REFER TO FIG. SD6-11 IN THE 'BLUE BOOK')
- DIVERSION DRAIN (REFER TO FIG. SD5-5 IN THE 'BLUE BOOK')
- SEDIMENT FENCE (REFER TO FIG. SD6-8 IN THE 'BLUE BOOK')
- POSSIBLE STOCKPILE LOCATION (REFER TO FIG. SD4-1 IN THE 'BLUE BOOK')

NOTES

1. A SHAKER GRID IS TO BE INSTALLED AT THE MAIN EXIT POINT FOR ALL CONSTRUCTION VEHICLES.
2. ANY REMAINING SEDIMENT/CLAY THAT IS DEPOSITED ON ORCHARD ROAD DOWNSTREAM OF THE SHAKER GRID IS TO BE REMOVED FROM THE ROAD DAILY BY A SWEEPER/EDUCTOR TRUCK.

10-JAN 2007

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: EROSION AND SEDIMENT CONTROL PLAN

Drawing No. 4670-12
Issue D
Cad File No. 4670-12
Xref.(s)

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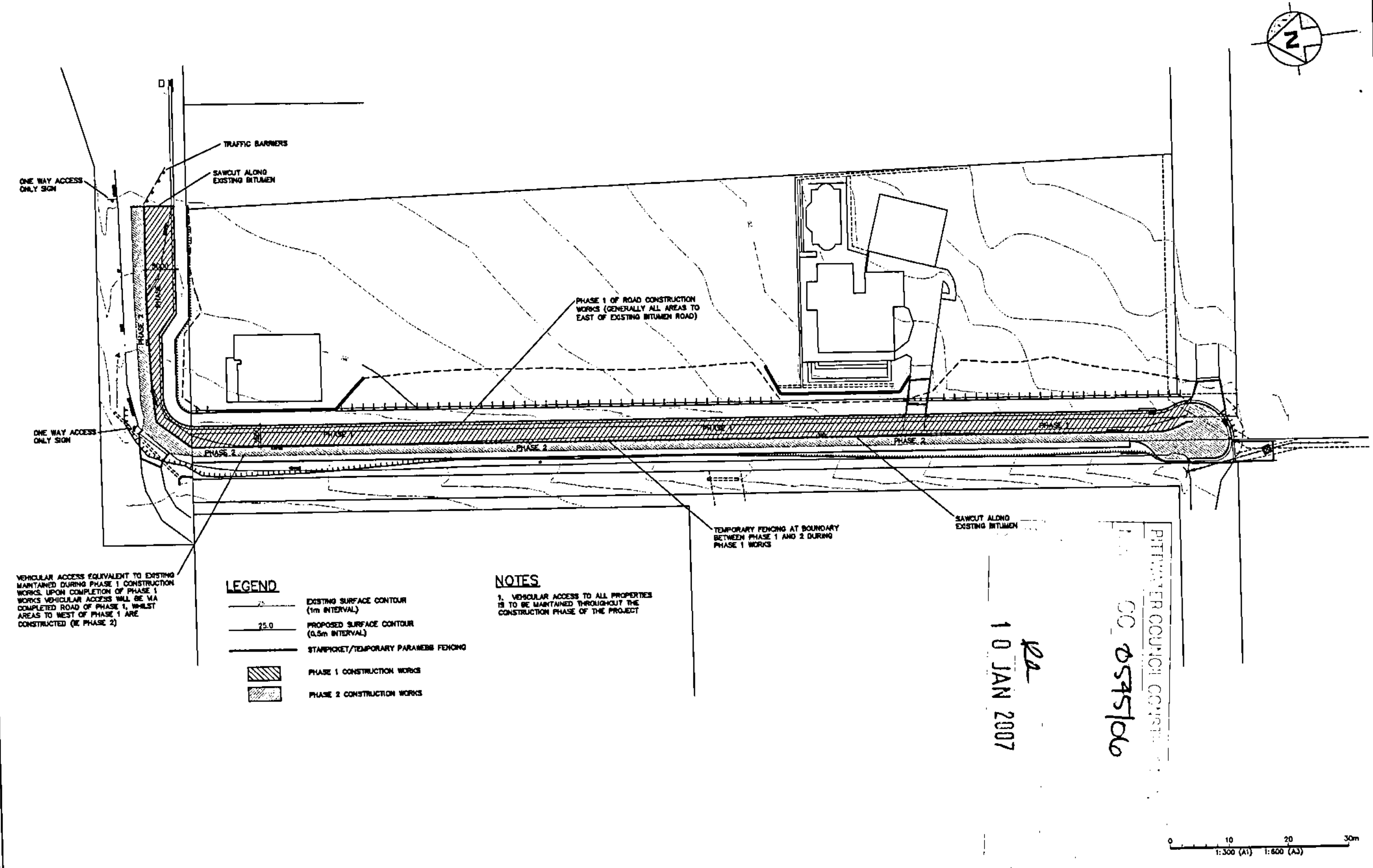

PITTWATER COUNCIL CONST...
CC 0595/06
10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
A	ISSUED FOR CONSTRUCTION	MS	ARQ	MS	M. TOOKER	21.07.06

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN

Drawing No. 4670-13
Issue A
Cad File No. 4670-13
Xref.(s)

A1

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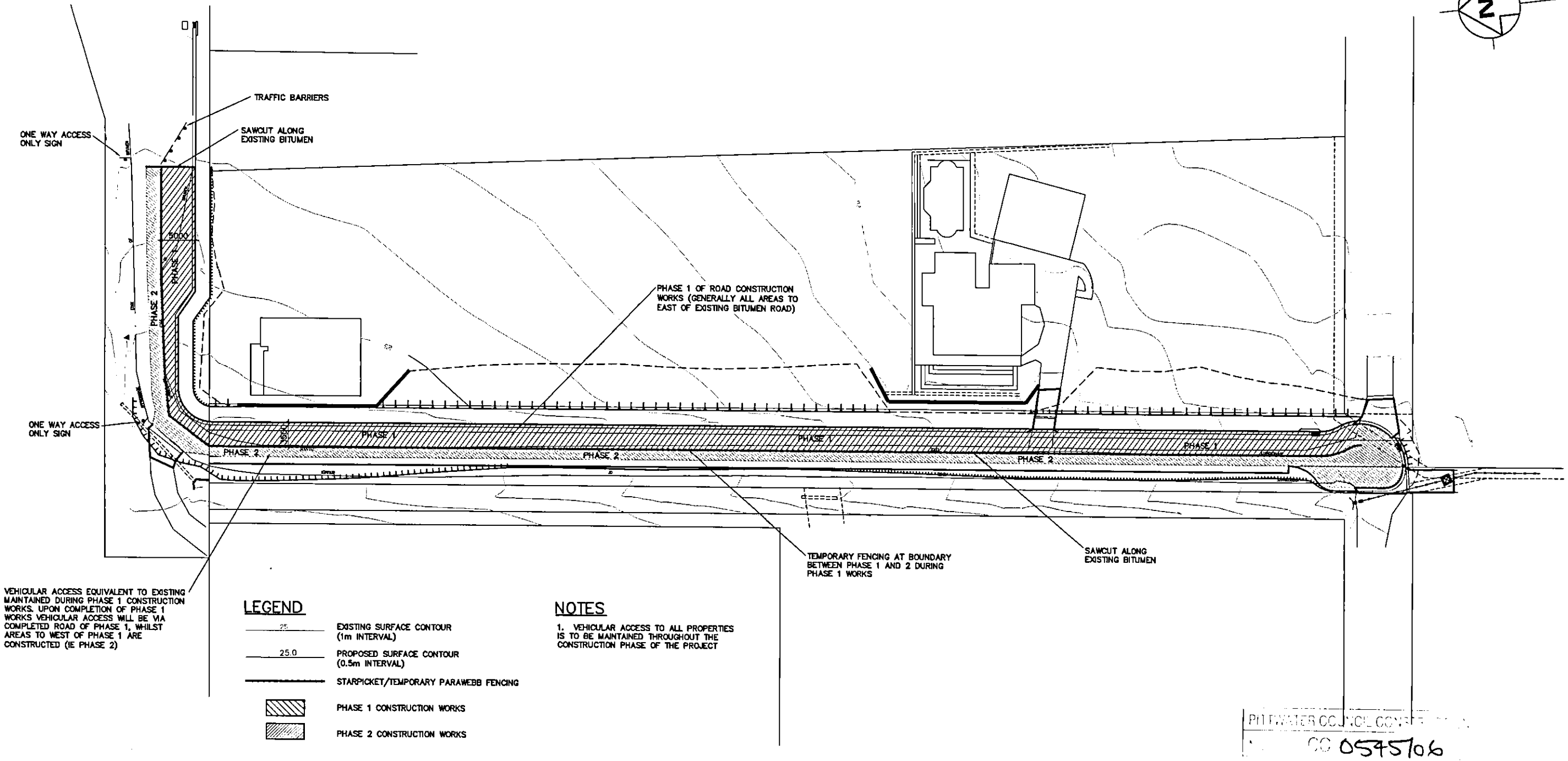

LEGEND

- 25 — EXISTING SURFACE CONTOUR (1m INTERVAL)
- 25.0 — PROPOSED SURFACE CONTOUR (0.5m INTERVAL)
- STARPICKET/TEMPORARY PARAWEBB FENCING
- PHASE 1 CONSTRUCTION WORKS
- PHASE 2 CONSTRUCTION WORKS

NOTES

1. VEHICULAR ACCESS TO ALL PROPERTIES IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PHASE OF THE PROJECT

PATTERSON COUNCIL COPY
CC 0595/06

Re
10 JAN 2007

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
A	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06

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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN

Drawing No. 4670-13
Issue A
Cad File No. 4670-13
Xref.(s)

A1

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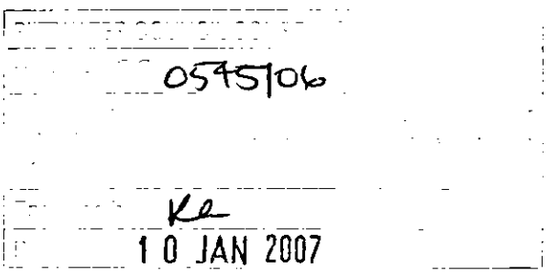
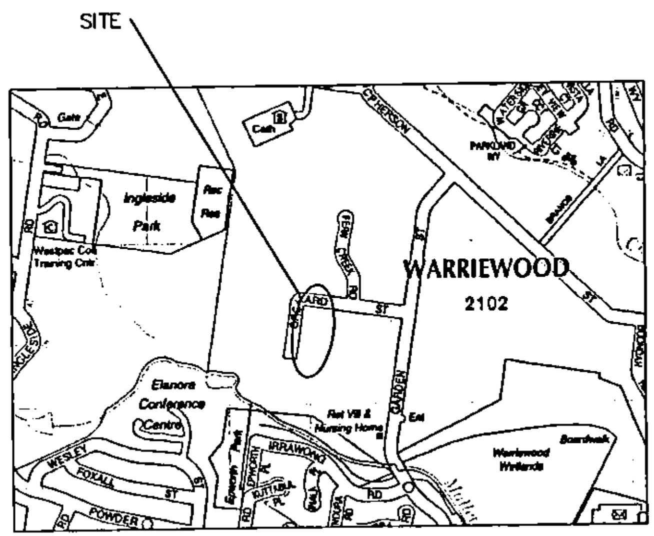
APPENDIX B



WARRIEWOOD VALLEY, 7 & 7A ORCHARD ST.
(PART OF SECTOR 10)
STORMWATER MANAGEMENT
for
V, D AND M BUBALO



LOCALITY PLAN
NTS

DRAWING LIST:

4670-01-01	TITLE SHEET, LOCALITY PLAN AND DRAWING LIST
4670-01-02	GENERAL NOTES & SPECIFICATIONS
4670-01-03	SITE PLAN
4670-01-04	DRAINAGE LONG SECTIONS
4670-01-05	DRAINAGE DETAILS
4670-01-06	SEDIMENT AND EROSION CONTROL PLAN

PITTWATER COUNCIL CONST...
CC 0575/06
KA
10 JAN 2007

DRG STATUS : FOR TENDER

	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	P.N	MS	M. TOOKER	22.09.05
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05
A	ISSUED FOR REVIEW	DR	ARG	MS		30.08.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN

Title: TITLE SHEET, LOCALITY PLAN AND DRAWING LIST

Drawing No. 4670-01-01
Issue C
Cad File No. 4670-01-01
Xref.(s)

670-01 Orchard St. Drainage Des - ARG\Drawings\4670-01-01.dwg, 22/09/2005 10:49:45 AM, \\ppbsyd01\RICOH - Level 4 - RPCS

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE SUPERINTENDENT BEFORE PROCEEDING WITH THE WORK.

2. ALL LEVELS ARE IN TERMS OF AUSTRALIAN HEIGHT DATUM (AHD). ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.

3. DESIGN BASED ON SURVEY INFORMATION SUPPLIED BY BYRNE & ASSOCIATES PTY LTD. THE SURVEY MAY NOT PICK UP ALL EXISTING FEATURES. WHERE MAJOR DISCREPANCIES ARE IDENTIFIED THE CONTRACTOR SHALL INFORM THE SUPERINTENDENT BEFORE PROCEEDING.

4. NO TREES ARE TO BE REMOVED (UNLESS INDICATED ON THE DRAWINGS) WITHOUT THE SUPERINTENDENTS CONSENT.

5. NO WORK IS TO BE UNDERTAKEN ON PRIVATE PROPERTY WITHOUT CONSENT FROM THE SUPERINTENDENT & THE PROPERTY OWNERS.

6. DO NOT SCALE FROM THESE DRAWINGS UNLESS NOTED OTHERWISE.

7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

8. IF THE CONTRACTOR HAS ANY QUESTION, REQUIRES CLARIFICATION OF ANY ISSUE, OR FINDS ANY DISCREPANCY WITHIN THESE DRAWINGS, THE CONTRACTOR SHALL ADVISE THE SUPERINTENDENT BEFORE PROCEEDING.

9. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT SAA CODES, WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES, EXCEPT WHERE VARIED BY THESE DRAWINGS.

10. ALL SETOUT DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES.

11. THE CONTRACTOR SHALL PROVIDE TEST CERTIFICATES FROM A N.A.T.A. APPROVED TESTING LABORATORY CERTIFYING THAT THE MATERIALS USED COMPLY WITH THE RELEVANT SPECIFICATIONS.

12. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO PROTECT EXISTING SERVICES. ANY SERVICE AUTHORITIES PROPERTY DAMAGED DURING THE COURSE OF THE CONTRACT SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.

STORMWATER DRAINAGE

1. ALL STORMWATER WORKS ARE TO BE UNDERTAKEN GENERALLY IN ACCORDANCE WITH AS 3500 (2003) STORMWATER DRAINAGE.

2. UNLESS NOTED OTHERWISE, ALL REINFORCED CONCRETE PIPES ARE TO BE CLASS 2 AND RUBBER RING JOINTED. RUBBER RINGS SHALL BE MANUFACTURED AND TESTED IN ACCORDANCE WITH AS1646. THE EXCAVATED TRENCH WIDTH FOR PIPE LAYING MUST BE AT LEAST 400MM WIDER THAN THE OUTER DIAMETER OF THE PIPE. PIPES ARE TO BE LAID CENTRALLY WITHIN THE EXCAVATED TRENCH.

3. ALL PIPEWORK SHALL BE BEDDED ON A CONTINUOUS UNDERLAY OF SAND, NOT LESS THAN 75MM THICK IN OTHER THAN ROCK AND 200MM THICK IN ROCK AFTER COMPACTION. THE SAND SHALL BE GRADED IN ACCORDANCE WITH AS3500 AND COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY AND SHALL BE GRADED EVENLY TO THE REQUIRED GRADIENT OF THE PIPELINE.

4. IN WET OR UNSTABLE GROUND CONDITIONS WHERE THE TRENCH BOTTOM REQUIRES FURTHER STABILIZING, ADDITIONAL BEDDING OF 20MM AND/OR 30MM NOMINAL SIZE AGGREGATE (AS DIRECTED BY THE SUPERINTENDENT), SHALL BE PLACED BELOW THE STANDARD BEDDING TO A DEPTH DETERMINED BY THE SUPERINTENDENT. WHERE ORDERED BY THE SUPERINTENDENT AN APPROVED FILTER FABRIC SHALL BE USED IN CONJUNCTION WITH THE ADDITIONAL BEDDING.

5. THE BED AND HAUNCH MATERIAL SHALL BE COMPACTED FOR THE FULL WIDTH OF THE TRENCH BY A MINIMUM OF TWO PASSES OF A VIBRATING PLATE OR HAND TAMPING METHOD TO THE SATISFACTION OF THE SUPERINTENDENT.

6. CHASES SHALL BE FORMED WHERE NECESSARY TO PREVENT SOCKETS, FLANGES OR THE LIKE FROM BEARING ON THE TRENCH BOTTOM OR THE UNDERLAY.

7. THE CONTRACTOR SHALL ENSURE THAT ANY EXISTING STRUCTURES LOCATED ADJACENT TO EXCAVATED TRENCHES ARE SUPPORTED OR PROTECTED TO PREVENT DAMAGE TO OR MOVEMENT OF THESE STRUCTURES.

8. THE CONTRACTOR MUST LEAVE ALL STORMWATER DRAINAGE WORKS UNCOVERED UNTIL ANY TESTING DEEMED NECESSARY BY THE SUPERINTENDENT HAS BEEN PERFORMED.

9. PIPE LAYING SHALL BEGIN AT THE DOWNSTREAM END OF THE LINE WITH THE SOCKET ENDS OF THE PIPE FACING UPSTREAM. THE BARREL OF EACH PIPE SHALL BE IN CONTACT WITH THE BEDDING MATERIAL THROUGHOUT ITS FULL LENGTH.

10. FOR RUBBER RING JOINTS THE PIPE ENDS SHALL BE THOROUGHLY CLEANED BEFORE THE JOINT IS MADE. THE TWO PIPE SECTIONS SHALL THEN BE TIGHTLY JOINED WITH THEIR INNER SURFACES AT THE MANUFACTURER'S NOMINATED LAYING GAP.

11. LIFTING HOLES IN PIPES AND CULVERTS SHALL BE PLUGGED WITH MORTAR, PRECAST TAPERED PLUGS, OR TAPE SURROUNDS OR OTHER APPROVED MEANS PRIOR TO BACKFILL MATERIAL BEING PLACED.

12. CUTTING OPERATIONS FOR CONCRETE PIPES SHALL PROVIDE NEAT END SURFACES. THE CUT SURFACES SHALL BE GIVEN TWO COATS OF A SUPERINTENDENT APPROVED EPOXY PAINT.

STORMWATER DRAINAGE (cont.)

13. JOINTS SHALL NOT BE MADE UNDERWATER. THE TRENCH SHALL BE DEWATERED TO FACILITATE JOINT MAKING AND INSPECTION. PRECAUTIONS SHALL BE TAKEN TO PREVENT EROSION OF JOINT MATERIAL BY MOVING CURRENTS OF WATER.

14. COMPLETED CEMENT MORTAR JOINTS SHALL BE KEPT DAMP AND PROTECTED FROM THE DIRECT RAYS OF SUN UNTIL BACKFILLING TAKES PLACE.

15. DRAINAGE LINES SHALL BE CONSTRUCTED TO THE TOLERANCES AS FOLLOWS:

PIPELINE GRADING	LINE TOLERANCE (mm)	LEVEL TOLERANCE (mm)
-LESS THAN 0.6%	50	10
-0.6% TO 1%	50	20
-GREATER THAN 1%	50	40

NOT WITHSTANDING THE TOLERANCES ABOVE EACH PIPE SHALL HAVE A MINIMUM FALL (APPROVED BY THE SUPERINTENDENT) IN THE DIRECTION OF FLOW.

16. BACKFILL MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO PLACING AND COMPACTION.

17. ALL BACKFILL FOR STORMWATER DRAINAGE WORKS IS TO BE COMPACTED IN LAYERS NOT EXCEEDING 300mm LOOSE THICKNESS AND COMPACTED WITHOUT DAMAGING OR DISPLACING THE PIPEWORK.

18. BACKFILL FOR STORMWATER PITS AND PIPES SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AND GRADED IN ACCORDANCE WITH AS 3500 (2003).

19. UNLESS SPECIFIED OTHERWISE ALL DRAINAGE PITS TO BE CAST INSITU. THE GRADE OF CONCRETE TO BE USED SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 32MPA. STEEL REINFORCING BARS SHALL COMPLY WITH THE REQUIREMENTS OF AS1302. WELDED WIRE REINFORCING SHALL COMPLY WITH AS1304.

20. GALVANISED STEEL STEP IRONS AT SPACINGS OF 0.3m ARE REQUIRED IN ALL DRAINAGE PITS GREATER THAN 1.2m DEEP.

21. UNLESS SPECIFIED ALL DRAINAGE GRATES TO BE GALVANISED MILD STEEL TO AS 3996 AND CLASS B.

22. ALL CAST INSITU CONCRETE DRAINAGE PITS SHALL BE CONSTRUCTED TO THE FORMS AND DIMENSIONS SHOWN ON THE DRAWINGS. WHERE THE GROUND IS SOLID THE SUPERINTENDENT MAY PERMIT THAT BACK FORMS NEED NOT BE USED IN THE CONSTRUCTION OF PITS, THE CONCRETE BEING POURED AGAINST THE EARTH. WHERE THIS IS DONE, THE THICKNESS OF THE WALLS OF SUCH PITS SHALL BE INCREASED BY A MINIMUM OF 50MM GREATER THAN THE DIMENSION SHOWN ON THE DRAWINGS. ALL COSTS ASSOCIATED WITH THIS INCREASE IN THICKNESS SHALL BE BORNE BY THE CONTRACTOR.

23. ALL PRE-CAST PITS TO BE BCP PRE-CAST (OR APPROVED EQUIVALENT) WITH MINIMUM BASE HEIGHT OF 1150MM (IE. ORDER CODE PTC-1150) AND THE MINIMUM NUMBER OF RISERS REQUIRED TO MAKE UP THE SPECIFIED PIT DEPTH.

24. uPVC PIPES SHALL CONFORM IN ALL RESPECTS WITH THE REQUIREMENTS OF AS1254. THE CLASS OF PIPES SHALL BE uPVC "STORMWATER HD" DESIGNED FOR SOLVENT WELD SPIGOT AND SOCKET CONNECTION UNLESS NOTED OTHERWISE.

25. uPVC PIPES SHALL BE SUPPLIED WITH SUFFICIENT QUANTITIES OF SOLVENT FOR MAKING OF THE PIPE JOINTS.

26. uPVC PIPE ENDS SHALL BE THOUROUGHLY CLEANED BEFORE THE JOINT IS MADE. JOINTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS USING JOINTING SOLVENT AND PRIMER.

27. uPVC PIPES SHALL BE TRANSPORTED, HANDLED AND STACKED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

28. uPVC PIPE LAYING SHALL BEGIN AT THE DOWNSTREAM END OF THE LINE WITH THE SOCKET END OF THE PIPE FACING UPSTREAM. WHEN THE PIPES ARE LAID, THE BARREL OF EACH PIPE SHALL BE IN CONTACT WITH THE BEDDING MATERIAL THROUGHOUT ITS FULL LENGTH.

29. THE uPVC PIPE ENDS SHALL BE THOROUGHLY CLEANED BEFORE THE JOINT IS MADE. JOINTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS DIRECTIONS USING JOINTING SOLVENT AND PRIMER.

ATLANTIS DETENTION TANKS

1. ALL ATLANTIS PRODUCTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.

2. FILTRATION UNIT TO BE 'ATLANTIS LARGE FILTRATION UNIT' (PART No. 5003A) WITH ALUMINIUM LID AND GEOTEXTILE BASKET.

3. ATLANTIS MATRIX TANK MODULES TO BE EITHER 'DOUBLE MODULE' (PART No. 70004) OR 'TRIPLE MODULE' (PART No. 70005) WITH A MINIMUM CRUSH STRENGTH OF 26.8t/m².

4. MINIMUM ATLANTIS CELL BACKFILL COVER IN NON-TRAFFICABLE AREAS IS TO BE 500MM

5. NON-WOVEN GEOTEXTILE TO BE PLACED AROUND ENTIRE PERIMETER OF FINISHED BLOCK OF ATLANTIS CELLS.

6. AT PENETRATIONS THROUGH THE OUTER GEOTEXTILE LAYER, ADDITIONAL GEOTEXTILE TO BE PLACED WITH MINIMUM OVERLAP OF 300MM BETWEEN ATLANTIS CELL & OBVERT OF INCOMING/OUTGOING PIPE.

EARTHWORKS

1. EXCAVATION IN ROCK SHALL BE MINIMISED. WHERE THE DESIGN WOULD REQUIRE EXTENSIVE EXCAVATION IN ROCK, THE SUPERINTENDENT SHALL BE INFORMED PRIOR TO PROCEEDING.

2. ALL EXCAVATION WORKS ADJACENT TO EXISTING STRUCTURES OR IN UNSTABLE CONDITIONS MUST INCLUDE SHORING.

3. THE CONTRACTOR SHALL OBTAIN CURRENT SERVICE LOCATIONS FROM ALL RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF WORKS.

4. WHERE EXCAVATION WORK IS REQUIRED IN THE VICINITY OF EXISTING SERVICES, THE CONTRACTOR SHALL LOCATE AND SUPPORT ALL SERVICES DURING THE WORKS.

5. WHERE EXCAVATED MATERIAL IS TO BE USED FOR FILLING, THE MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO USE.

6. ALL WASTE MATERIALS SHALL BE DISPOSED OFF-SITE IN AN APPROPRIATE MANNER.

CONCRETE

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

2. CONCRETE USED IN THE WORKS SHALL BE EITHER MASS CONCRETE OR REINFORCED CONCRETE AS NOTED ON THE DRAWINGS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

PROPERTY	REINFORCED CONCRETE	MASS CONCRETE
EXPOSURE CLASSIFICATION	B2	A1
MINIMUM 28 DAY COMPRESSIVE STRENGTH	32 MPa	25 MPa
CEMENT TYPE	GENERAL PURPOSE	GENERAL PURPOSE
WATER / BINDER RATIO (MAX.)	0.40	0.40
CLEAR COVER TO REINFORCEMENT (MIN.)	50mm	-
SURFACE FINISH - FORMED	CLASS 2	CLASS 2
- UNFORMED	WOOD FLOAT	WOOD FLOAT

3. THE FINISHED CONCRETE SHALL BE DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. CONCRETE SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.

4. THE FINISHED CONCRETE SURFACE SHALL BE FREE OF CRACKS HAVING A CRACK WIDTH EQUAL TO OR GREATER THAN 0.1 mm AT TIME OF PRACTICAL COMPLETION. IF CRACKING EXCEEDS THIS LIMIT, THE CONTRACTOR SHALL MAKE GOOD THE CRACKS TO THE SATISFACTION OF THE SUPERINTENDENT WHICH MIGHT COMPRISE REPLACEMENT OF CONCRETE ELEMENT OR SEALING THE CRACKS WITH SILANE/SILICA FUME GEL OR OTHER WORKS.

5. TESTING AND ASSESSMENT FOR COMPLIANCE OF CONCRETE SHALL BE CARRIED OUT BY THE CONTRACTOR IN ACCORDANCE WITH AS 3600.

6. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC TIPPED MILD STEEL CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

7. CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 7 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 14 DAYS FOLLOWED BY A GRADUAL DRYING OUT. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC.

8. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

REINFORCEMENT

1. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

2. REINFORCEMENTS SYMBOLS:

N	DENOTES GRADE 500 N BARS TO AS/NZS 4671 DUCTILITY CLASS N
R	DENOTES GRADE 250 R HOT ROLLED PLAIN BARS TO AS 1302 DUCTILITY CLASS N
SL	DENOTES GRADE 500 L DEFORMED WELDED WIRE MESH TO AS/NZS 4671 DUCTILITY CLASS L
SM	DENOTES GRADE 500 N DEFORMED WELDED WIRE MESH TO AS/NZS 4671 DUCTILITY CLASS N
LTM	DENOTES GRADE 500 L DEFORMED WIRE TRENCH MESH TO AS/NZS 4671 DUCTILITY CLASS L

17N 20 - 250

17	NUMBER OF BARS IN GROUP
N	BAR GRADE AND TYPE
20	NOMINAL BAR DIAMETER IN mm
250	MAXIMUM SPACING IN mm

3. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.

4. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED AT NOT GREATER THAN 1M CENTRES BOTH WAYS. CONCRETE BLOCKS SHALL BE MADE FROM THE SAME CONCRETE TO BE POURED AROUND THE BLOCK. PLASTIC CHAIRS SHALL NOT BE USED. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

REINFORCEMENT (cont.)

6. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN OR OTHERWISE APPROVED IN WRITING BY THE SUPERINTENDENT. LAPS SHALL BE IN ACCORDANCE WITH AS 3600 AND NOT LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND SHALL BE AS FOLLOWS:-

BAR DIA.	LAP LENGTH
12	400
16	500

7. JOGGLES TO BARS SHALL BE 1 BAR DIAMETER OVER A LENGTH OF 12 BAR DIAMETERS.

8. FABRIC SHALL BE LAPPED 2 TRANSVERSE WIRES PLUS 50 mm. BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF THE WIRE.

9. WHERE TRANSVERSE TIE BARS ARE NOT SHOWN PROVIDE N12-400 SPLICED WHERE NECESSARY AND LAP WITH MAIN BARS 400 mm U.N.O.

10. THE FOLLOWING NOTATIONS MAY HAVE BEEN USED ON THE DRAWINGS:

LV :	LENGTH VARIES
CV :	COG VARIES
EW :	EACH WAY
EF :	EACH FACE
SV :	SHAPE VARIES
B1 :	BOTTOM REINFORCEMENT - LAID FIRST
B2 :	BOTTOM REINFORCEMENT - LAID SECOND
T1 :	TOP REINFORCEMENT - LAID FIRST
T2 :	TOP REINFORCEMENT - LAID SECOND
T & B :	TOP AND BOTTOM
ALT. :	ALTERNATING BARS

FORMWORK

1. UNLESS NOTED OTHERWISE ALL CONCRETE FORMWORK SHALL BE FOR A CLASS '2' FINISH.

2. THE DESIGN CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE CONTRACTOR.

3. DESIGN AND CONSTRUCTION AND STRIPPING TIMES SHALL COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE NOTED OR APPROVED BY THE SUPERINTENDENT.

4. DURING CONSTRUCTION, SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORTED SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED, THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LIVE LOADS.

5. THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT THE PRIOR APPROVAL OF THE SUPERINTENDENT.

REINSTATEMENT WORKS

1. UNLESS OTHERWISE SPECIFIED ALL EXCAVATIONS ARE TO BE REINSTATED TO THE EXISTING GROUND SURFACE LEVEL.

2. IF FENCES ARE DAMAGED OR REMOVED DURING CONSTRUCTION THEY ARE TO BE REINSTATED AT THE COMPLETION OF THE WORKS AT THE CONTRACTORS EXPENSE.

3. UNLESS OTHERWISE SPECIFIED, ALL SURFACES ARE TO BE REINSTATED TO THE EXISTING SURFACE CONDITION (e.g. ROAD PAVEMENT, KERB AND GUTTER, GRASSED VERGE OR FOOTPATH).

4. ALL PAVEMENT RECONSTRUCTION TO BE IN ACCORDANCE WITH COUNCILS STANDARD SPECIFICATION, AUS-SPEC OR RTA SPECIFICATIONS AS DIRECTED BY THE SUPERINTENDENT.

ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM

CONTRACTOR SHALL CALL:
DIAL BEFORE YOU DIG 1100
PRIOR TO COMMENCEMENT OF WORK TO OBTAIN ALL CURRENT SERVICE AUTHORITY PLANS

DIAL 1100 BEFORE YOU DIG

... COUNCIL ... CC 0545/06

10 JAN 2007

DRG STATUS : FOR TENDER

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	P.N	MS	M. TOOKER	22.09.05
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	06.09.05
A	ISSUED FOR REVIEW	DR	ARG	MS		30.06.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS.

level 4
104 Mount Street
North Sydney 2060
telephone (02) 9957 1619
facsimile (02) 9957 1291
A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN

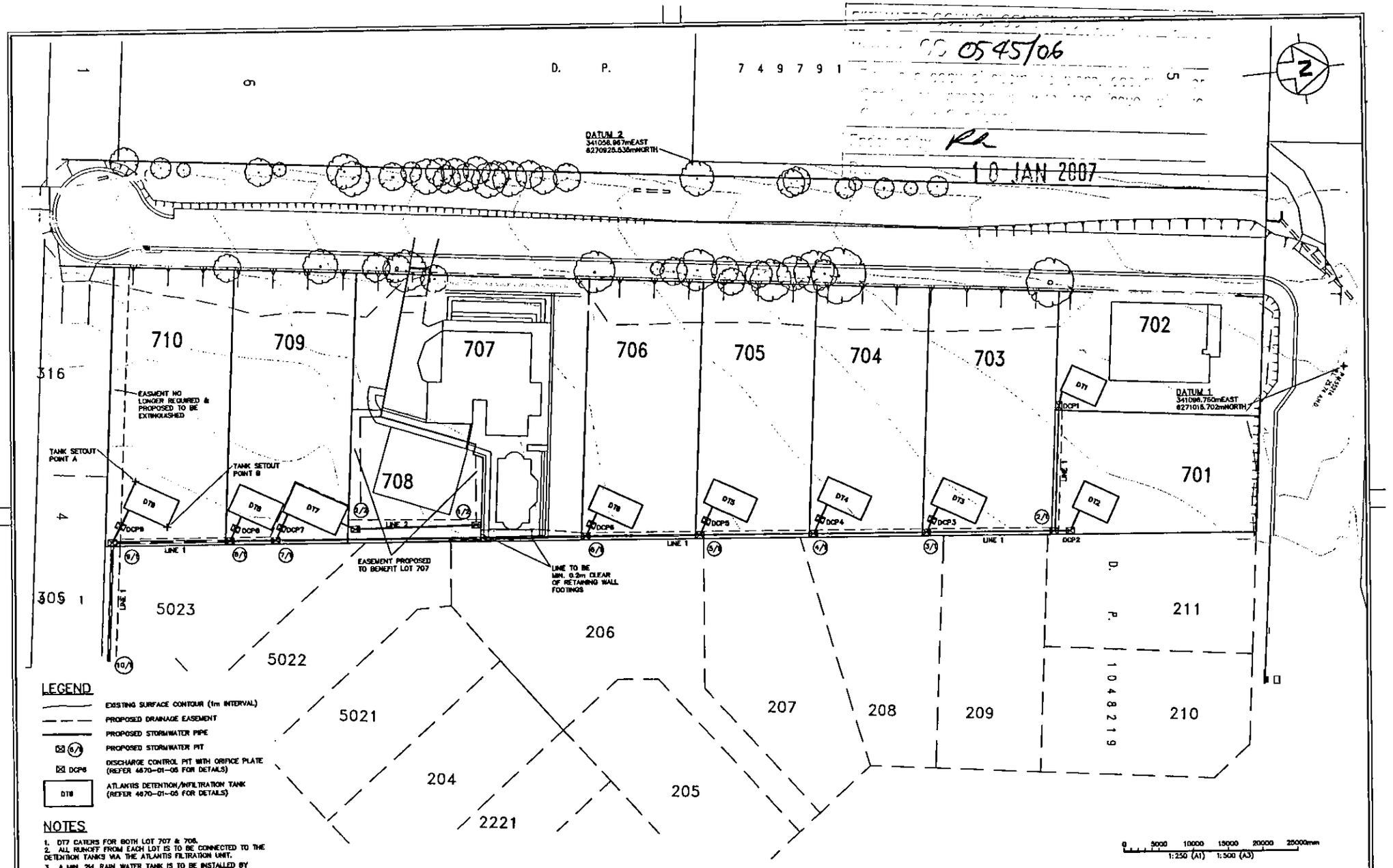
Title: GENERAL NOTES AND SPECIFICATIONS

Drawing No. 4670-01-02

Issue C

Cad File No. 4670-01-02

Xref.(s)



LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- PROPOSED DRAINAGE EASEMENT
- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER PIT
- DISCHARGE CONTROL PIT WITH ORIFICE PLATE (REFER 4670-01-05 FOR DETAILS)
- ATLANTIS DETENTION/INFILTRATION TANK (REFER 4670-01-05 FOR DETAILS)

NOTES

1. DT7 CATERS FOR BOTH LOT 707 & 708.
2. ALL RUNOFF FROM EACH LOT IS TO BE CONNECTED TO THE DETENTION TANKS VIA THE ATLANTIS FILTRATION UNIT.
3. A MIN. 2kL RAIN WATER TANK IS TO BE INSTALLED BY OTHERS ON EACH LOT

DRG STATUS : FOR TENDER

C	ISSUED FOR TENDER	DS	P.N	MS	M. TOOKER	22.09.05	
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05	
A	ISSUED FOR REVIEW	DR	ARG	MS		30.08.05	
	Details of Issue	Des'd	Dra	Chk'd	Approved	Date	

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.S.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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A.C.N. 003 220 226

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN

Title: SITE PLAN

Drawing No. 4670-01-03
Issue C
Cad File No. 4670-01-03
Xref.(s)

PIT SCHEDULE

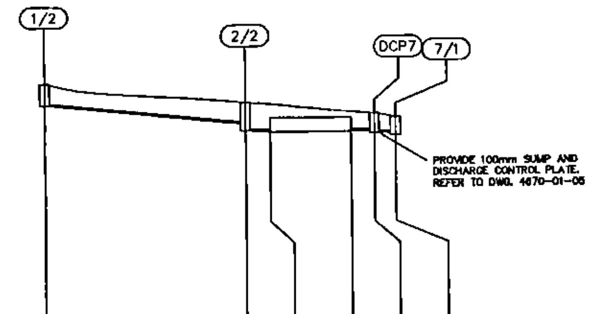
PIT No.	PIT SIZE	PIT DEPTH	PIT INVERT RL.	PIT TYPE	PIT LID	ORIFICE #	mEAST	mNORTH
DCP1	900x600	1300	22.94	PRE-CAST	GALVANISED GRATE	71	341097.801	6270974.240
2/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341115.422	6270971.565
3/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341113.561	6270953.359
4/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341111.878	6270937.059
5/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341110.205	6270920.764
6/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341108.533	6270904.471
7/1	900x600	1700	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341103.994	6270860.260
8/1	900x600	1700	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341103.325	6270853.734
9/1	900x600	1500	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341101.623	6270837.154
10/1	EXISTING	EXISTING	REFER LONG SECTION	EXISTING	EXISTING	-	EXISTING	EXISTING
1/2	900x600	2000	REFER LONG SECTION	CAST-IN-SITU	GALVANISED GRATE	-	341105.065	6270868.961
2/2	900x600	2700	REFER LONG SECTION	CAST-IN-SITU	GALVANISED GRATE	-	341103.701	6270871.713
DCP7	900x600	1800	13.20	CAST-IN-SITU	GALVANISED GRATE	103	341102.304	6270861.268
DCP2	900x600	1300	22.10	PRE-CAST	GALVANISED GRATE	71	341115.683	6270973.925
DCP3	900x600	1300	21.30	PRE-CAST	GALVANISED GRATE	81	341111.845	6270954.375
DCP4	900x600	1300	20.45	PRE-CAST	GALVANISED GRATE	77	341109.905	6270938.234
DCP5	900x600	1300	19.50	PRE-CAST	GALVANISED GRATE	77	341108.287	6270921.906
DCP6	900x600	1300	18.40	PRE-CAST	GALVANISED GRATE	78	341106.938	6270905.422
DCP8	900x600	1700	13.00	CAST-IN-SITU	GALVANISED GRATE	77	341101.655	6270854.728
DCP9	900x600	1800	12.30	CAST-IN-SITU	GALVANISED GRATE	75	341099.383	6270838.491

NOTES
1. REFER TO 4670-01-05 FOR DETAILS OF CAST-IN-SITU PITS.
2. ALL PIT LIDS TO BE A MINIMUM OF CLASS B ACCORDING TO AS 3996-1992.
3. PIT CO-ORDINATES ARE CENTRE OF LID.
4. ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.

ATLANTIS DETENTION/INFILTRATION TANK SCHEDULE

TANK No.	TANK SIZE	TANK HEIGHT	TANK VOL.	MIN BASE RL.	POINT A mEAST	POINT A mNORTH	POINT B mEAST	POINT B mNORTH
DT1	4080x6480	880	18.3	23.14	341092.168	6270976.803	341098.477	6270979.424
DT2	4080x6480	880	18.4	22.30	341108.841	6270976.707	341115.150	6270979.329
DT3	4080x6850	880	23.9	21.50	341106.099	6270956.863	341113.099	6270960.382
DT4	3872x6850	880	21.4	20.85	341104.031	6270940.036	341110.890	6270944.043
DT5	3872x6850	880	21.8	19.70	341102.471	6270923.881	341109.131	6270927.888
DT6	3872x6850	880	22.1	18.80	341101.512	6270907.124	341108.172	6270911.131
DT7	4488x8220	1310	46.8	13.40	341096.136	6270863.979	341104.197	6270868.746
DT8	4080x6650	880	24.8	13.20	341095.425	6270856.039	341102.435	6270859.837
DT9	4080x6650	880	24.7	12.50	341093.278	6270841.245	341100.286	6270845.044

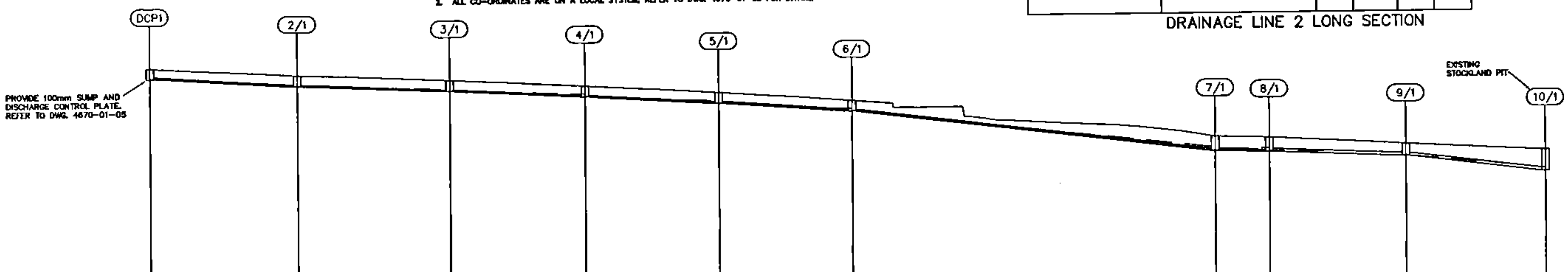
NOTES
1. TANK CO-ORDINATES DEFINE THE SOUTH-WEST (POINT A) AND NORTH-EAST (POINT B) CORNERS OF EACH TANK.
2. ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.



DIAMETER	150mm uPVC	150mm uPVC	DT7	150mm uPVC	
GRADE	10.6%	4.4%	0.0%	0.8%	5.1%

Datum R.L. 14.00						
PIPE INVERT	16.02	14.20 / 13.50	13.42 / 13.40	13.40 / 13.42	13.40 / 13.30	13.20 / 13.00
NATURAL SURFACE	17.50	16.2	16.0	15.2	15.0	14.7
CHAINAGE	0.00	17.20	19.49	27.14	29.34	31.31

DRAINAGE LINE 2 LONG SECTION



DIAMETER	150mm uPVC	150mm uPVC	150mm uPVC	150mm uPVC	225mm RCP	225mm RCP	225mm RCP	375mm RCP	EXISTING 375mm RCP
GRADE	6.4%	4.3%	5.2%	5.8%	6.7%	11.7%	3.0%	4.2%	11.6%

Datum R.L. 12.00	DCP1	2/1	3/1	4/1	5/1	6/1	7/1	8/1	9/1	10/1
H.G.L. LEVELS	23.04	22.13 / 21.87	21.36 / 21.20	20.59 / 20.36	19.59 / 19.40	18.52 / 18.30	13.43 / 13.22	13.21 / 12.93	12.55 / 12.21	10.48
PIPE INVERT	23.04	21.90 / 21.90	21.10 / 21.10	20.25 / 20.25	19.30 / 19.30	18.20 / 18.20	13.00 / 13.00	12.80 / 12.80	12.10 / 12.10	10.10 / 10.10
NATURAL SURFACE	24.2	23.2	22.4	21.6	20.6	18.5	14.7	14.5	13.6	12.7
CHAINAGE	0.00	17.81	36.28	52.67	69.05	85.43	129.87	136.43	153.09	170.09

DRAINAGE LINE 1 LONG SECTION

0 5000 10000 15000 20000 25000mm
1:250 (A1) 1:500 (A3)

DRG STATUS : FOR TENDER

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	P.H	MS	M. TOOKER	22.09.05
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	06.09.05
A	ISSUED FOR REVIEW	OR	ARG	MS		30.08.05

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A.C.N. 003 220 228

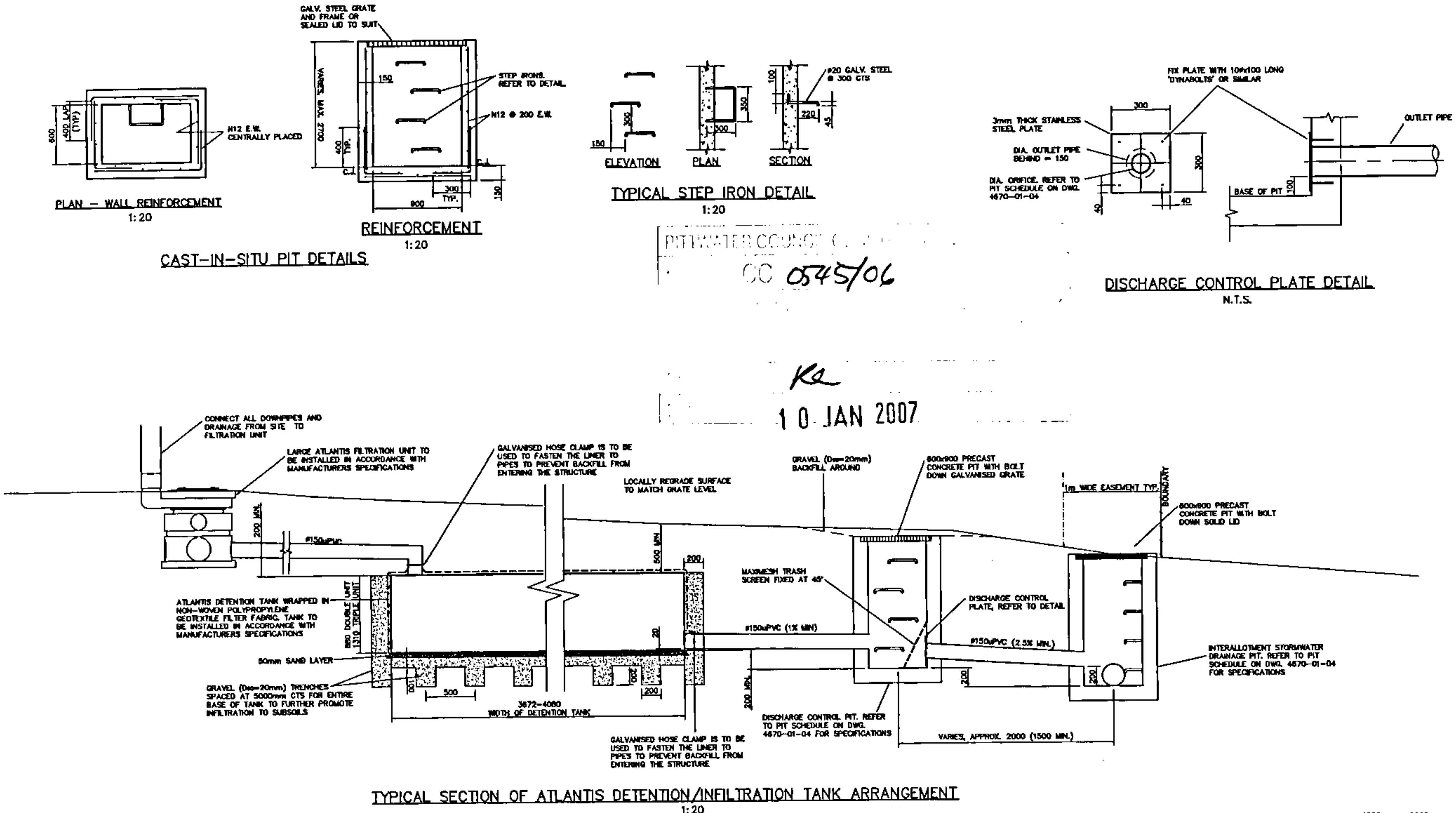
Patterson Britton
& Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET
STORMWATER MANAGEMENT DESIGN

Title: DRAINAGE LONG SECTIONS

Drawing No. 4670-01-04
Issue C
Cad File No. 4670-01-04
Xref.(s)



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Patterson Britton & Partners Pty Ltd
consulting engineers

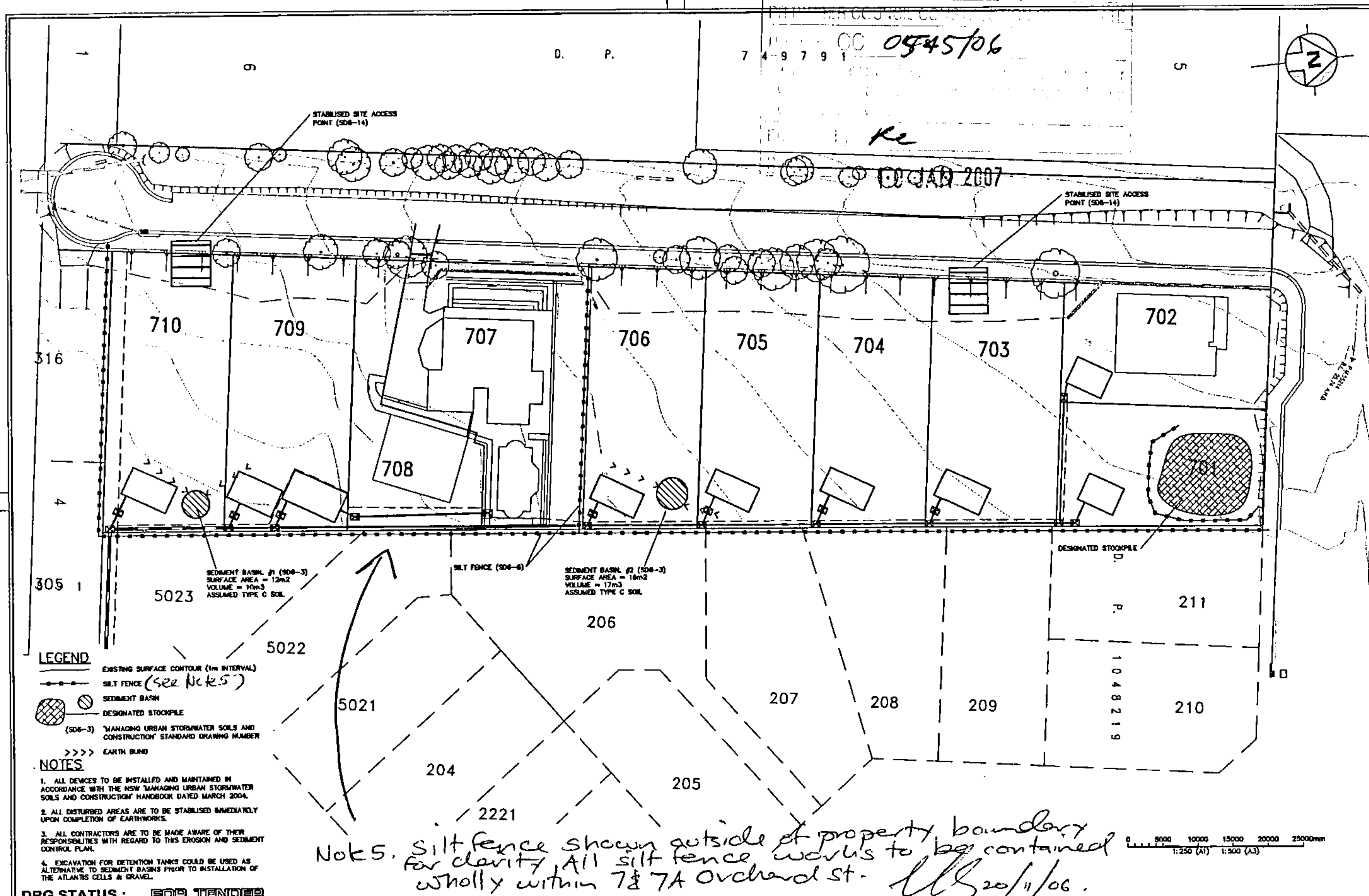
Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN

Title: DRAINAGE DETAILS

Drawing No. 4670-01-05
Issue C
Cad File No. 4670-01-05

4670-01 Orchard St. Drainage Des - ARG\Drawings\4670-01-05.dwg, 22/09/2005 10:56:32 AM, \\pbpsyd01\RICOH - Level 4 - RPCS



DRG STATUS: FOR TENDER

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN

Title: SEDIMENT AND EROSION CONTROL PLAN

Drawing No. 4670-01-06
Issue B
Cad File No. 4670-01-06
Xref.(s)

A1

OFFICIAL RECEIPT

30/06/2006 Receipt No 194981

To D BUBALO M BUBALO V BUBALO

107 ORCHARD STREET
WARRIEWOOD 2102

Applic	Reference	Amount
GL Re	SWBF-S94 BUSHFIRE	$4,327.05
GL Re	SWCF-S94 COMMUNITY	$26,722.36
GL Re	SWCL-S94 CREEKLINE CORRIDOR	$70,257.39
GL Re	SWCW-S94 CREEKLINE CORRIDOR	$45,108.28
GL Re	SWLS-S94 LIBRARY	$7,543.20
GL Re	SWPC-S94 PEDESTRIAN CYCLEWAY	$34,449.66
GL Re	SWPM-S94 PLAN MANAGEMENT	$8,887.83
GL Re	SWPR-S94 PUBLIC RECREATION	$99,515.01
GL Re	SWTT-S94 TRAFFIC & TRANSPORT	$41,676.95

Total: $338,487.73

Amounts Tendered

Cash	$0.00
Cheque	$338,487.73
Db/Cr Card	$0.00
Money Order	$0.00
Agency Rec	$0.00
Total	$338,487.73
Rounding	$0.00
Change	$0.00
Nett	$338,487.73

Printed 30/06/2006 1:17:27
Cashier PTaske

... Contribution Breakdown (Wa... iewood Valley)

TE: - PLEASE ENSURE THAT PAYMENT IS SUBMITTED TO CASHIER WITH THIS FORM

...152/02 (For Receipt Description)

.../10/04

...BDIVISION OF ONE LOT INTO TEN

ORCHARD STREET, WARRIEWOOD (For Receipt Description)

...ntribution Amount	Cashier Code	Account No.	Responsible Business Unit
...,676.95	SWTT	91310C1210000	Urban Infrastructure
...5,108.28	SWCW	91317C1210000	Urban Infrastructure
...,257.39	SWCL	91303C1210000	Urban Infrastructure
...,722.36	SWCF	91316C1210000	Community & Library Services
...,515.01	SWPR	91312C1210000	Reserves & Recreation
...,449.66	SWPC	91311C1210000	Reserves & Recreation
...,327.05	SWBF	91314C1210000	Natural Resources
...,543.20	SWLS	91315C1210000	Community & Library Services
	SWVP	91250C1210000	Urban Infrastructure
...,887.83	SWPM	91318C2210000	
...8,487.73			

...06.06

...4981

...E SEND COMPLETED FORM AND A COPY OF THE RECEIPT TO PROJECT LEADER WARRIEWOOD INFRASTRUCTURE

PITTWATER COUNCIL ... 0545/06

Re

10 JAN 2007 10 JAN 2007

Section 94 Contribution Breakdown (Warriewood Valley)

NOTE: - PLEASE ENSURE THAT PAYMENT IS SUBMITTED TO CASHIER WITH THIS FORM

DA Consent No.: N0152/02 (For Receipt Description)

Consent Date: 20/10/04

DA Consent Description: SUBDIVISION OF ONE LOT INTO TEN

Property Address: 7 ORCHARD STREET, WARRIEWOOD (For Receipt Description)

S94 Subset	Contribution Amount	Cashier Code	Account No.	Responsible Business Unit
Traffic and Transport	$41,676.95	SWTT	91310C1210000	Urban Infrastructure
Creekline corridor (works)	$45,108.28	SWCW	91317C1210000	Urban Infrastructure
Creekline corridor (land)	$70,257.39	SWCL	91303C1210000	Urban Infrastructure
Community Facilities	$26,722.36	SWCF	91316C1210000	Community & Library Services
Public Recreation	$99,515.01	SWPR	91312C1210000	Reserves & Recreation
Pedestrian Cycleway	$34,449.66	SWPC	91311C1210000	Reserves & Recreation
Bushfire	$ 4,327.05	SWBF	91314C1210000	Natural Resources
Library Services	$ 7,543.20	SWLS	91315C1210000	Community & Library Services
Ponderosa Parade	$ ———	SWVP	91250C1210000	Urban Infrastructure
Plan Management	$ 8,887.83	SWPM	91318C2210000	
Total Payment	$ 338,487.73			

To be completed by Cashier

Date Paid: 30.06.06

Receipt Number: 194981

0545/06

10 JAN 2007

NOTE TO CASHIER: - *PLEASE SEND COMPLETED FORM AND A COPY OF THE RECEIPT TO PROJECT LEADER WARRIEWOOD INFRASTRUCTURE*

PITTWATER COUNCIL
CC 05/5/06

Rec
10 JAN 2007

Pittwater Council

Telephone (02) 9970 1111
Facsimile (02) 9970 7150

Facsimile

To:	**Wally Bubalo**	**Address:**	**7 Orchard Street, Warriewood**
Fax:	**9970 8454**	**Date:**	**19 May 2006**
From:	**Ross McWhirter**	**Re:**	**7 Orchard Street subdivision**
CC:		**Pages:**	**1**

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply**

Message: - Revised Section 94 Contributions.
The revised Section 94 contributions applicable until 30 June 2006 are: -

ELEMENT	CONTRIBUTION per DWELLING	TOTAL CONTRIBUTION (7 dwellings)
Traffic and Transport	$5,953.65	$41,676.95
Creekline Corridor (Works)	$6,444.04	$45,108.28
Creekline Corridor (Land)	$10,036.77	$70,257.39
Community Facilities	$3,817.48	$26,722.36
Recreation and Open Space	$14,216.43	$99,515.01
Pedestrian and cycleway network	$4,921.38	$34,449.66
Bushfire protection	$618.15	$4,327.05
Library services	$1,077.60	$7,543.20
Plan Management	$1,269.69	$8,887.83
		$338,487.73

Please contact the undersigned if you have any enquiries concerning this matter.

R. McWhirter

Ross McWhirter
PROJECT LEADER WARRIEWOOD INFRASTRUCTURE

KYORA LANDSCAPES

Professional Landscape Design and Construction

www.kyora.com.au

21 November, 2006

Wayne Treble
The Certification Group
c/-

Dear Wayne

Re: WD & M Bubalo, 7 Orchard Street, Warriewood
Lot 3, DP 23863
Development Application No: NO152/02

Please be advised that the Landscaping plans have been prepared in accordance with conditions B45, B45a, B45b & D44, Development Control Plan No 29 – Warriewood Valley Urban Land Release, regarding the above property

For further clarification, please do not hesitate to contact me on the numbers below.

Yours sincerely,
KYORA LANDSCAPES

STUART MERCER

ABN: 17 435 110 096 Lic No: 119182C
P.O. Box 343 NARRABEEN NSW 2101
Ph: 9913 3999 Fax: 9913 3699 Mobile: 0418 979 059

level 4
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North Sydney 2060

PO Box 515
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Australia

telephone: (02) 9957 1619
facsimile: (02) 9957 1291
email: reception@patbrit.com.au
ABN 89 003 220 228

Patterson Britton
& Partners Pty Ltd

consulting engineers

Newcastle Office
8 Telford Street
Newcastle East 2300

PO Box 668
Newcastle 2300
Australia

telephone: (02) 4926 7777
facsimile: (02) 4926 2111
email: mail@newcastle.patbrit.com.au

lt487002mjs070105-bubalo cert cond B25 and B29.doc

The Certification Group
PO Box 870
Narrabeen, NSW, 2101
Fax 9944 6330

CC Wally Bubalo
Fax 9997 6090

Friday, 5 January 2007

Attention: Mr Wayne Treble

Dear Sir

BUBALO SITE ACCESS AND SEDIMENT/EROSION CONTROL CERTIFICATION

Further to your recent request we certify that the design undertaken for the above site complies with both Conditions B25 and B29 of DA Consent No. N0152/02.

We confirm that access to the site complies with the requirements of Pittwater Councils DCP No. 3 "Driveways and Internal Roadways and AS2890.1-1993: "Parking Facilities - Off Street Carparking".

We also confirm that the proposed sediment and erosion control plan/details for the site has been designed in accordance with the requirements of the NSW Department of Land and Water Conservation (*Now DNR*).

We trust this information is satisfactory. Should you have any further enquiries, please do not hesitate to contact me on (02) 9957 1619.

Yours faithfully
PATTERSON BRITTON

Mark Tooker
Principal

10 JAN 2007

Review / Verification by Date

5/1/2007

Pittwater Council

Postal Address: P.O. Box 882, Mona Vale NSW 1660, DX 9018 Mona Va

pittwaterlga.com.au **e-mail:** pittwater_council@pittwater.nsw.gov.

James Payne, Manager - Urban Infrastructure
8am to 5:30pm Mon - Thurs, 8am to 5pm Fri
Phone 9970 1188

16 August 2006

W D & M Bubalo
107 Orchard Street
WARRIEWOOD 2102

Dear Sir

Re: DA N0457/05 & N0152/02 Orchard Street Warriewood
Construction Phase - Traffic Management Plan

Council refers to construction phase, Traffic Management Plan as set out in the Patterson Britton & Partners Pty Ltd letter dated Friday, 21 July 2006.

Council is satisfied with the Traffic Management Plan as set out in the above referred correspondence.

This letter may be submitted with your application for a construction certificate for the works under the above referred development consent.

Yours faithfully

James Payne
MANAGER - URBAN INFRASTRUCTURE

PITTWATER COUNCIL CC
CC 0545/06

RA

10 JAN 2007

Pittwater Council

OFFICIAL RECEIPT

09/01/2007 Receipt No 208571

To D, M & B BUBALO

107 ORCHARD STREET
WARRIEWOOD NSW 2102

Applic	Reference	Amount
GL Re	QLSL-Buil 1 X N0152/02	$875.00

Total:	$875.00
Amounts Tendered	
Cash	$0.00
Cheque	$875.00
Db/Cr Card	$0.00
Money Order	$0.00
Agency Rec	$0.00
Total	$875.00
Rounding	$0.00
Change	$0.00
Nett	$875.00

Printed 09/01/2007 9:40:02
Cashier JVisch

PITTWATER COUNCIL
CC 0595/06

10 JAN 2007

BUILDING & CONSTRUCTION

See reverse of form for instructions

LEVY PAYMENT FORM

FORM NO.

OFFICE USE ONLY

PART A – DETAILS OF PERSON/COMPANY/ORGANISATION LIABLE TO PAY LEVY

PLEASE PRINT ALL DETAILS USING CAPITALS

Surname (if person) or Company/Organisation name: BUBALO

Given names (if person): VLADO DRAGAN MILEVA

ABN (if applicable):

POSTAL ADDRESS
No. and street or PO Box: 107 ORCHARD ST
WARRIEWOOD

Town/suburb:

State: NSW Postcode: 2102 Bus. hours phone: 0299706670

PART B – ADDRESS OF BUILDING/CONSTRUCTION WORK

Number and street: 107 ORCHARD ST
WARRIEWOOD

Town/suburb:

State: NSW Postcode: 2102

Estimated start date D 20 M 01 Y 2007 Estimated finish date D M 04 Y 2007

PART C – DETAILS OF WORK – to be completed by consenting/certifying authority with plan lodged for approval

Local Council Area: PITTWATER

¹ DA/CC/CDC No.: N0152/02

Estimated value of work (see note on back) $ 250,000. Levy payable $ 875.

¹ If you have provided a CC above, please provide DA number here

Signature of Officer/Private Certifier

Name of Officer/Private Certifier Date D M Y

Business hours phone

PART D – DETAILS – to be completed by Dept/Authority where applicable – see reverse

Department/Authority

Contract/DA No (circle which) Contract amount $

Levy payable $

Contact person (Print)

Contact person (Signature) Phone number

Date D M Y

PART E – DECLARATION – to be signed by person liable to pay levy or authorised officer of company/organisation

Any false or misleading information provided on this form may result in prosecution under Section 58A.
I hereby declare that the information provided on this form is true and correct to the best of my knowledge

Name VLADO BUBALO Signature V. Bubalo Date D 09 M 01 Y 2007

PART F – TO BE COMPLETED WHERE EXEMPTION IS APPROVED

Exemption Approval Certificate No. 054510 CAN 2007

RH 208571
090V06

Building and Construction Industry Long Service Payments Corporation, Locked Bag 3000, Central Coast MC NSW 2252
Tel: 13 14 41 Fax: (02) 9287 5685 Email: levy@lspc.nsw.gov.au www.lspc.nsw.gov.au ABN 93 646 090 808

Jan06/180

Ke

10 JAN 2007

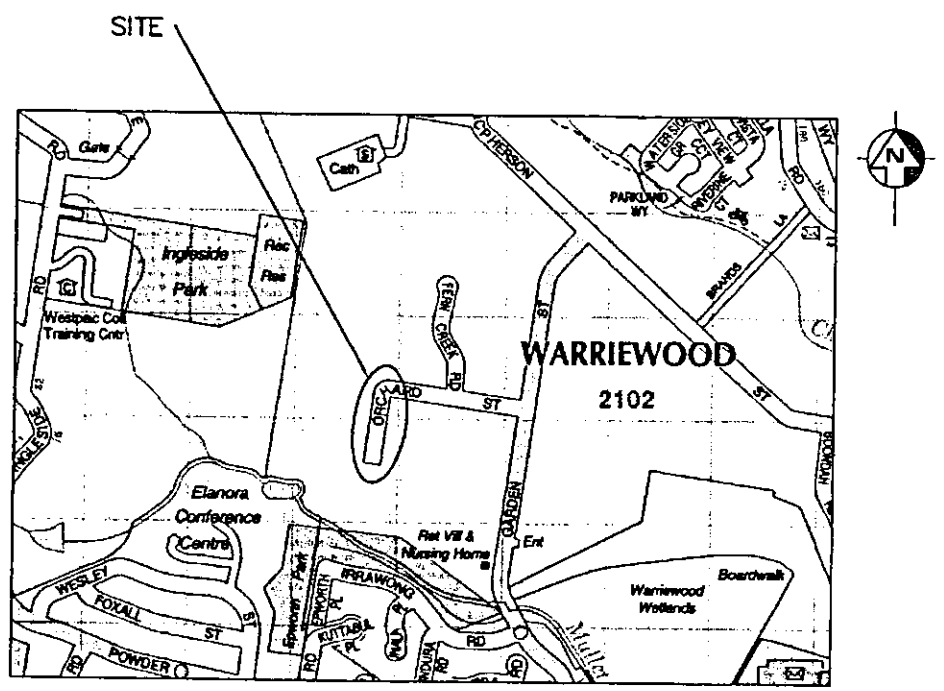
FILE COPY

ORCHARD STREET ACCESS ROAD, WARRIEWOOD
CIVIL ROAD DESIGN
for
V, D AND M BUBALO

COUNCIL FILE COPY

PITTWATER COUNCIL COPY
DA 0545/06

Rc
10 JAN 2007



LOCALITY PLAN
NTS

DRAWING LIST:

4670-01	TITLE SHEET, LOCALITY PLAN AND DRAWING LIST
4670-02	GENERAL NOTES & SPECIFICATIONS (SHEET 1 OF 2)
4670-03	GENERAL NOTES & SPECIFICATIONS (SHEET 2 OF 2) AND MISCELLANEOUS DETAILS
4670-04	SITE PLAN AND LONGITUDINAL SECTION
4670-05	CUL-DE-SAC KERB DEVELOPMENT AND ACCESS ROAD TYPICAL SECTION
4670-06	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 1 OF 3
4670-07	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 2 OF 3
4670-08	ACCESS ROAD DESIGN CROSS SECTIONS SHEET 3 OF 3
4670-09	PROPOSED SURFACE CONTOURS AND PAVEMENT/KERB DESIGN DETAILS
4670-10	STORMWATER DRAINAGE PLAN
4670-11	STORMWATER DRAINAGE LONGITUDINAL SECTIONS
4670-12	EROSION AND SEDIMENT CONTROL PLAN
4670-13	CONSTRUCTION PHASE TRAFFIC MANGEMENT PLAN

Note: Construction Certificate only approves works consistent with Consent N0152/02

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
E	RETAINING WALL DETAIL ADDED	MS	PC	MS	M. TOOKER	18.10.06
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

level 4
104 Mount Street
North Sydney 2060

telephone (02) 9957 1818
facsimile (02) 9957 1291
email reception @ pbpl.com.au
A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: TITLE SHEET, LOCALITY PLAN AND DRAWING LIST

Drawing No. 4670-01
Issue E
Cad File No. 4670-01
Xref.(s)

N:\4670 BUBALO\Dwgs\4670-01.dwg, SHEET 1, 18/10/2006 9:50:16 AM

A1

GENERAL NOTES

1. ALL WORKS SHALL BE IN ACCORDANCE WITH PITTWATER COUNCILS AUS-SPEC CONSTRUCTION SPECIFICATION, DETAILS SHOWN ON THESE DRAWINGS, AND TO THE DIRECTIONS OF THE PROJECT MANAGER.

2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS AND WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.

3. ALL SET OUT DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.

4. DURING CONSTRUCTION THE WORKS SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING AND BATTERS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

5. ALL MATERIALS AND WORKMANSHIP USED IN THE CONSTRUCTION OF THIS DESIGN SHALL BE IN ACCORDANCE WITH ALL RELEVANT CURRENT AUSTRALIAN STANDARDS.

6. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

7. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA. THE ACCURACY IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. ALL CLEARANCES AND APPROVALS SHALL ALSO BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY PRIOR TO THE COMMENCEMENT OF WORK

8. THE CONTRACTOR SHALL OBTAIN SETOUT CO-ORDINATES FROM THE SUPERINTENDENT, AND ARRANGE ALL SURVEY SETOUT BY A REGISTERED SURVEYOR

9. ALL NEW AND EXHUMED SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS WITHIN THE SITE SHALL BE BACKFILLED WITH DGB20 MATERIAL TO SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENSITY RATIO. SUBJECT TO PRIOR APPROVAL FROM RELEVANT AUTHORITY

10. ON COMPLETION OF SERVICES INSTALLATION. ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AREAS, GRASSED AREAS AND ROAD PAVEMENTS.

11. WHERE NEW WORK ABUTS EXISTING, THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE FREE FROM ABRUPT CHANGES, IS OBTAINED.

12. CARE TO BE TAKEN WHEN EXCAVATING NEAR ENERGY AUSTRALIA, INTEGRAL ENERGY, TELSTRA AND AGL SERVICES. NO MECHANICAL EXCAVATION TO BE UNDERTAKEN OVER POWER, TELSTRA AND AGL SERVICES HAND EXCAVATE IN THESE AREAS. LIAISE WITH RELEVANT AUTHORITY AS REQUIRED.

13. THE CONTRACTOR SHALL NOT DISTURB ANY EXISTING SURVEY BENCH MARKS OR REFERENCE MARKS (UNLESS INDICATED FOR REMOVAL) WITHOUT LANDS DEPT APPROVAL IN WRITING.

14. THE CONTRACTOR TO FENCE AND SECURE SITE.

15. PUBLIC ROAD WORKS
THE CONTRACTOR'S ATTENTION IS DRAWN TO THE REQUIREMENTS OF PITTWATER COUNCIL. WHERE THE WORKS ARE LOCATED IN A ROAD RESERVE OR CROSSES THE PAVEMENT OF A PUBLIC ROADWAY OR FOOTWAY. THE CONTRACTOR SHALL OBTAIN A PERMIT COVERING THE NECESSARY WORKS AND COMPLY WITH ALL THE CONDITIONS COVERING THE ISSUE OF SUCH PERMIT. A CHARGE IS MADE FOR PERMITS ISSUED IN RESPECT OF PAVEMENT OPENINGS. THE CONTRACTOR SHALL OBTAIN DETAILS FROM COUNCIL. PAY ALL FEES. MEET ALL REQUIREMENTS AND CARRY OUT ALL LIAISON AT NO EXTRA COST. ALL PAVEMENT SURFACING IS TO BE UNDERTAKEN BY THE CONTRACTOR, ALL PAVEMENT REINSTATEMENT TO BE UNDERTAKEN BY THE CONTRACTOR. ALL TO PITTWATER COUNCIL'S STANDARDS AND APPROVAL.

16. PAVEMENT DESIGN REPORT BY GEOTECHNIQUE, JANUARY 2005 – THE CONTRACTOR SHALL ENSURE THAT THEY ARE FAMILIAR WITH THE CONTENTS OF THIS REPORT.

17. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT SO THAT AT ANY TIME ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL-WEATHER ACCESS OR SUBJECTED TO ADDITIONAL OR POLLUTED STORM WATER RUNOFF DURING THE PERIOD OF CONSTRUCTION.

18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO COUNCIL'S INFRASTRUCTURE, SUCH REPAIR OR REINSTATEMENT TO BE CARRIED OUT IMMEDIATELY TO THE SATISFACTION OF COUNCIL.

19. THE CONTRACTOR IS TO PREPARE AND IMPLEMENT A TRAFFIC MANAGEMENT PLAN TO COUNCIL'S STANDARDS AND APPROVAL FOR ALL WORKS.

20. SITE SURVEY UPON WHICH DESIGN HAS BEEN BASED PREPARED BY BYRNE & ASSOCIATES, DECEMBER 2004.

SAFETY

1. ATTENTION IS DRAWN TO THE OCCUPATIONAL HEALTH AND SAFETY ACT (2000), WHICH REQUIRES THAT EMPLOYERS ENSURE THE HEALTH, SAFETY AND WELFARE OF THEIR EMPLOYEES.

2. THE CONTRACTOR MUST, AT ALL TIMES, EXERCISE ANY OTHER NECESSARY AND REASONABLE PRECAUTIONS APPROPRIATE TO THE NATURE OF THE WORK AND THE CONDITIONS UNDER WHICH THE CONTRACT IS TO BE PERFORMED FOR THE SAFETY OF ALL PERSONS ON THE WORK SITE, OR IN THE VICINITY.

QUALITY ASSURANCE

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN A QUALITY ASSURANCE SYSTEM MEETING THE REQUIREMENTS OF AS 9002. THE QUALITY SYSTEM SHALL BE SUCH THAT RECORDS ARE KEPT OF ALL ASPECTS AND STAGES OF THE WORK.

2. THE RECORDS FOR EACH CONSTRUCTION TASK SHALL BE STAGED AND ITEMISED TO THE SATISFACTION OF THE CONTRACTOR ADMINISTRATOR. THE PROFORMAS FOR RECORDS SHALL BE SUBMITTED TO THE CONTRACTOR ADMINISTRATOR FOR APPROVAL AND WORK SHALL NOT COMMENCE UNTIL SUCH APPROVAL HAS BEEN GIVEN.

3. DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ACCURATE AND UP TO DATE RECORDS AND SHALL MAKE SUCH RECORDS AVAILABLE TO THE CONTRACTOR ADMINISTRATOR IF REQUESTED. FAILURE TO MAINTAIN RECORDS AS SPECIFIED WILL RESULT IN THE CONTRACTOR RE-INSPECTING COMPLETED WORKS IF INSTRUCTED TO DO SO BY THE CONTRACTOR ADMINISTRATOR.

4. AT THE COMPLETION OF EACH STAGE OF THE WORKS THE CONTRACTOR SHALL CERTIFY THAT THOSE WORKS HAVE BEEN UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATION AND INSTRUCTIONS ISSUED DURING THE COURSE OF THE CONTRACT.

EXISTING SERVICES AND FEATURES

1. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.

2. MAINTAIN EXISTING STORMWATER DRAINAGE FLOWS THROUGH THE SITE AT ALL TIMES. MAKE DUE ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.

3. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL OBTAIN THE SUPERINTENDENT'S APPROVAL FOR HIS PROGRAMME FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.

4. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES AS REQUIRED TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.

5. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO THE ADJACENT RESIDENCES. THE CONTRACTOR IS TO GAIN APPROVAL OF THE SUPERINTENDENT FOR THE TIME OF INTERRUPTION.

GENERAL STORMWATER NOTES

1. ALL STORMWATER WORKS ARE TO BE UNDERTAKEN GENERALLY IN ACCORDANCE WITH AS 3500 STORMWATER DRAINAGE.

2. UNLESS OTHERWISE APPROVED ALL DRAINAGE PIPES SHALL BE CLASS "2" SPIGOT AND SOCKET RCP PIPES WITH RUBBER RING JOINTS.

3. CONTRACTOR TO SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION TO DISSIMILAR PIPEWORK.

4. ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL BE CEMENT RENDERED WITH A NON-SHRINK EPOXY GROUT TO ENSURE A SMOOTH FINISH.

5. PRECAST PITS SHALL NOT BE USED. ALL DRAINAGE PITS TO BE CAST INSITU. LINTELS MAY BE PRECAST TO SUIT PROPOSED PITS.

6. STEP IRONS AT SPACINGS OF 0.3m ARE TO BE PROVIDED IN DRAINAGE PITS MORE THAN 1.2m DEEP.

7. PROVIDE 3.0M LENGTH OF 100DIA SUBSOIL DRAINAGE PIPE WRAPPED IN FABRIC SOCK AT UPSTREAM END OF EACH PIT.

8 ALL CONCRETE USED IN DRAINAGE PITS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 40MPa.

9. THE EXCAVATED TRENCH WIDTH FOR PIPE LAYING MUST BE AT LEAST 300mm WIDER THAN THE OUTER DIAMETER OF THE PIPE. PIPES ARE TO BE LAID CENTRALLY WITHIN THE EXCAVATED TRENCH.

10. ALL PIPES ARE TO BE LAID ON A MINIMUM BEDDING OF 75mm OF SAND GRADED IN ACCORDANCE WITH AS 3500.3. BEDDING SHALL BE COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY.

11. BACKFILL FOR STORMWATER PITS AND PIPES SHALL BE COMPACTED TO AT LEAST 95% (98% UNER ROADS) OF THE MAXIMUM DRY DENSITY AND GRADED IN ACCORDANCE WITH AS 3500.3.

12. BACKFILL MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO PLACING AND COMPACTION.

GENERAL STORMWATER NOTES (cont.)

13. THE CONTRACTOR SHALL ENSURE THAT ANY EXISTING STRUCTURES LOCATED ADJACENT TO EXCAVATED TRENCHES ARE SUPPORTED OR PROTECTED TO PREVENT DAMAGE TO OR MOVEMENT OF THESE STRUCTURES

14. UNLESS SPECIFIED ALL DRAINAGE GRATES TO BE HEAVY DUTY GALVANISED MILD STEEL TO AS 3996.

15. CHASES SHALL BE FORMED WHERE NECESSARY TO PREVENT SOCKETS, FLANGES OR THE LIKE FROM BEARING ON THE TRENCH BOTTOM OR THE UNDERLAY.

16. MATERIAL SHALL BE PLACED IN THE PIPE SURROUND IN LAYERS NOT MORE THAN 200mm LOOSE THICKNESS AND COMPACT WITHOUT DAMAGING OR DISPLACING THE PIPEWORK.

GENERAL COMPACTION NOTES

1. FOUNDATION MATERIAL DEEMED BY THE SUPERINTENDENT AS UNSUITABLE TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.

2. UNLESS OTHERWISE APPROVED OR SPECIFIED. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING:
A) FREE FROM ORGANIC AND PERISHABLE MATTER
B) MAXIMUM PARTICLE SIZE 75MM
C) PLASTICITY INDEX BETWEEN 2% AND 20%
D) CBR > 10%

3. SELECT FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200MM LOOSE THICK LAYERS AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR – 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289E3.1 OF NOT LESS THAN THE FOLLOWING STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289E1.1:

LOCATION STANDARD DRY DENSITY
–AREAS OF SERVICE TRENCHES 98%
–ROAD AND CARPARKS 100%
–LANDSCAPED AREAS 90%

4. THE CONTRACTOR SHALL PROGRAMME THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS. ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT HIS COST.

5. COMPACTION CONTROL TESTING SHALL BE CARRIED OUT BY AND AT THE COST OF THE CONTRACTOR TO CONFORM WITH LEVEL 1. AS DEFINED IN AS3798–1996.

CONCRETE NOTES

GENERAL

C1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600 AND THE SPECIFICATION. KEEP A COPY OF THE DOCUMENTS ON SITE.

C2. VERIFY ALL SETTING OUT DIMENSIONS WITH THE SUPERINTENDENT AND/OR THE SURVEYOR.

CONCRETE

C1. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH AS3600 CURRENT EDITIONS WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

C2. CONCRETE USED IN THE WORKS SHALL BE EITHER MASS CONCRETE OR REINFORCED CONCRETE AS NOTED ON THE DRAWINGS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

PROPERTY	REINFORCED CONCRETE	MASS CONCRETE
EXPOSURE CLASSIFICATION	B2	B2
MIN 28 DAY COMPRESSIVE STRENGTH	40 MPa	32 MPa
CEMENT TYPE	GENERAL PURPOSE	GENERAL PURPOSE
CEMENT CONTENT (MIN.)	350kg/m3	300kg/m3
WATER / BINDER RATIO (MAX.)	0.45	0.55
CLEAR COVER TO REINFORCEMENT (MIN.)	45 mm	45 mm
SURFACE FINISH – FORMED	CLASS 2	CLASS 2
– UNFORMED	WOOD FLOAT	WOOD FLOAT
MAXIMUM COARSE AGGREGATE SIZE	20 mm	20 mm

C3. NO 'BRECCIA' TYPE AGGREGATE IS TO BE USED.

C4. CEMENT TO BE TYPE SL TO AS3972 MAX CONCRETE SHRINKAGE TO BE 600UM TO AS1012.

C5. NO ADMIXTURES ARE TO BE USED WITHOUT THE APPROVAL OF THE ENGINEERS.

C6. CURE ALL CONCRETE USING AN APPROVED METHOD IN ACCORDANCE WITH ACSE SPECIFICATION. CURING COMPOUNDS TO COMPLY WITH AS3798. PVA BASED CURING COMPOUNDS ARE NOT ACCEPTABLE.

CONCRETE NOTES (cont.)

C7. THE FINISHED CONCRETE SHALL BE DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. CONCRETE SHALL BE COMPACTED WITH MECHANICAL VIBRATORS

C7. THE FINISHED CONCRETE SURFACE SHALL BE FREE OF CRACKS HAVING A CRACK WIDTH EQUAL TO OR GREATER THAN 0.1 mm AT TIME OF PRACTICAL COMPLETION. IF CRACKING EXCEEDS THIS LIMIT, THE CONTRACTOR SHALL MAKE GOOD THE CRACKS TO THE SATISFACTION OF THE SUPERINTENDENT WHICH MIGHT COMPRISE REPLACEMENT OF CONCRETE ELEMENT OR SEALING THE CRACKS WITH SILANE/SILICA FUME GEL OR OTHER WORKS.

C8. TESTING AND ASSESSMENT FOR COMPLIANCE OF CONCRETE SHALL BE CARRIED OUT BY THE CONTRACTOR IN ACCORDANCE WITH AS 3600. SUBMIT ALL RESULTS TO THE SUPERINTENDENT.

C9. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. PLASTIC TIPPED WILD STEEL CHAIRS SHALL NOT BE USED. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

C10. MAINTAIN COVER TO REINFORCEMENT AT CHAMFERS, DRIP GROOVES, REGLETS, ETC.

C11. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE SUPERINTENDENT.

C12. CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE SUPERINTENDENT.

C13. DURING AND IMMEDIATELY FOLLOWING POURING, THE CONCRETE SHALL BE PROTECTED FROM WIND AND SUN. AWNINGS AND WIND BREAKS ARE TO BE UTILISED FOR THIS PURPOSE.

C14. CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 7 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 14 DAYS FOLLOWED BY A GRADUAL DRYING OUT. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC. DO NOT USE APPLIED CURING AGENTS.

C15. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

FINISHING

F1. THE CONCRETE SHALL BE SCREEDED TO THE REQUIRED CROSS SECTION PROFILE FREE OF DEPRESSIONS AND HIGH AREAS TO SATISFY THE REQUIREMENTS OF AN INITIAL FINISH.

F2. FINAL FINISHING INCLUDES FLOATING AND TEXTURING THE PAVEMENT AND SHALL COMMENCE ONLY AS SOON AS THE WATER SHEEN HAS LEFT THE PAVEMENT SURFACE AND NOT IN ANY AREA WHERE THERE IS FREE SURFACE WATER.

FORMWORK

FM1. UNLESS NOTED OTHERWISE ALL CONCRETE FORMWORK SHALL BE CLASS '2' FINISH

FM2. THE DESIGN CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE CONTRACTOR.

FM3. DESIGN AND CONSTRUCTION AND STRIPPING TIMES SHALL COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE NOTED OR APPROVED BY THE SUPERINTENDENT.

FM4. DURING CONSTRUCTION SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORT SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LIVE LOADS.

FM5. THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT THE PRIOR APPROVAL OF THE SUPERINTENDENT.

PITTWATER COUNCIL CONSENT
CC 0595/06
Ke
10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
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level 4
104 Mount Street
North Sydney 2060
telephone (02) 9957 1618
facsimile (02) 9957 1291
email reception @pattbrit.com.au
A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS
SHEET 1 OF 2

Drawing No. 4670-02
Issue D
Cad File No. 4670-02
Xref.(s)

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ASPHALTIC CONCRETE NOTES

1. GENERAL
A) MINERAL AGGREGATES TO COMPLY WITH CLAUSE 2.1 – MATERIALS OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
B) MINERAL FILLER TO COMPLY WITH AS2357–1980 MINERAL FILLERS FOR ASPHALT AND CLAUSE 2.1.2 – FILLER OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
C) BITUMEN BINDER SHALL COMPLY WITH CLAUSE 2.1.3 – BINDER OF RTA SPECIFICATION R116 – "ASPHALT (DENSE AND OPEN GRADED)".

2. MIX PROPORTIONS
A) JOB MIX – 10mm & 14mm (AS SPECIFIED ON DRAWINGS) NOMINAL SIZE AGGREGATE MINIMUM BITUMEN CONTENT (%) BY MASS OF TOTAL MASS – 5.1%
B) MIX STABILITY – BETWEEN 16KN AND 38KN AS DETERMINED BY RTA TEST METHODS T605 AND T607.
C) AIR VOIDS IN COMPACTED MIX – BETWEEN 4% AND 7% OF THE VOLUME OF THE MIX.
D) VOIDS FILLED IN BINDER – 65–80% OF AIR VOIDS IN THE TOTAL MINERAL AGGREGATE FILLED BY BINDER IN ACCORDANCE WITH RTA TEST METHOD T605 AND T607.

3. PAVEMENT PREPARATION
A) THE EXISTING SURFACE TO BE SEALED SHALL BE DRY AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER.
B) ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK–COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE.

4. TACK COAT
A) THE WHOLE OF THE AREA TO BE SHEETED WITH ASPHALTIC CONCRETE SHALL BE LIGHTLY AND EVENLY COATED WITH RAPID SETTING BITUMEN COMPLYING WITH RTA SPECIFICATIONS 3252, 3253, 3254, 3259 AND 3269. APPLICATION RATE FOR RESIDUAL BITUMEN SHALL BE 0.15 TO 0.30 LITRES/SQUARE METRE. APPLICATION SHALL BE BY MEANS OF A MECHANICAL SPRAYER WITH SPRAY BAR.

5. SPREADING
A) ALL ASPHALTIC CONCRETE SHALL BE SPREAD WITH A SELF PROPELLED PAVING MACHINE.
B) THE ASPHALTIC CONCRETE SHALL BE LAID AT A MIX TEMPERATURE AS SHOWN BELOW:

ROAD SURFACE TEMPERATURE IN SHADE (°C)	MIX TEMPERATURES (°C)
5–10	NOT PERMITTED
10–15	150
15–25	145
OVER 25	140

C) ASPHALTIC CONCRETE SHALL NOT BE LAID WHEN THE ROAD SURFACE IS WET OR WHEN COLD WINDS CHILL THE MIX TO ADVERSELY AFFECT SPREADING AND COMPACTION.

6. JOINTS
A) THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM.
B) THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER.

7. COMPACTION
A) ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS.
B) INITIAL ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C.
C) SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 60OC USE PNEUMATIC TYRED ROLLER.
D) MINIMUM CHARACTERISTICS VALUE OF RELATIVE COMPACTION OF A LOT WHEN TESTED IN ACCORDANCE WITH CLAUSE 4.9 – COMPACTION OF RTA SPECIFICATION 116 "ASPHALT (DENSE AND OPEN GRADED)" SHALL BE 95%

8. FINISHED PAVEMENT PROPERTIES
A) FINISHED SURFACES SHALL BE SMOOTH DENSE AND TRUE TO SHAPE AND SHALL NOT VARY MORE THAN 10MM FROM THE SPECIFIED PLAN LEVEL AT ANY POINT AND SHALL NOT DEVIATE FROM THE BOTTOM OF A ORARY 3M STRAIGHT EDGE LAID IN ANY DIRECTION BY MORE THAN 5MM.

9. THE PROPOSED 1m WIDE ROAD SHOULDER AT THE WESTERN EDGE OF THE NEW ROAD IS TO BE STABLISED WITH A FLUSH SEAL FINISH ONLY.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO THE STANDARD RECOMMENDED BY THE NSW DEPARTMENT OF HOUSING'S 'BLUE BOOK' TITLE "MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION", 4TH EDITION, MARCH 2004.

2. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL INFORM THEIR STAFF OF THEIR OBLIGATIONS UNDER THIS EROSION AND SEDIMENT CONTROL SECTION.

3. SILT SOCKS AND GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED AT ALL DRAINAGE INLET PITS.

4. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION.

5. ALL SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED AFTER EACH RAINFALL EVENT FOR STRUCTURAL DAMAGE AND ALL TRAPPED SEDIMENT TO BE REMOVED TO THE APPROPRIATE STOCKPILE.

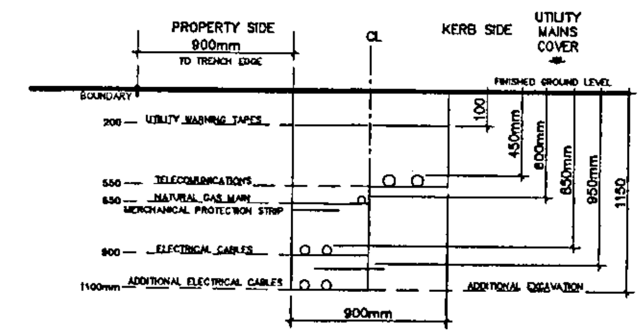
6. STABILISE ALL COMPLETED ROAD BATTERS WITH HYDROMULCH.

CONSTRUCTION MATERIALS

1. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KINDS, AND, UNLESS OTHERWISE SPECIFIED, SHALL CONFORM TO THE RELEVANT AUSTRALIAN STANDARDS.

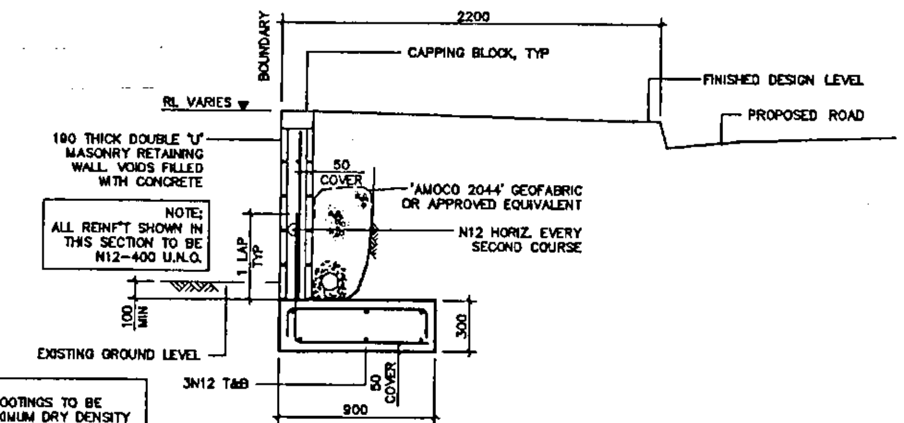
2. SUFFICIENT NOTICE SHALL BE GIVEN BY THE CONTRACTOR TO THE SUPERINTENDENT TO ENABLE ANY MATERIALS THAT ARE BROUGHT ON THE SITE TO BE EXAMINED. ALL MATERIALS ARE TO BE SUITABLY STACKED TO FACILITATE EXAMINATION.

3. WHERE THE CONTRACTOR SUPPLIES MATERIALS OF A MIXED OR POOR QUALITY, THE SUPERINTENDENT SHALL HAVE THE POWER TO REQUIRE THE CONTRACTOR TO PICK OUT AND STACK THOSE MATERIALS WHICH IN HIS OPINION ARE SUITABLE FOR THE WORKS, AND TO HAVE THOSE UNSUITABLE REMOVED FROM THE SITE OF THE WORKS.



WIDTH OF TRENCH MAY BE REDUCED TO 600mm WITH 1 x TELECOMMUNICATIONS PROVIDER. LOCALISED WIDENING IS REQUIRED FOR PITS AND PILLARS

TYPYCAL SHARED SERVICE TRENCH FORMAT
NTS



NOTE;
ALL REINF'T SHOWN IN THIS SECTION TO BE N12–400 U.N.O.

NOTE;
SUBGRADE UNDER ALL FOOTINGS TO BE COMPACTED TO 98% MAXIMUM DRY DENSITY AND INSPECTED BY THE SUPERINTENDENT PRIOR TO PLACEMENT OF CONCRETE FOOTING

TYPICAL RETAINING WALL SECTION (MAX 800 HIGH)
1:20

NOTES

1. FOUNDATIONS HAVE BEEN DESIGNED FOR A SAFE BEARING CAPACITY OF 100 kPa. SAFE BEARING CAPACITY TO BE CONFIRMED BY A GEOTECHNICAL ENGINEER.

2. ALL CONCRETE WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

3. ALL STEEL REINFORCEMENT TO BE GRADE 500 N BARS TO AS/NZS 4671 DUCTILITY CLASS N

4. ALL MASONRY WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700 AND THE SPECIFICATION.

5. APPLY 3 COATS OF WATERPROOF PAINT, HYDROSEAL BITUMINOUS EMULSION OR EQUIVALENT ON RETAINED EARTH SIDE OF RETAINING WALL OVER FULL HEIGHT OF RETAINING WALL.

6. PROVIDE 2 LAYERS OF 0.2mm POLYETHELENE WATERPROOF MEMBRANE BENEATH CONCRETE FOOTING LAPPED 400 AT JOINTS AND TAPED. TEARS OR PUNCTURES ARE TO BE TAPED.

7.

CONCRETE QUALITY

ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	f'c
FOOTINGS	80 mm	20 mm	GP	32 MPa
CORE FILL	220 mm	10 mm	GP	20 MPa

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
E	RETAINING WALL DETAILS ADDED	MS	PC	MS	M. TOOKER	18.10.06
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL–DE–SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS SHEET 2 OF 2 AND MISCELLANEOUS DETAILS

Drawing No. 4670-03
Issue E
Cad File No. 4670–02
Xref.(s)

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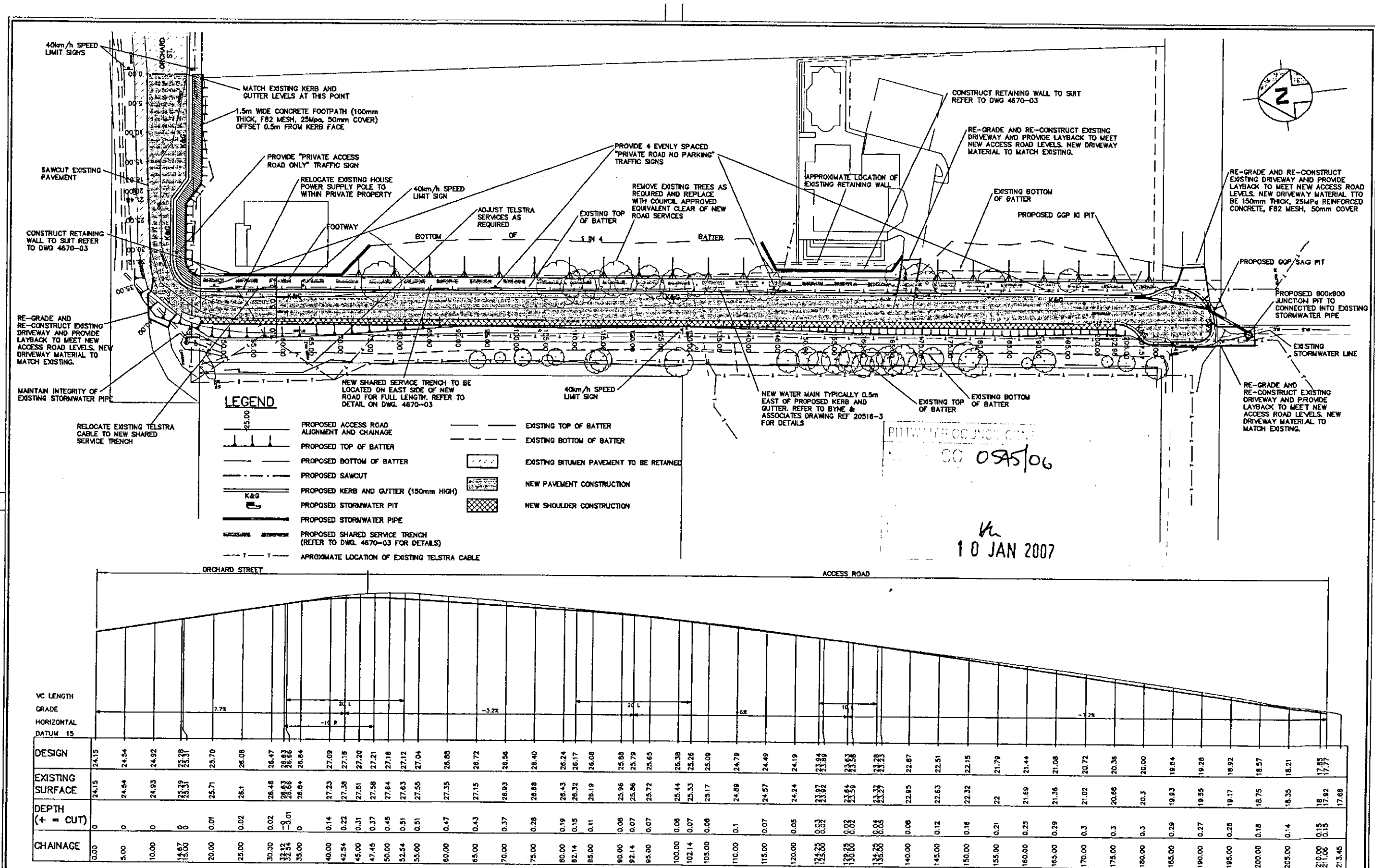

ACCESS ROAD LONGITUDINAL SECTION

SCALE HORIZONTAL 1:300
SCALE VERTICAL 1:150

HORIZONTAL 0 10 20 30m (1:300 (A1) 1:600 (A3))
VERTICAL 0 5000 10000 15000mm (1:150 (A1) 1:300 (A3))

DRG STATUS : FOR CONSTRUCTION

Issue	Details of issue	Dsn'd	Drn	Chk'd	Approved	Date
E	RETAINING WALL DETAIL ADDED	MS	PC	MS	M. TOOKER	16.10.06
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C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B-1	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Client: W. D. AND M. BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: SITE PLAN AND ACCESS ROAD LONGITUDINAL SECTION

Drawing No. 4670-04
Issue E
Cad File No. 4670-04
Xref.(s)

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CC 0545/06
10 JAN 2007

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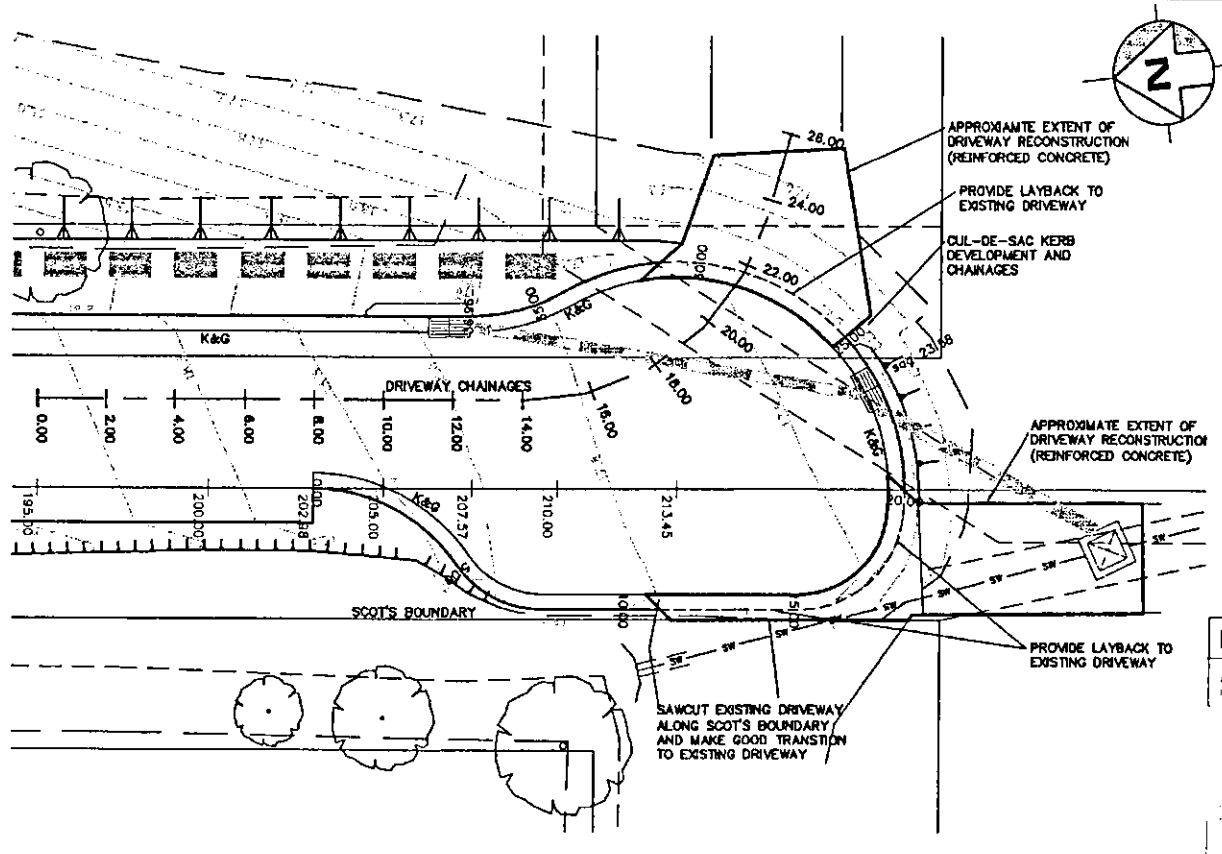
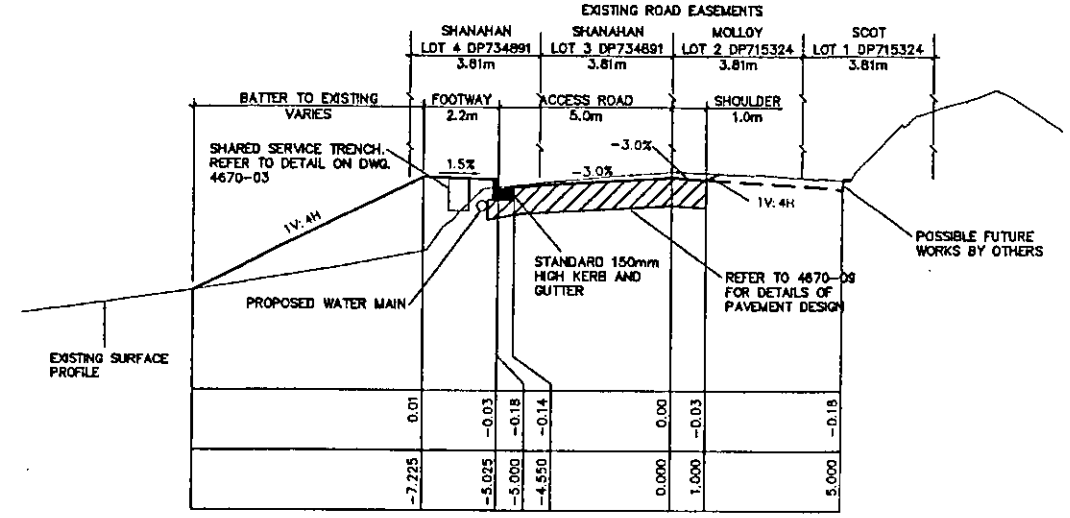
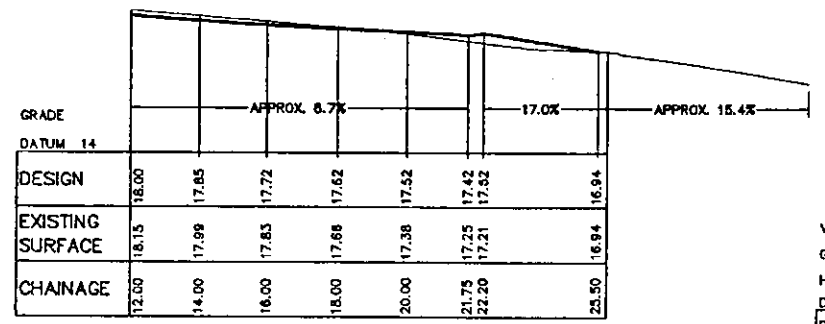


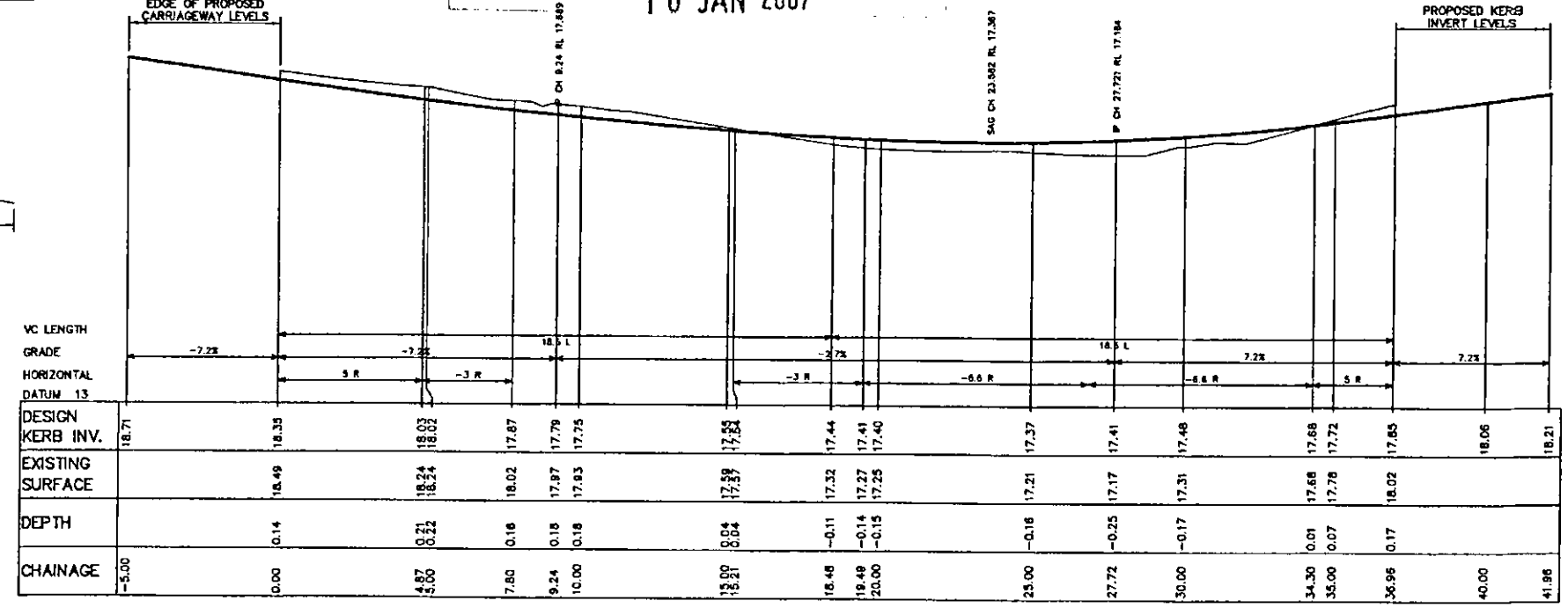
CUL-DE-SAC PLAN
1:100



ACCESS ROAD TYPICAL SECTION
HORIZONTAL 1:100
VERTICAL 1:50



DRIVEWAY LONG SECTION
SCALE HORIZONTAL 1:100
SCALE VERTICAL 1:100



CUL-DE-SAC KERB DEVELOPMENT
SCALE HORIZONTAL 1:100
SCALE VERTICAL 1:50

HORIZONTAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)
VERTICAL 0 1000 2000 3000 4000 5000mm
1:50 (A1) 1:100 (A3)

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: CUL-DE-SAC KERB DEVELOPMENT AND ACCESS ROAD TYPICAL CROSS SECTION

Drawing No. 4670-05
Issue E
Cad File No. 4670-05
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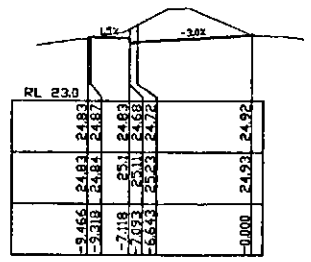

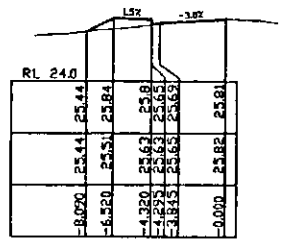

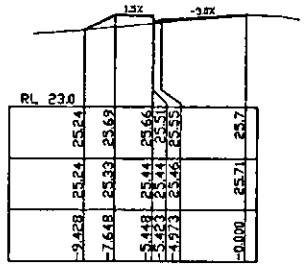

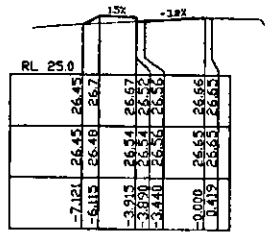

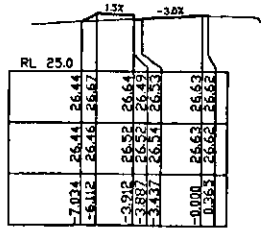

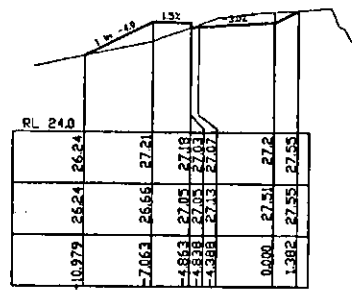

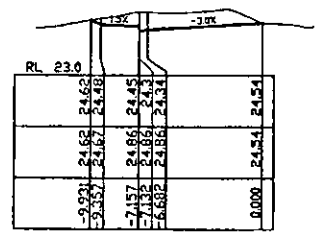

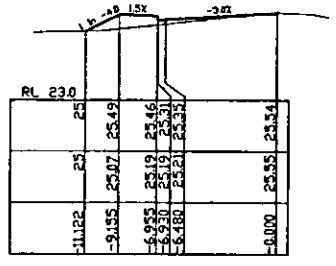

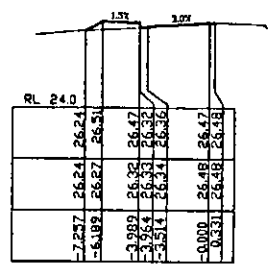

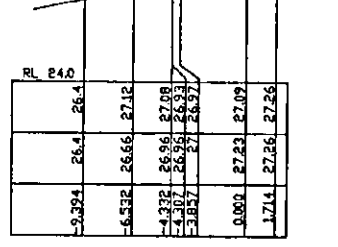

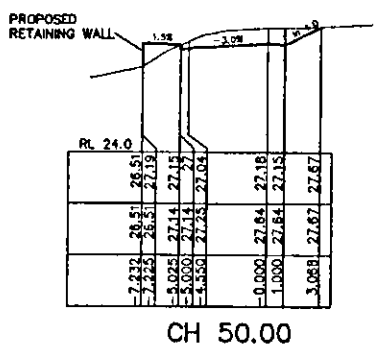

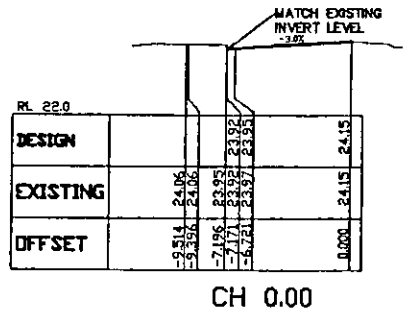

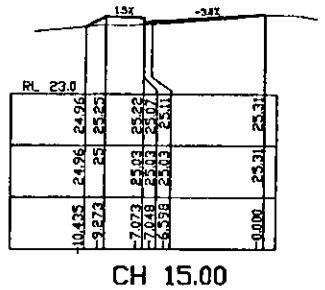

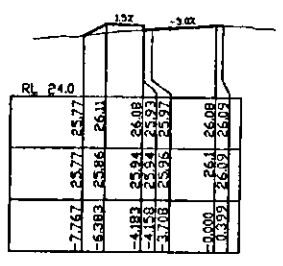

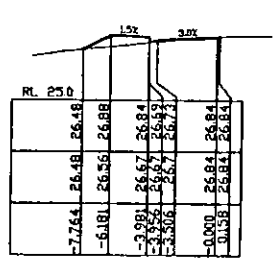

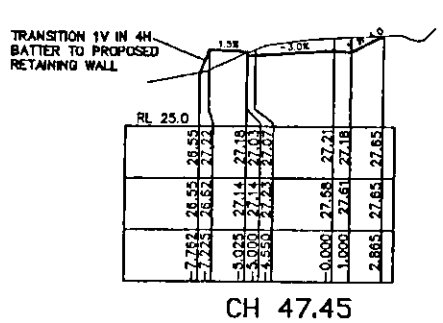

HORIZONTAL 0 5000 10000 15000 20000mm
1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 1 OF 3

Drawing No. 4670-06
Issue D
Cad File No. 4670-06
Xref.(s)

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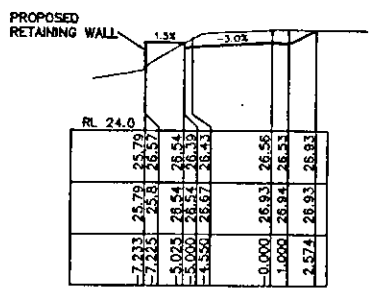
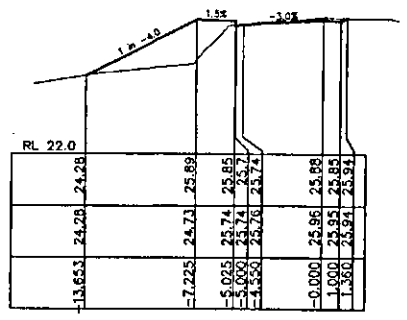
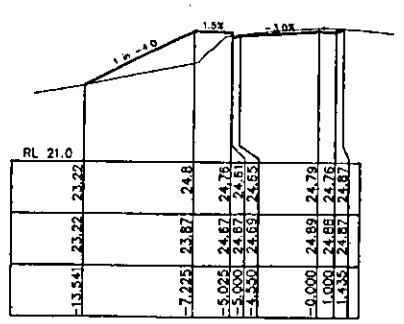
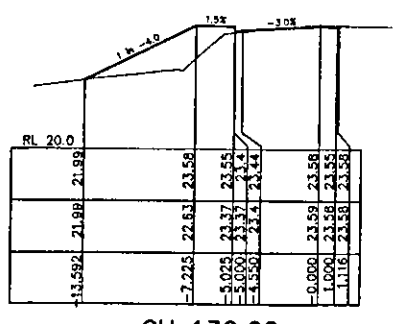
DA 0545/06

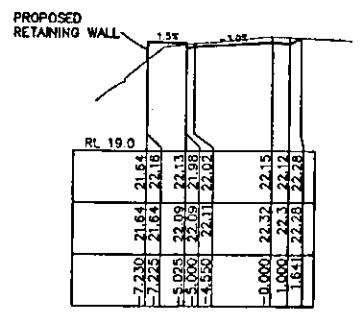
10 JAN 2007

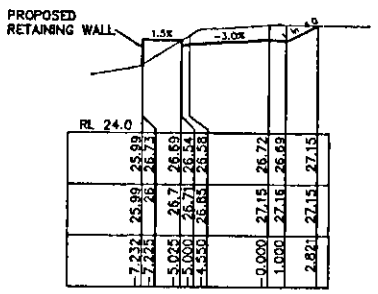


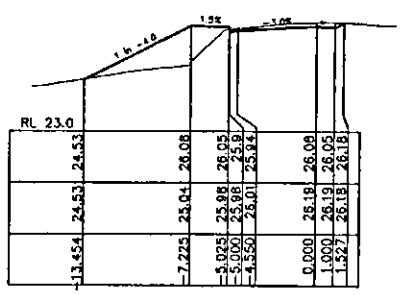


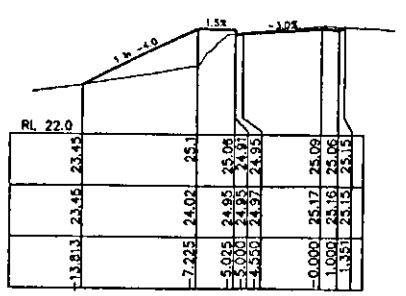


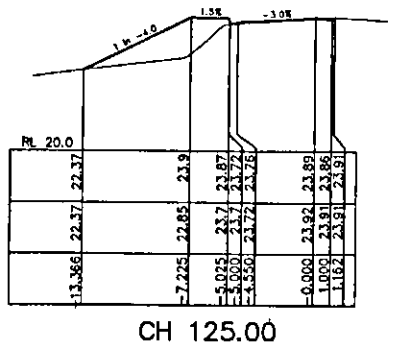


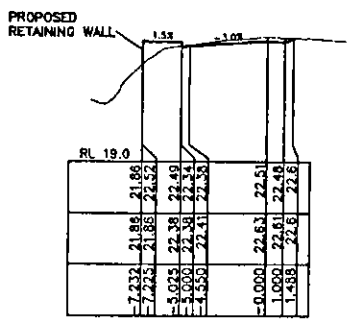


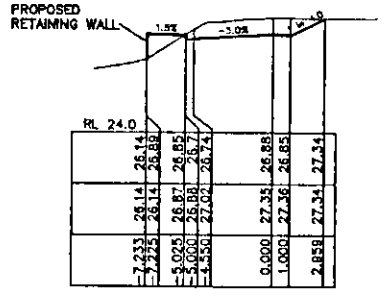


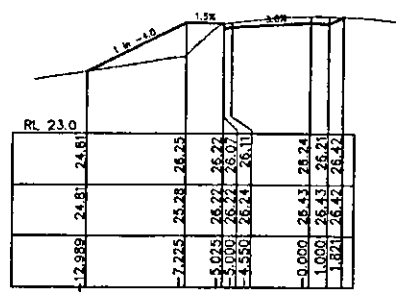


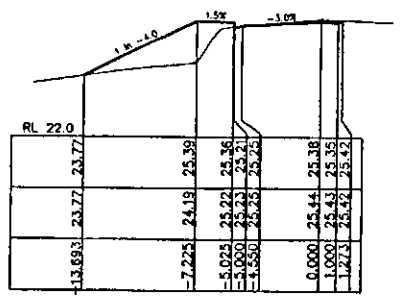


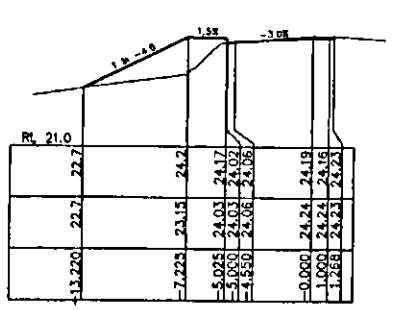


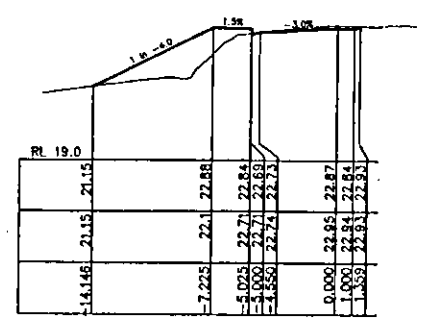


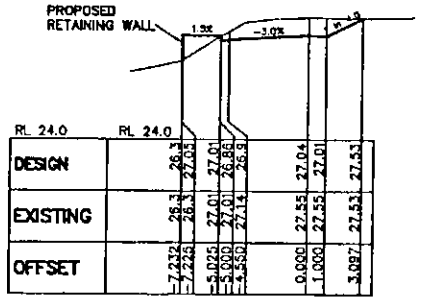


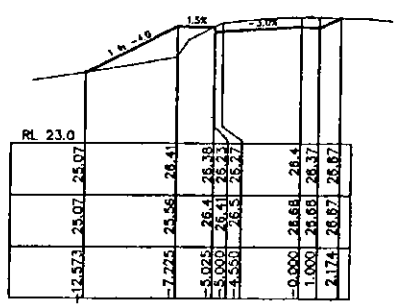


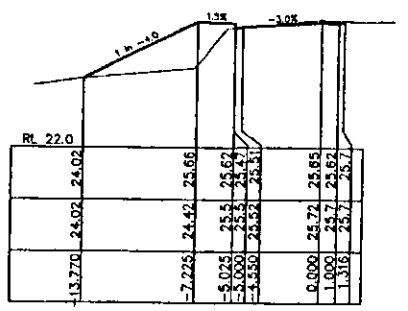


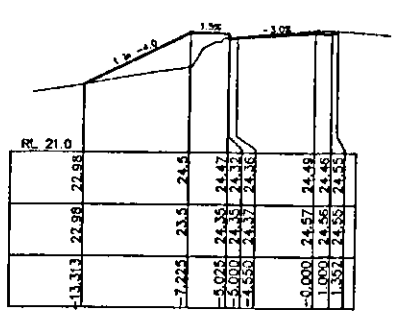


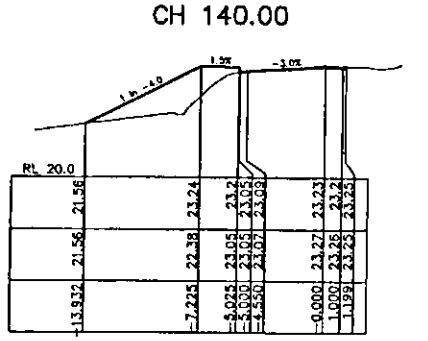












HORIZONTAL 0 5000 10000 15000 20000mm
1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
E	CH 145 & 150 AMENDED	MS	PC	MS	M. TOOKER	18.10.06
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
B	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 2 OF 3

Drawing No. 4670-07
Issue E
Cad File No. 4670-06
Xref.(s)

N:\4670 BUBALO\Drawings\4670-06.dwg, SHEET 2, 16/10/2006 11:21:47 AM

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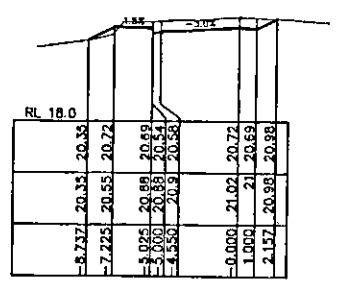
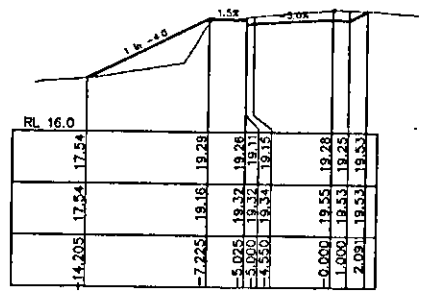


CH 170.00



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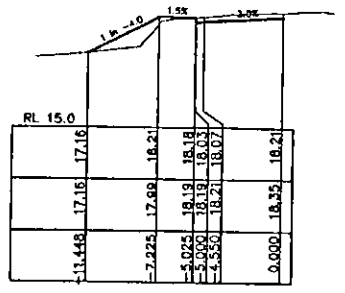

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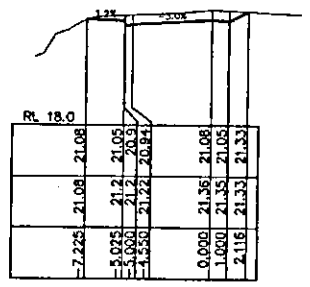

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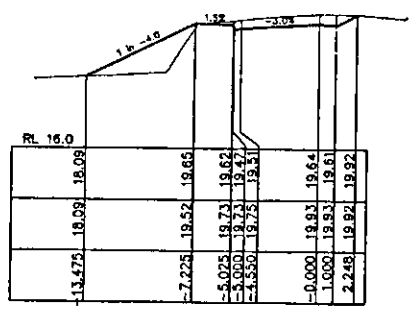

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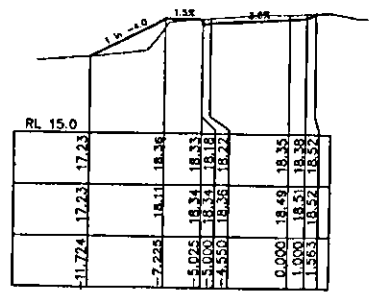
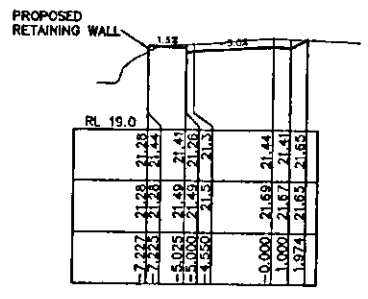


CH 202.98



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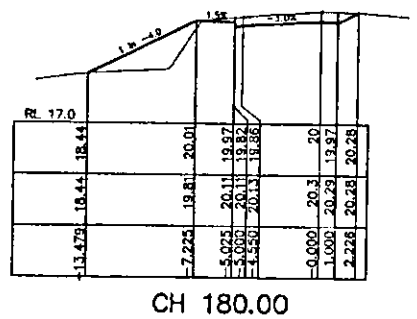

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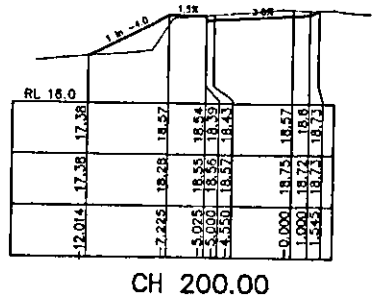

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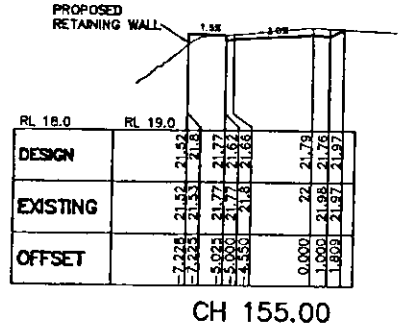

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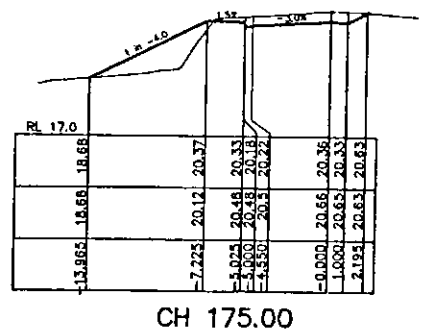
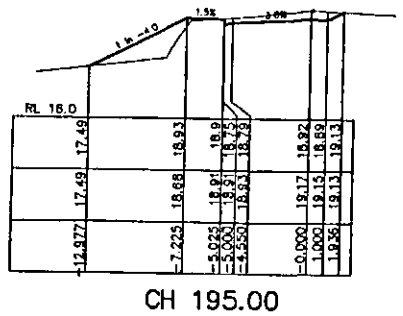


CH 175.00



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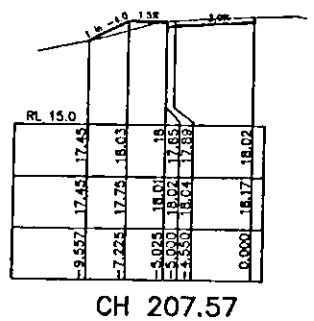

CH 207.57

PATTERSON BRITTON
CC 054506

Ra
10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

HORIZONTAL 0 5000 10000 15000 20000mm (1:200 (A1) 1:400 (A3))

VERTICAL 0 2000 4000 6000 8000 10000mm (1:100 (A1) 1:200 (A3))

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
E	CH 155 & 160 AMENDED	MS	PC	MS	M. TOOKER	16.10.06
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		06.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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email reception @pbnlt.com.au
A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

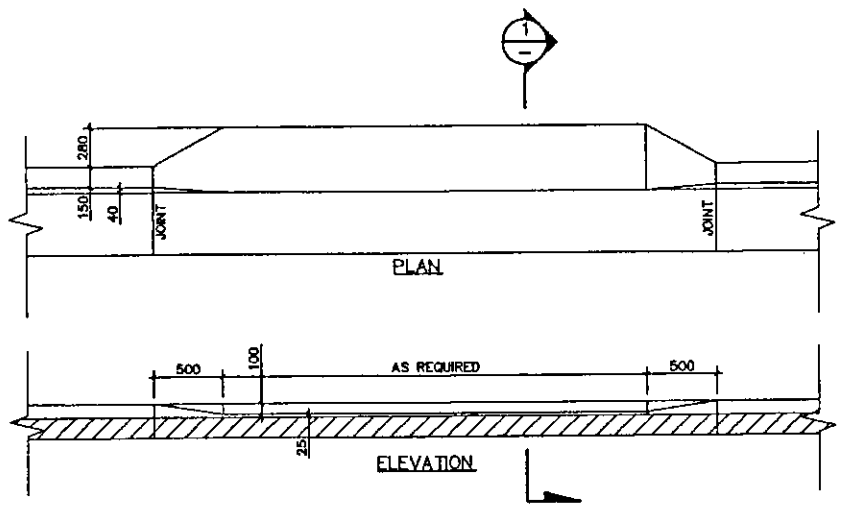
Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 3 OF 3

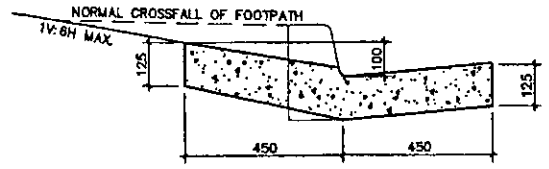
Drawing No. 4670-08
Issue E
Cad File No. 4670-06
Xref.(s)

N:\4670 BUBALO\Drawings\4670-06.dwg, SHEET 3, 16/10/2006 11:21:59 AM

A1

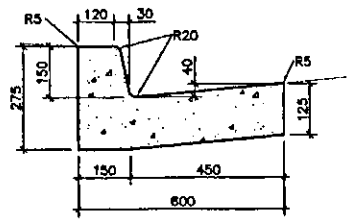


STANDARD VEHICULAR CROSSING
1:25

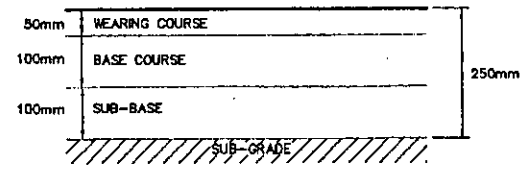


SECTION 1:10

STANDARD GUTTER CROSSING (LAYBACK)

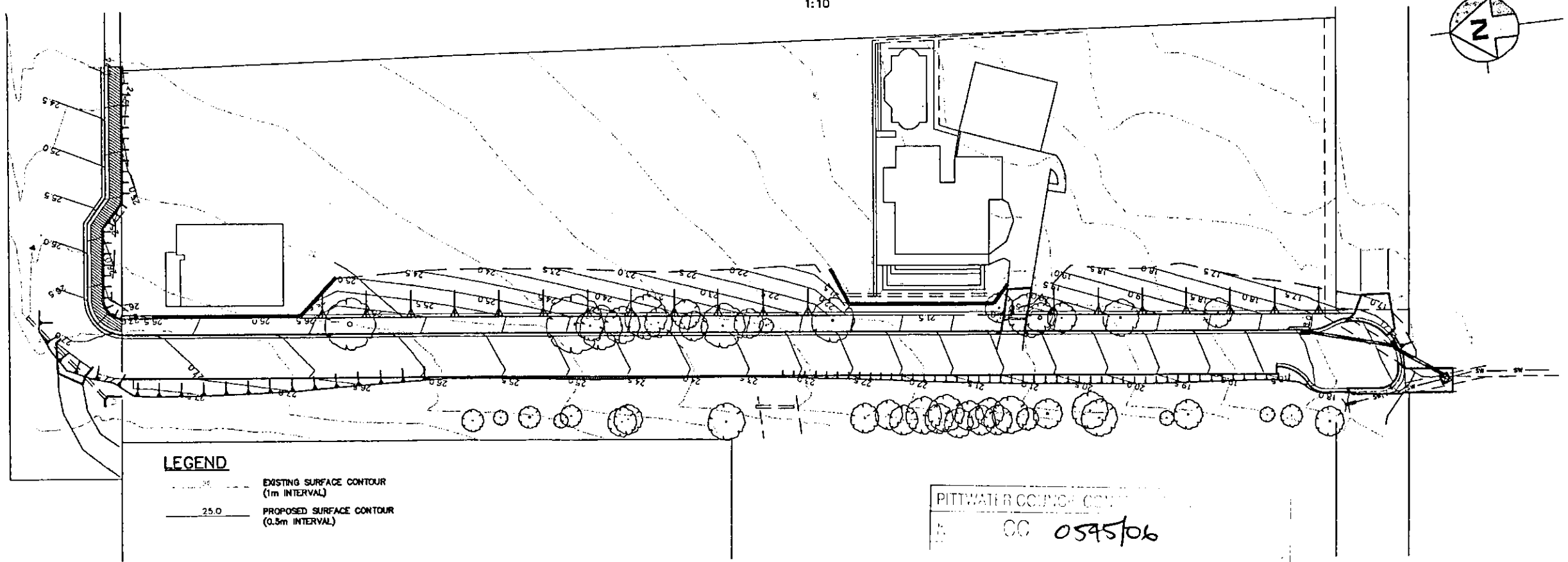


150mm KERB & GUTTER
1:10



TYPICAL ROAD PAVEMENT DETAIL

NOTE
1. THE BASE COURSE MATERIAL CAN BE DGB20 OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGB20 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION. THE SUB-BASE MATERIAL CAN BE CRUSHED SANDSTONE OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGS40 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION.
2. THE MINIMUM COMPACTION DRY DENSITY RATIO'S ARE AS FOLLOWS (AS1289.5.4.1-1993):
   - BASECOURSE 98% MODIFIED
   - SUB-BASE 95% MODIFIED
   - SUB-GRADE 100% STANDARD OR DENSITY RATIO OF 85%
3. PAVEMENT WEARING COURSE TO CONSIST OF A 30mm THICK LAYER OF AC14 OVERLAIN BY A 20mm THICK LAYER OF AC10.
4. FOR DETAILS OF THE REQUIRED ROAD PAVEMENT REFER TO PAVEMENT DESIGN REPORT PREPARED BY GEOTECHNIQUE PTY LTD, 14th JANUARY 2005.



PROPOSED SURFACE CONTOURS
1:300

PITTWATER COUNCIL
DA 0595/06
Rec
10 JAN 2007

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
E	DRAWING TITLE AMENDED	MS	PC	MS	M. TOOKER	18.10.06
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: PROPOSED SURFACE CONTOURS AND PAVEMENT/ KERB DESIGN DETAILS

Drawing No. 4670-09
Issue E
Cad File No. 4670-09
Xref.(s)

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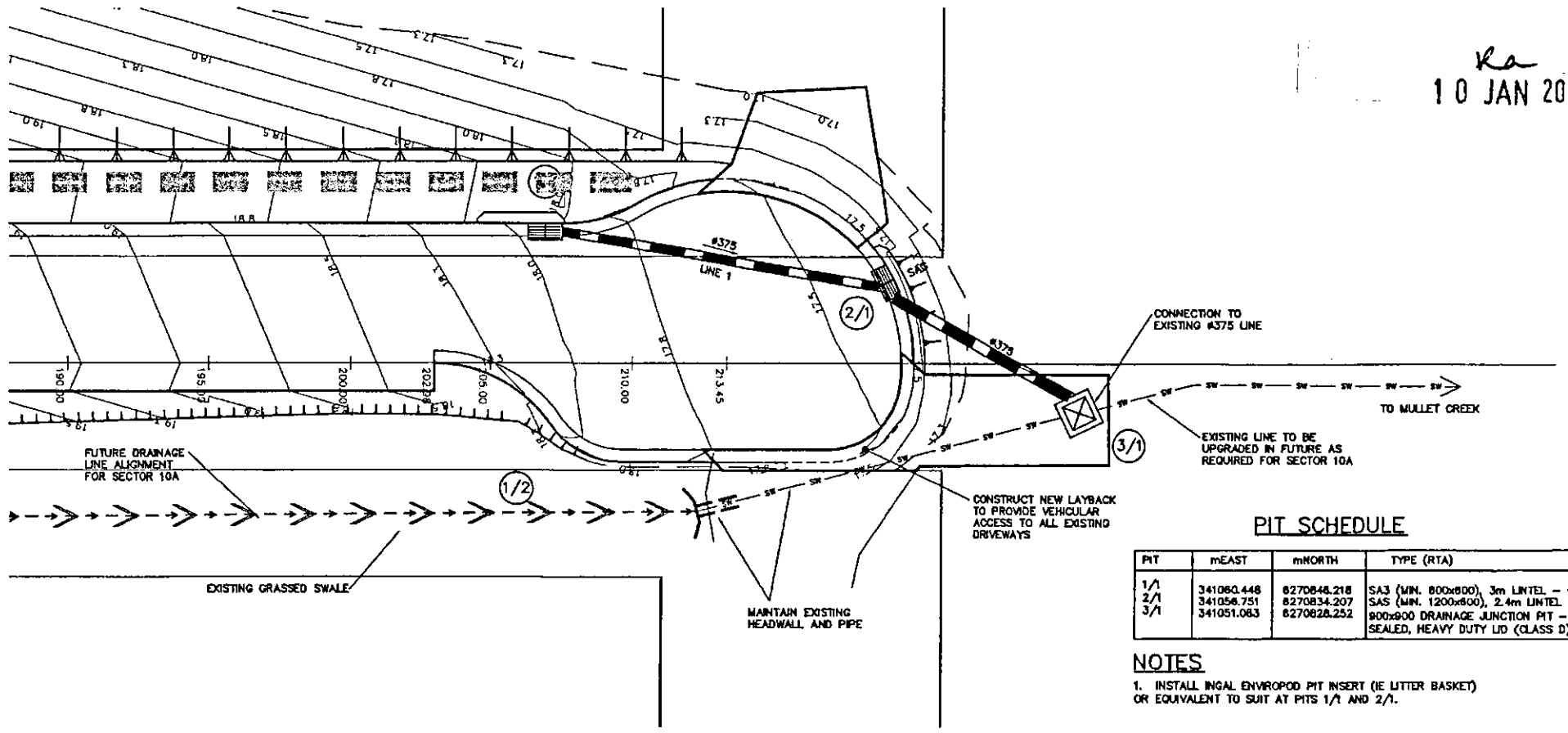

DRAINAGE PLAN
1:100

PIT SCHEDULE

PIT	mEAST	mNORTH	TYPE (RTA)
1/1	341060.448	6270848.218	SA3 (MIN. 800x800), 3m LINTEL – ON GRADE
2/1	341056.751	6270834.207	SA5 (MIN. 1200x800), 2.4m LINTEL – SAG
3/1	341051.083	6270828.252	900x900 DRAINAGE JUNCTION PIT – JUNCTION SEALED, HEAVY DUTY LID (CLASS D).

NOTES

1. INSTALL INGAL ENVIROPOD PIT INSERT (IE LITTER BASKET) OR EQUIVALENT TO SUIT AT PITS 1/1 AND 2/1.

0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : TENDER, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL.-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: STORMWATER DRAINAGE PLAN

Drawing No. 4670-10
Issue D
Cad File No. 4670-10
Xref.(s)

N:\4670 BUBALO\Drawings\4670-10.dwg, Layout1, 19/10/2006 11:24:12 AM

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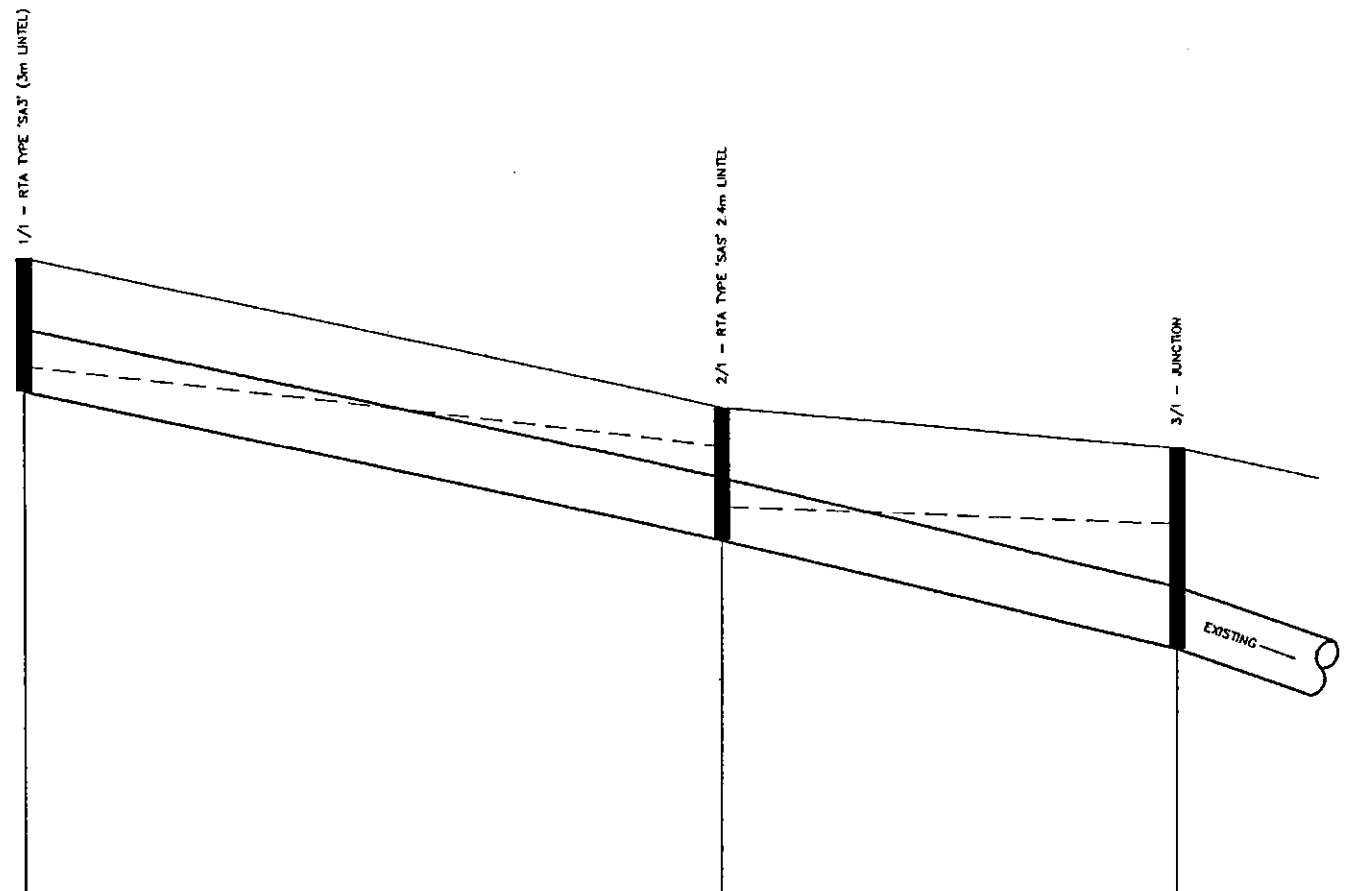

	1/1 – RTA TYPE 'SAS' (3m UNITEL)	2/1 – RTA TYPE 'SAS' 2.4m UNITEL	3/1 – JUNCTION
	Q20=237L/s 375mm CLASS 2 7.2%	Q20=246L/s 375mm CLASS 2 MIN. 8.0%	Q20=246L/s 375mm CLASS 2 APPROX. 11.8%
Datum El. 13			
HGL	17.352 / 16.865	16.503 / 16.397	15.778
Surface Level	18	17.1	16.85
Invert Level	17.200 / 16.300	16.300	MATCH EXISTING
Chainage	0	12.57	20.79

NOTES

1. FLOWS SHOWN ARE FOR A 20yr ARI EVENT.

NOT TO SCALE

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CVL–DE–SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
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email reception @pattbrit.com.au
A.C.N. 003 229 226

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: STORMWATER DRAINAGE LONGITUDINAL SECTIONS

Drawing No. 4670-11
Issue D
Cad File No. 4670–11
Xref.(s)

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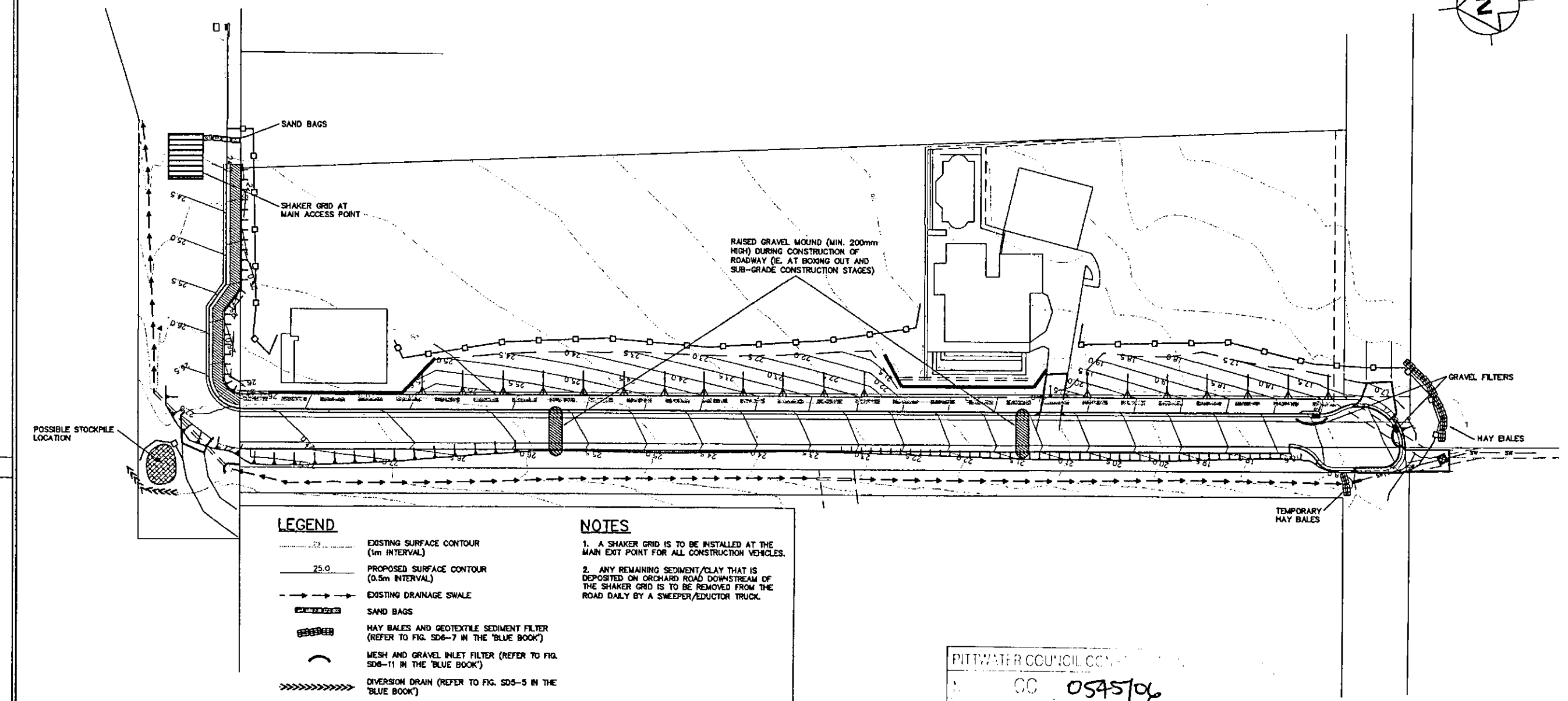

LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- PROPOSED SURFACE CONTOUR (0.5m INTERVAL)
- EXISTING DRAINAGE SWALE
- SAND BAGS
- HAY BALES AND GEOTEXTILE SEDIMENT FILTER (REFER TO FIG. SD6-7 IN THE 'BLUE BOOK')
- MESH AND GRAVEL INLET FILTER (REFER TO FIG. SD6-11 IN THE 'BLUE BOOK')
- DIVERSION DRAIN (REFER TO FIG. SD5-5 IN THE 'BLUE BOOK')
- SEDIMENT FENCE (REFER TO FIG. SD6-8 IN THE 'BLUE BOOK')
- POSSIBLE STOCKPILE LOCATION (REFER TO FIG. SD4-1 IN THE 'BLUE BOOK')

NOTES

1. A SHAKER GRID IS TO BE INSTALLED AT THE MAIN EXIT POINT FOR ALL CONSTRUCTION VEHICLES.
2. ANY REMAINING SEDIMENT/CLAY THAT IS DEPOSITED ON ORCHARD ROAD DOWNSTREAM OF THE SHAKER GRID IS TO BE REMOVED FROM THE ROAD DAILY BY A SWEEPER/EDUCTOR TRUCK.

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
D	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06
C	CUL-DE-SAC REVISED	MS	ARG	MS		08.11.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: EROSION AND SEDIMENT CONTROL PLAN

Drawing No. 4670-12
Issue D
Cad File No. 4670-12
Xref.(s)

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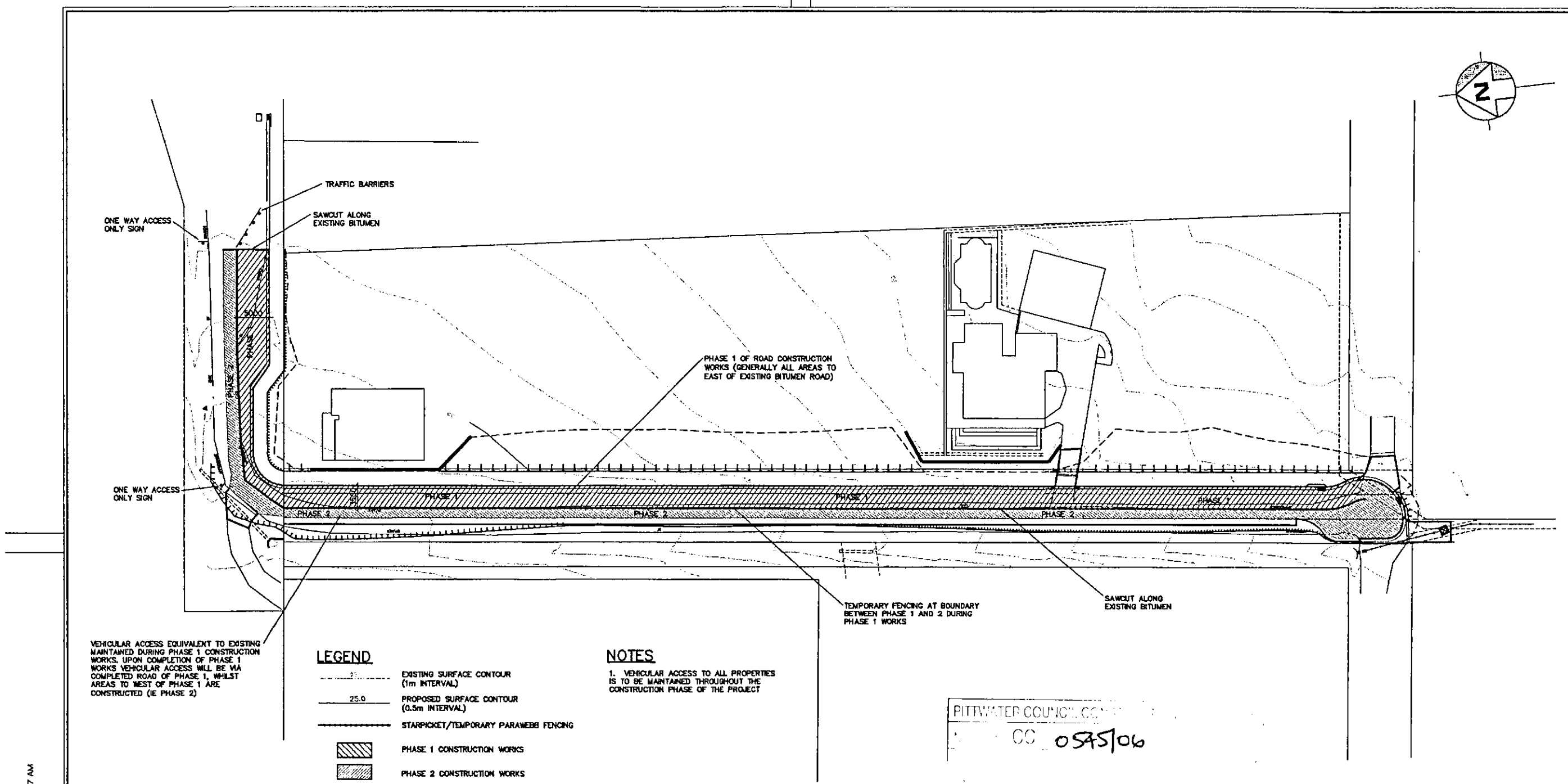

PITTWATER COUNCIL CC
CC 0595/06

10 JAN 2007

DRG STATUS : FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
A	ISSUED FOR CONSTRUCTION	MS	ARG	MS	M. TOOKER	21.07.06

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: CONSTRUCTION PHASE TRAFFIC MANAGEMENT PLAN

Drawing No. 4670-13
Issue A
Cad File No. 4670-13
Xref.(s)

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FILE COPY

MR W BUBALO

WARRIEWOOD VALLEY
7&7A ORCHARD STREET
(*PART OF SECTOR 10*)

Water Management Report
Construction Certificate Issue

Issue No. 1
SEPTEMBER 2005

Patterson Britton
& Partners Pty Ltd
consulting engineers

MR W BUBALO

WARRIEWOOD VALLEY
7&7A ORCHARD STREET
(PART OF SECTOR 10)

Water Management Report
Construction Certificate Issue

PITTWATER COUNCIL
0545/06

RC
10 JAN 2007

Issue No. 1
SEPTEMBER 2005

Document Amendment and Approval Record

Issue	Description of Amendment	Prepared by [date]	Verified by [date]	Approved by [date]
1	CC Water Management Report	David Stone 6/9/05	Michael Shaw 6/9/05	Mark Tooker 7.9.05

Note: This document is preliminary unless it is approved by a principal of Patterson Britton & Partners.
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1 EXECUTIVE SUMMARY

This document is the Construction Certificate (*CC*) issue Water Management Report (*WMR*) for the proposed development of 7&7A Orchard Street (*part of Sector 10*), Warriewood Valley. It follows on from the Development Application (*DA*) issue water management report, detailing additional information gathered during the design process and where necessary recalibration of previously developed models.

Pittwater Councils "*Warriewood Valley Urban Release Water Management Specification*" (*WMS*), Feb 2001 has been utilised as the guiding document for preparation of the report, with detailed analysis of the following aspects of water management for the proposed development:

- Water cycle management;
- Water quality management;
- Flood protection; and
- Stormwater quantity management.

Appendix A includes a signed copy of Councils CC document checklist to confirm that all the tasks required of the above aspects have been undertaken.

The runoff quantity, water cycle, flooding and quality control measures proposed in the development satisfy Councils requirements detailed in their WMS.

1.1 WATER MANAGEMENT PLAN

The proposed development of 7&7A Orchard St (*Part of Sector 10*) provides a Water Management Plan (*WMP*) that is detailed in the **Drawings** and in summary incorporates the following:

- Stormwater retention and WSUD measures that include Atlantis infiltration/retention cells and rainwater tanks that allow achievement of the predevelopment runoff volume (*refer to **Section 4** of this report titled "Description of Proposed* Water Management Measures*" for details)*;
- A water quality control treatment train that consists of a major water quality control pond (*WQCP1*), Gross Pollutant Traps (*GPT's*) and other WSUD measures (*refer to **Section 5** of this report titled "Water Quality Assessment" for details)*;
- A detailed stormwater quality monitoring programme (*refer to **Section 5** of this report titled "Water Quality Assessment" for details)*
- Stormwater Detention measures consisting of Atlantis Cell type detention tanks on each proposed lot to ensure downstream flows are maintained at predevelopment levels (*refer to **Section 7** of this report titled "Stormwater Quantity Management" for details)*; and
- Provision of a development that complies with both NSW floodplain management policy and Councils flood planning requirements (*including evacuation*) (*refer to **Section 7.3** of this report titled "Flood Management" for details).*

1.2 SECTOR 10 OWNERSHIP

Sector 10 consists of a number of different landholders. 7&7A Orchard St is approximately 0.6ha out of a total of 13.9ha for the Sector as a whole.

The water management plan for Sector 10 previously developed for the Stockland component of the Sector also took into consideration the Sector wide implications for future water management. This has meant some of the various components of the Stockland water management plan have been sized to accommodate development of 7&7A Orchard Street.

The components of the Stockland development that have been sized to include development of 7&7A Orchard Street include the water quality control ponds (*WQCP's*) and GPT's. In addition, a significant proportion of the monitoring undertaken for the Stockland development also applies to this site.

1.3 CERTIFICATION

The contents of this report are certified by Michael Shaw, who is a registered NPER engineer with the Institution of Engineers, to comply with the requirements of Pittwater Council's Water Management Specification (*February 2002*).

2 INTRODUCTION

The proposed development site (*7 & 7A Orchard Street, Warriewood Valley*) is part of Sector 10 and is included within the Warriewood Valley Urban Release Area, which has been identified for release for urban purposes by the Minister for Planning.

The site has a total area of approximately 6,068m^2 and has frontage to the southern side of Orchard Street at Warriewood. The site is bounded on the north by a private accessway and on the south by Stockland owned land (*refer to **Figure 1** for details*). No creeks or major overland flow paths currently traverse or impact on the site.

Patterson Britton & Partners *(PBP)* has been engaged by Mr W Bubalo to prepare a Water Management Report relating to the impacts of the proposed development on water management issues. These issues include long-term hydrologic assessment *(water balance)*, water quality assessment, flood attenuation, floodplain management and stormwater quantity management.

It should be noted that this report only applies to the land owned by Mr W Bubalo which is proposed to be subdivided into 10 residential lots. It does not relate to the proposed reconstruction of the adjacent private access road. Details of the access road design have been included in **Appendix B** for information purposes only.

This current report has been prepared for the Construction Certificate (*CC*) stage of the overall development process.

The Water Management Report has been prepared in accordance with Pittwater Council's publication "*Warriewood Valley Urban Land Release – Water Management Specification*" *(February, 2001) (WMS)*.

A completed copy of the "*Documentation Checklist – Construction Certificate*", confirming that all tasks required by Council's WMS have been undertaken, is found at **Appendix A.**

3 DESCRIPTION OF PROPOSED WATER MANAGEMENT MEASURES

A number of different water management measures are proposed to be used for this site. These measures are illustrated in the **Drawings** and described below and include:

- Rainwater Tanks;
- Atlantis Detention/Infiltration Tanks and Filtration Units; and
- A Water Quality Control Pond located in the downstream area of Sector 10.

3.1 RAINWATER TANKS

A $2m^3$ rainwater tanks is proposed to be installed on each lot (*ie a total volume of $20m^3$*). The location of the tanks on each of the lots will vary depending on the final form of the individual dwellings.

The rainwater tanks are to be installed such that only roof water is collected. The water from the tanks is to be used, as a minimum, for irrigation and toilet flushing purposes. A trickle top up and back flow prevention device are to be installed to Sydney Water's specifications.

While providing a retention function, the rainwater tanks also provide a detention function, as determined in the water cycle assessment (***refer to Section 4***). Studies have shown that at the beginning of a storm event the rainwater tanks will, on average, be only 58% full with the remainder being able to be included as effective detention..

When full, overflow from the rainwater tanks is to be directed to the Atlantis cell detention/infiltration taks installed at the rear of each lot.

3.2 ATLANTIS TANKS AND FILTRATION UNITS

Atlantis detention/infiltration tanks and filtration units are proposed to be installed at the low point of each lot (*refer to **Drawing 4670-01-03***). The size of the tanks varies for each lot. A schedule of tank sizes is included in **Drawing 4670-01-04.**

All overflow from the rainwater tanks and other surface water runoff is to be directed to the Atlantis filtration units and tanks.

Each tank is to be installed with a filtration unit upstream to provide pre treatment and prevent clogging of the tanks and infiltration media. Filtration units are to be installed to the manufacturers and Patterson Britton & Partners specifications (*refer to **Appendix D and Drawings 4670-01-02 and 05***).

The base of each tank is to be underlain by 50mm of sand and evenly spaced gravel trenches (*as detailed in **Drawing 4670-01-05***) in order to enhance the infiltration capacity of the site.

Downstream of each tank is a Discharge Control Pit (*DCP*). These pits restrict the discharge from the site to the permissible site discharge (*PSD*) by using a discharge control plate or orifice. The DCP's also include a surface grate to allow surface runoff not collected upstream of the Atlantis cells to be detained prior to discharge from the site. A trash screen is also to be installed over the orifice plate to prevent clogging.

Tank 'DT7', which benefits lots 707 and 708, is located within lot 709. This requires an easement to be established in Lot 709 for the benefit of these lots. The drainage lines running along the rear of all the lots (*ie Line 1 and Line 2*) will also require easements.

3.3 WATER QUALITY CONTROL POND

Water Quality Control Pond 1 (WQCP1) was constructed as part of the downstream Stockland development and was sized to provide stormwater treatment for the 7&7A Orchard Street development. For details of the construction of WQCP1 refer to the CC Issue Water Management Report (*PBP, February 2002*) prepared for the Stockland Development. For details of the performance of WQCP1 since construction, refer to monitoring results provided in **Appendix C** and also the 8th Quarter Post Subdivision Certificate Water Quality Monitoring Report (*PBP, November 2004*) prepared for the Stockland development. The results show that it is currently exceeding its performance targets.

4 WATER CYCLE ASSESSMENT

An assessment of the water cycle for the site (*ie 7&7A Orchard St only*) was carried out at DA stage to ascertain the impact of the proposed development on runoff volume and baseflow. The existing water cycle was used as a basis of comparison for two development scenarios. The first scenario explored the impact of development where minimal management practices were introduced. The second scenario compares existing conditions with the proposed development layout where a suite of water management practices is proposed.

The DA water cycle model did not require amendment at CC stage as the detailed design shown in the **Drawings** has been undertaken to meet the outcomes of the earlier modelling by incorporating an equivalent suite of water management practices. All other assumptions made within the DA water cycle model remain valid.

To achieve the objective of the DA model the following stormwater retention volumes were required to, and have been incorporated into the design:

- Implementation of $2m^3$ (*2kL*) rainwater tanks within each of the 10 proposed lots (*ie total capacity of $20m^3$*); and
- Provision of $222.1m^3$ of Atlantis infiltration/detention tanks.

4.1 WATER CYCLE ASSESSMENT RESULTS

4.1.1 Existing Conditions

The results indicated that 24% of total rainfall was converted to runoff for existing conditions.

For the years 1995 to 1998:

- The average annual rainfall volume falling on the site was 8,876 m^3;
- The average annual volume of runoff from impervious surfaces was 0 m^3;
- The average annual volume of pervious surface runoff was 2,108 m^3; and
- The average annual volume of infiltration was 1,820 m^3.

The total runoff as a percentage of total rainfall (*24%*) is slightly lower than the percentage calculated in the IWMS (*36%*), however considering that the L&T IWMS model (*NAM*) simulated a 10 year period of rainfall for a much larger area with likely lower average infiltration rates than for this site, the result is considered acceptable.

4.1.2 Post Development – No Water Management Practices

The results indicated that 56% of total rainfall was converted to runoff for the post development conditions without introduction of specific water volume reduction measures.

For the years 1995 to 1998:

- The average annual rainfall volume falling on the site was 8,876 m^3;
- The average annual volume of runoff from impervious surfaces was 3,919 m^3;
- The average annual volume of pervious surface runoff was 1,077 m^3; and
- The average annual volume of infiltration was 898 m^3.

Of particular interest is the increase in runoff volume from impervious surfaces and the decrease in infiltration volume.

4.1.3 Post Development – Introduction of Water Management Practices

The results of the water balance indicated that 23% of total rainfall was converted to runoff for the post development conditions with the introduction of the above mentioned measures.

For the years 1995 to 1998:

- The average annual rainfall volume falling on the site was 8,876 m^3;
- The average annual flow volume to the rainwater tanks was 2,351 m^3, reuse demand was 1,646 m^3, 1,151 m^3 of mains water was required and 1,859 m^3 of spilled to the infiltration systems;
- The average annual flow volume to the infiltration systems was 4,686 m^3; and
- The average annual volume of infiltration was 2,430 m^3.

Introduction of the proposed water management practices reduces the fraction of runoff from 56% to 23% of the total rainfall, which is 1% less than the runoff rate for existing conditions.

5 WATER QUALITY ASSESSMENT

This section contains a description of the updated CC monitoring plan for the site including the results of additional sampling, undertaken since publication of the DA stage WMR.

5.1 MONITORING PLAN OBJECTIVES

Prior to urbanisation of Sector 10, a monitoring plan was developed for Stockland in accordance with Council's Water Management Specification (*February 2001*) and AS/NZ 5667.6: 1998 "*Water Quality Sampling – Guidance on Sampling of Rivers and Streams*". The Stockland monitoring plan was developed based on a sector wide approach and hence incorporates the Bubalo owned land (*7&7A Orchard Street*).

The objectives of the monitoring plan are to:-

- develop an understanding of the existing conditions present in the waterways within and adjacent to Sector10;
- continually assess the quality of these waterways during the construction phase of Sector 10; and
- assess the impact of constructed water quality measures following construction to ensure the development is ecologically sustainable.

Monitoring undertaken prior to the development of Stockland's lots within Sector 10 was used to establish the pre-development quality of the waterways within and adjacent to Sector 10 (*termed "baseline data"*). This data was compared with post subdivision monitoring results of the Stockland development and will also be compared with the post subdivision results of the 7&7A Orchard Street development to determine whether pollution controls are operating adequately and if the water quality is improving.

During the development stage of 7&7A Orchard Street, implementation of the monitoring plan will allow early detection of any adverse impacts likely to risk the health of the public or the quality of downstream waterways such as Warriewood Wetlands.

5.2 SCOPE OF MONITORING PLAN

7&7A Orchard Street drains directly to the Stockland drainage system of Sector 10, which inturn leads to WQCP1. Discharge from WQCP1 then drains through Sector 12 to Warriewood Wetlands.

5.2.1 Monitoring Locations

The primary waterway that was selected for monitoring as part of the Stockland monitoring programme for Sector 10 was Mullet Creek. This creek receives runoff in part from Sector 10 and then discharges into Warriewood Wetlands. Sampling locations for existing

conditions were selected at the downstream and upstream ends of this creek with relation to Sector 10 (*refer to **Figure 1***).

A third internal sampling site was also monitored at the discharge point from Sector 10 into Sector 12 (*refer to **Figure 1***).

As part of the post subdivision certificate water quality monitoring programme for the Stockland owned land, both the inlets and outlets from WQCP1 and WQCP 2 were monitored.

Currently no water body exists within or immediately adjacent to 7&7A Orchard Street. In addition to the Sector 10 monitoring, sampling has also been undertaken at the existing piped drainage discharge point to Mullet Creek (*refer to **Figure 1**, sampling site IS3*). This pipe currently drains the existing private access road and any upstream areas which also drain to this road. However, 7&7A Orchard Street does not currently drain to this point and the proposed lots are designed to drain through the Stockland development rather than to Mullet Creek.

Following development of 7&7A Orchard Street, a sampling site will be established at the piped discharge point from the proposed subdivision into the Stockland development (*refer to **Figure 1**, sampling site IS2*).

5.2.2 Types of Monitoring

The monitoring plan for Sector 10 (*including 7&7A Orchard Street*) consists of three main categories:-

- physico-chemical water quality monitoring;
- ecosystem/rapid biological assessment monitoring; and
- riparian sediment toxicant monitoring.

5.2.3 Water Quality Monitoring (Discrete Sampling)

The water quality monitoring component of the plan consists of:-

- dry weather sampling undertaken quarterly; and
- wet weather sampling undertaken for at least 3 events (*recording a rainfall depth greater than 20mm over the catchment in a 24 hour period*) spread evenly over the year and sampling throughout the rainfall event (*rising and falling limbs of storm hydrograph*).

Samples are tested for the constituents listed in Council's WMS and reported to conform with Council's specification.

As mentioned above, discrete sampling of two dry weather events has already been undertaken at the access road discharge point to Mullet Creek. Following construction of 7&7A Orchard Street sampling will be undertaken at the discharge point of 7&7A Orchard Street into the Stockland development (*refer to **Figure 1**, sampling site IS2*).

5.2.4 Rapid Biological Assessment Monitoring

Habitat monitoring has been undertaken as part of the Stockland development in Mullet Creek (*ie. at the location of the water sampling stations*).

As no natural aquatic systems exist on the site (*7&7A Orchard Street*), no additional rapid biological assessment has been or will be required.

5.2.5 Sediment Toxicant Monitoring

Sampling and testing of bed sediment has already been undertaken in Mullet Creek as part of the Stockland development

As no natural waterways currently exist on the site (*7&7A Orchard Street*) no additional bed sediment sampling will be required.

5.2.6 SQUID Monitoring

All Stockland constructed stormwater quality improvement devices (*SQUID's*) for Sector 10 have been monitored for 2 years since issue of the Stage 1 subdivision certificate. This has included:

- Measurement of volume/mass of material removed from GPT's and an assessment of its relative composition;
- Discrete sampling at the major inlets/outlets of the proposed WQCP; and
- Qualitative assessment of effectiveness of other proposed water quality control measures (*ie bio-retention swales*)

Following construction within 7&7A Orchard Street, the qualitative assessment for Stockland constructed devices will be extended to quarterly inspection of the proposed infiltration tanks within 7&7A Orchard Street (*for a 2 year period*).

5.2.7 Flow Gauging for Monitoring

To assess the magnitude of wet weather events and determine the position of a particular sample within a storm event, both the rainfall depth and flood depth will be recorded. Rainfall depth data will be obtained from the BoM, whilst flood depths will be recorded at the closest available flood gauge to the site (*Garden Street crossing of Mullet Creek*).

The total depth of rainfall experienced during the event will allow PBP to determine if the event sampled will comply with Council's minimum 20mm depth over 24 hours criteria. A sustained length of record of the water levels at Garden Street will allow PBP to determine if the sample has been taken on either the rising or falling limb of the regional storm hydrograph.

5.2.8 Quality Assurance/Measurement Accuracy

All samples collected for the monitoring plan will be tested by a NATA certified laboratory. Copies of all original data testing certificates will be provided along with information detailing the collection and preservation status upon delivery at the laboratory. The laboratory testing detection limits will also be included on all test certificates.

5.3 MONITORING RESULTS

5.3.1 Water Quality Monitoring Results

Summary tables of the pre construction, construction and post subdivision water quality data from sampling undertaken for the Stockland development is included in **Appendix C**. **Table 1** contains data for the pre construction monitoring undertaken at the discharge point of the access road to Mullet Creek.

The results for the sample taken on 5 May 2005 are similar to results for previous monitoring of the Stockland upstream site in Mullet Creek as would be expected. However, results from 26 July 2005 show high levels of a number of pollutants when compared to previous monitoring and Councils objectives. Nutrient levels (*ie Total Nitrogen (TN) and Total Phosphorus (TP)*) were significantly higher than the previous monitoring and above Council's medium and long term goals. This is most likely due to external sources, which may include excess fertiliser application to land upstream.

The highly turbid nature of the sample could explain the high concentrations of copper, lead and zinc (*the values for these metals were all above Council's medium and long term objectives*). The high suspended solids concentration may indicate the bed sediments had been disturbed and pollutants stored in the sediments had been remobilised.

5.3.2 Rapid Biological Assessment Monitoring Results

For details of the rapid biological assessment monitoring results for Sector 10 refer to the Stockland water management reports (*DA to post sub-division issues*).

5.3.3 Bed Sediment Toxicant Monitoring Results

For details of the bed sediment toxicant monitoring results for Sector 10 refer to the Stockland water management reports (*DA to post sub-division issues*).

Table 1 –Pre Construction (*7&7A Orchard St*) Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal*	5 May 2005	26 July 2005
						WSIS10A	WSBUB2
Total rain over 5 days preceding sampling	mm					0	0
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.02	*1.30*
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.8	**8.2**
Nitrate	mg/L	NS	NS	NS	NS	0.06	<0.02
Nitrite	mg/L	NS	NS	NS	NS	<0.02	<0.02
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.8	8.2
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	0.05	**1.70**
Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.05	0.80
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.01	<0.01
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	*980*	40
Suspended Solids	mg/L	<100	SQ	<20	<6	2	**430**
Turbidity (field)	NTU	NS	SQ	<50	<20	5	**105**
pH (field)	pH unit	NS	6.6-8	6.6-8	6.6-8	**8.76**	**8.54**
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	2.91	2.54
Temperature (field)	°C	NS	SQ	SQ	SQ	19.7	19.2
Conductivity (field)	mS/cm	NS	NS	NS	NS	0.234	0.335
Salinity (field)	%	NS	NS	NS	NS	0	0
Arsenic	ug/L	NS	SQ	50%SQ	50	<2	5
Chromium	ug/L	NS	SQ	50%SQ	10	<5	<5
Copper	ug/L	NS	SQ	50%SQ	2	<5	**16**
Lead	ug/L	NS	SQ	50%SQ	1	<2	**27**
Mercury	ug/L	NS	SQ	50%SQ	0.1	<0.05	<0.05
Zinc	ug/L	NS	SQ	50%SQ	50	20	**120**
Organo chlorine Pesticides (OC)	mg/L	NS	SQ	50%SQ	NS	<21	<21
Organo phosphate Pesticides (OP)	mg/L	NS	SQ	50%SQ	NS	<220	<220
Phenols	mg/L	NS	SQ	50%SQ	NS	<170	<170
PAHs	mg/L	NS	SQ	50%SQ	NS	<17	<17
Hardness	mg/L	NS	NS	NS	NS	68	140
Chlorophyll A	mg/L	NS	15	15	10	<0.005	0.09
Oil and Grease	mg/L	NS	NS	NS	NS	<5	<5

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in Bold do not achieve the short term goal or where SQ is the short term goal
6. Rainfall data obtained from Bureau of Meteorology.
7. NS – Not Specified by Council, SQ – Status Quo,

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6 WATER QUALITY MANAGEMENT

This section contains a description of the updated CC water quality management plan for the site including a detailed description of the proposed measures and their management.

6.1 CONSTRUCTION PHASE

During bulk earthworks and construction for the proposed development, sediment and erosion control facilities will be constructed/installed in accordance with Council's specifications and with the requirements of the publication "*Managing Urban Stormwater – Soils and Construction*" *(Landcom, 2004)*.

A sediment and erosion control plan has been developed for construction (*refer to **Drawing 4670-01-06***) which outlines the strategies proposed to prevent excessive pollutant loads being exported from the site in runoff during and immediately following construction.

6.2 POST DEVELOPMENT PHASE

As required in Council's WMS, the objective of the water quality management strategy for the proposed development of Section 10 is to ensure a "*no net increase*" in pollutant loads discharged from the developed site compared to the existing conditions.

The proposed water quality management system for 7&7A Orchard Street consists of the following elements:

- the maximisation of pervious areas *(on each development lot)* so as to increase the infiltration potential;
- use of rainwater storage tanks for reuse in non-potable supply purposes and irrigation;
- use of Atlantis infiltration tanks *(described earlier in this report)*;
- installation of Atlantis Purification Units (*refer to **Appendix D** for details*);
- utilisation of the Stockland constructed underground Gross Pollutant Traps *(GPTs)* – these have been sized to account for 7&7A Orchard Street; and
- utilisation of the Stockland constructed water quality control pond 1(WQCP1) – this has been sized to account for 7&7A Orchard Street

It has been estimated that the pollutant loads discharging from Sector 10 as a whole (*ie including 7&7A Orchard Street*) will be lower than for the existing site conditions, making a substantial contribution to long-term improvements in receiving water quality.

Post sub-division certificate stage water quality monitoring results for WQCP1 show that the wetland is achieving better than the design objective in terms of TN, TP and SS reduction (*refer to **Appendix C** for details*).

6.2.1 Maintenance

The maintenance program for all water quality control measures implemented with 7&7A Orchard Street is as follows:

- Periodic *(3 monthly)* inspection and removal of accumulated sediments and trash from the Atlantis purification units; and
- Yearly inspection and removal of accumulated sediments from rainwater tanks and the Atlantis infiltration units.

6.2.2 Mosquito Risk Assessment

An assessment of the mosquito risk for all water quality control measures implemented within 7&7A Orchard Street has been undertaken. The outcomes of the assessment have resulted in incorporation of the following design measures to minimise mosquito nuisance:

- Pre-screening all flows to both the rainwater and infiltration tanks;
- Regular maintenance of infiltration tanks to prevent blockage; and
- Providing a seal to all maintenance access points to both the rainwater and infiltration tanks.

7 STORMWATER QUANTITY MANAGEMENT

7.1 INTEGRATED STRATEGY

The integrated strategy proposed for management of stormwater runoff quantity on the site is comprised of:

- source control which includes:
  - use of rainwater tanks (*2 m^3/lot ($20m^3$), of which 42% is counted as effective OSD storage – $8.4m^3$*) to reduce runoff volume, maximise non-potable supply/re-use and minimise peak flows discharging from individual allotments;
  - minimising impervious surfaces (*limited to 50% site wide*) to maximise infiltration potential and reduce runoff volumes;
  - the use of landscaping which encourages the maximisation of infiltration.
- the conveyance system which includes:
  - the proposed 20yr ARI piped drainage system (*effective detention storage volume = $19.4m^3$*) to reduce peak flow rates in events between the 20yr and 100yr ARI events;
- formal stormwater detention facilities to be incorporated at the downstream area of each lot which includes:
  - the proposed Atlantis Tank On site Detention system (*also utilised for infiltration purposes*) to provide a total detention volume of $366m^3$/ha or **$222.1m^3$** at a PSD of 225L/s/ha or 136.5L/s for the ten lot subdivision.

7.2 STORMWATER DETENTION

The proposed design achieves the requirements of the DA water management report, therefore no further detention modelling was required for the CC stage.

We confirm that CC design as shown in the **Drawings** results in post development outflows from 7&7A Orchard Street that are lower than for the base conditions model.

7.2.1 Flood Flow Gauging

No waterways exist on the site (*7&7A Orchard Street*), hence no flood flow gauging was undertaken.

7.3 FLOOD MANAGEMENT

The Bubalo site is not flood impacted by any major water body (*creek or major overland flow path*). A stormwater easement was originally proposed on the southern boundary of the site to allow access for the upstream development (*ie Sector 10A*) to the Stockland piped drainage system for all flows up to the 20 year ARI event. Overland flows in excess of the 20 year ARI event were

proposed to drain directly to Mullet Creek. However, during design of the access road an existing drainage line was discovered at the end of the road, discharging directly to Mullet Creek. At the same time Lawson & Treloar also identified potential flooding problems at the downstream end of Sector 10 and the main access road to Sector 12. It was therefore decided to drain all upstream flows for all events directly to Mullet Creek. An easement to drain these flows to the Stockland drainage system is therefore no longer required.

Note that the road drainage, as illustrated in **Appendix B,** has been designed to convey the 100 year ARI flows to Mullet Creek

7.4 FLOOD EVACUATION

The proposed development is sited well clear of the floodwaters of Mullet Creek in both the 100yr ARI and PMF events. Hence, all habitable floor levels will be sited clear of both the 100yr ARI and PMF events.

No flood evacuation strategy is therefore required for the site as it is not impacted by the PMF of Mullet Creek.

8 REFERENCES

Institution of Engineers, Australia
"*Australian Rainfall and Runoff, a Guide to Flood Estimation*" Canberra, 1987

Lawson & Treloar Pty Ltd
"*Integrated Water Management Strategy – Warriewood Valley* " November 1997
Report prepared for Pittwater Council

Patterson Britton & Partners
"*Water Management Report Sector 10*
Warriewood Valley" Issue 1, June 2001
Prepared for Stockland Trust Group

Patterson Britton & Partners
"*Water Management Report Sector 10*
Warriewood Valley-Construction Certificate Issue" Issue 7, February 2002
Prepared for Stockland Constructors

Patterson Britton & Partners
"*Post Subdivision Certificate Water Quality Monitoring Report Sector 10*
Warriewood Valley" Issue 1, January 2003
Prepared for Stockland Constructors

Pittwater Council
"*Flood Risk Management Policy for Pittwater Council*" 19 June 2001

Pittwater Council
"*Warriewood Valley Urban Land Release Water Management Specification*" February, 2001

PITTWATER COUNCIL CONSTRUCTION CERTIFICATE

Number: CC 0545/06

This is a copy of submitted plans, documents or Certificates associated with the issue of the Construction Certificate.

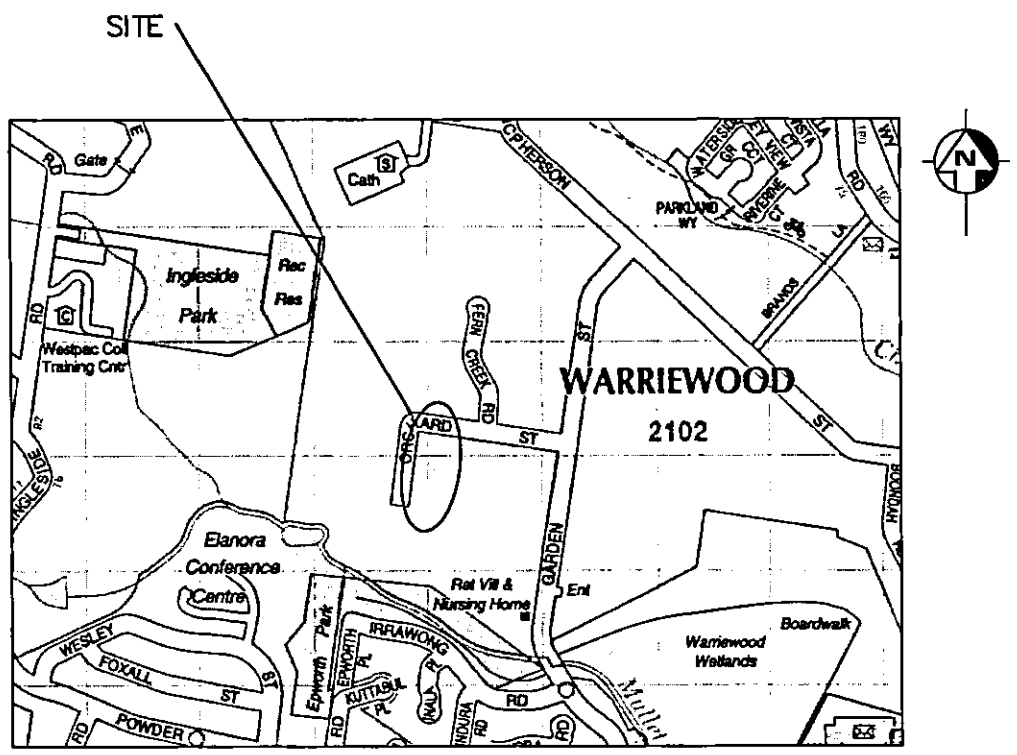
Endorsed by: RL

Date: 10 JAN 2007

DRAWINGS

WARRIEWOOD VALLEY, 7 & 7A ORCHARD ST.
(PART OF SECTOR 10)
INTERALLOTMENT DRAINAGE DESIGN
for
V, D AND M BUBALO

PITTWATER COUNCIL COPY
CC 0545/06
Rec
10 JAN 2007



LOCALITY PLAN
NTS

DRAWING LIST:

4670-01-01	TITLE SHEET, LOCALITY PLAN AND DRAWING LIST
4670-01-02	GENERAL NOTES & SPECIFICATIONS
4670-01-03	SITE PLAN
4670-01-04	DRAINAGE LONG SECTIONS
4670-01-05	DRAINAGE DETAILS
4670-01-06	SEDIMENT AND EROSION CONTROL PLAN

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of issue	Des'd	Drn	Chk'd	Approved	Date
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05
A	ISSUED FOR REVIEW	OR	ARG	MS		30.08.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET INTERALLOTMENT DRAINAGE DESIGN

Title: TITLE SHEET, LOCALITY PLAN AND DRAWING LIST

Drawing No. 4670-01-01
Issue B
Cad File No. 4670-01-01
Xref.(s)

N:\4670-01 Orchard St. Drainage Des - ARC\Drawings\4670-01-01.dwg, SHEET 1, 8/09/2005 9:45:59 AM

A1

GENERAL NOTES

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE SUPERINTENDENT BEFORE PROCEEDING WITH THE WORK.

2. ALL LEVELS ARE IN TERMS OF AUSTRALIAN HEIGHT DATUM (AHD). ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.

3. DESIGN BASED ON SURVEY INFORMATION SUPPLIED BY BYRNE & ASSOCIATES PTY LTD. THE SURVEY MAY NOT PICK UP ALL EXISTING FEATURES. WHERE MAJOR DISCREPANCIES ARE IDENTIFIED THE CONTRACTOR SHALL INFORM THE SUPERINTENDENT BEFORE PROCEEDING.

4. NO TREES ARE TO BE REMOVED (UNLESS INDICATED ON THE DRAWINGS) WITHOUT THE SUPERINTENDENTS CONSENT.

5. NO WORK IS TO BE UNDERTAKEN ON PRIVATE PROPERTY WITHOUT CONSENT FROM THE SUPERINTENDENT & THE PROPERTY OWNERS.

6. DO NOT SCALE FROM THESE DRAWINGS UNLESS NOTED OTHERWISE.

7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

8. IF THE CONTRACTOR HAS ANY QUESTION, REQUIRES CLARIFICATION OF ANY ISSUE, OR FINDS ANY DISCREPANCY WITHIN THESE DRAWINGS, THE CONTRACTOR SHALL ADVISE THE SUPERINTENDENT BEFORE PROCEEDING.

9. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT SAA CODES, WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES, EXCEPT WHERE VARIED BY THESE DRAWINGS.

10. ALL SETOUT DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES.

11. THE CONTRACTOR SHALL PROVIDE TEST CERTIFICATES FROM A N.A.T.A. APPROVED TESTING LABORATORY CERTIFYING THAT THE MATERIALS USED COMPLY WITH THE RELEVANT SPECIFICATIONS.

12. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO PROTECT EXISTING SERVICES. ANY SERVICE AUTHORITIES PROPERTY DAMAGED DURING THE COURSE OF THE CONTRACT SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.

STORMWATER DRAINAGE

1. ALL STORMWATER WORKS ARE TO BE UNDERTAKEN GENERALLY IN ACCORDANCE WITH AS 3500 (2003) STORMWATER DRAINAGE.

2. UNLESS NOTED OTHERWISE, ALL REINFORCED CONCRETE PIPES ARE TO BE CLASS 2 AND RUBBER RING JOINTED. RUBBER RINGS SHALL BE MANUFACTURED AND TESTED IN ACCORDANCE WITH AS1646. THE EXCAVATED TRENCH WIDTH FOR PIPE LAYING MUST BE AT LEAST 400MM WIDER THAN THE OUTER DIAMETER OF THE PIPE. PIPES ARE TO BE LAID CENTRALLY WITHIN THE EXCAVATED TRENCH.

3. ALL PIPEWORK SHALL BE BEDDED ON A CONTINUOUS UNDERLAY OF SAND, NOT LESS THAN 75MM THICK IN OTHER THAN ROCK AND 200MM THICK IN ROCK AFTER COMPACTION. THE SAND SHALL BE GRADED IN ACCORDANCE WITH AS3500 AND COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY AND SHALL BE GRADED EVENLY TO THE REQUIRED GRADIENT OF THE PIPELINE.

4. IN WET OR UNSTABLE GROUND CONDITIONS WHERE THE TRENCH BOTTOM REQUIRES FURTHER STABILIZING, ADDITIONAL BEDDING OF 20MM AND/OR 30MM NOMINAL SIZE AGGREGATE (AS DIRECTED BY THE SUPERINTENDENT), SHALL BE PLACED BELOW THE STANDARD BEDDING TO A DEPTH DETERMINED BY THE SUPERINTENDENT. WHERE ORDERED BY THE SUPERINTENDENT AN APPROVED FILTER FABRIC SHALL BE USED IN CONJUNCTION WITH THE ADDITIONAL BEDDING.

5. THE BED AND HAUNCH MATERIAL SHALL BE COMPACTED FOR THE FULL WIDTH OF THE TRENCH BY A MINIMUM OF TWO PASSES OF A VIBRATING PLATE OR HAND TAMPING METHOD TO THE SATISFACTION OF THE SUPERINTENDENT.

6. CHASES SHALL BE FORMED WHERE NECESSARY TO PREVENT SOCKETS, FLANGES OR THE LIKE FROM BEARING ON THE TRENCH BOTTOM OR THE UNDERLAY.

7. THE CONTRACTOR SHALL ENSURE THAT ANY EXISTING STRUCTURES LOCATED ADJACENT TO EXCAVATED TRENCHES ARE SUPPORTED OR PROTECTED TO PREVENT DAMAGE TO OR MOVEMENT OF THESE STRUCTURES

8. THE CONTRACTOR MUST LEAVE ALL STORMWATER DRAINAGE WORKS UNCOVERED UNTIL ANY TESTING DEEMED NECESSARY BY THE SUPERINTENDENT HAS BEEN PERFORMED.

9. PIPE LAYING SHALL BEGIN AT THE DOWNSTREAM END OF THE LINE WITH THE SOCKET ENDS OF THE PIPE FACING UPSTREAM. THE BARREL OF EACH PIPE SHALL BE IN CONTACT WITH THE BEDDING MATERIAL THROUGHOUT ITS FULL LENGTH.

10. FOR RUBBER RING JOINTS THE PIPE ENDS SHALL BE THOROUGHLY CLEANED BEFORE THE JOINT IS MADE. THE TWO PIPE SECTIONS SHALL THEN BE TIGHTLY JOINED WITH THEIR INNER SURFACES AT THE MANUFACTURER'S NOMINATED LAYING GAP.

11. LIFTING HOLES IN PIPES AND CULVERTS SHALL BE PLUGGED WITH MORTAR, PRECAST TAPERED PLUGS, OR TAPE SURROUNDS OR OTHER APPROVED MEANS PRIOR TO BACKFILL MATERIAL BEING PLACED.

12. CUTTING OPERATIONS FOR CONCRETE PIPES SHALL PROVIDE NEAT END SURFACES. THE CUT SURFACES SHALL BE GIVEN TWO COATS OF A SUPERINTENDENT APPROVED EPOXY PAINT.

STORMWATER DRAINAGE (cont.)

13. JOINTS SHALL NOT BE MADE UNDERWATER. THE TRENCH SHALL BE DEWATERED TO FACILITATE JOINT MAKING AND INSPECTION. PRECAUTIONS SHALL BE TAKEN TO PREVENT EROSION OF JOINT MATERIAL BY MOVING CURRENTS OF WATER.

14. COMPLETED CEMENT MORTAR JOINTS SHALL BE KEPT DAMP AND PROTECTED FROM THE DIRECT RAYS OF SUN UNTIL BACKFILLING TAKES PLACE.

15. DRAINAGE LINES SHALL BE CONSTRUCTED TO THE TOLERANCES AS FOLLOWS:

PIPELINE GRADING	LINE TOLERANCE (mm)	LEVEL TOLERANCE (mm)
-LESS THAN 0.6%	50	10
-0.6% TO 1%	50	20
-GREATER THAN 1%	50	40

NOT WITHSTANDING THE TOLERANCES ABOVE EACH PIPE SHALL HAVE A MINIMUM FALL (APPROVED BY THE SUPERINTENDENT) IN THE DIRECTION OF FLOW.

16. BACKFILL MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO PLACING AND COMPACTION.

17. ALL BACKFILL FOR STORMWATER DRAINAGE WORKS IS TO BE COMPACTED IN LAYERS NOT EXCEEDING 300mm LOOSE THICKNESS AND COMPACTED WITHOUT DAMAGING OR DISPLACING THE PIPEWORK.

18. BACKFILL FOR STORMWATER PITS AND PIPES SHALL BE COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AND GRADED IN ACCORDANCE WITH AS 3500 (2003).

19. UNLESS SPECIFIED OTHERWISE ALL DRAINAGE PITS TO BE CAST INSITU. THE GRADE OF CONCRETE TO BE USED SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 32MPA. STEEL REINFORCING BARS SHALL COMPLY WITH THE REQUIREMENTS OF AS1302. WELDED WIRE REINFORCING SHALL COMPLY WITH AS1304.

20. GALVANISED STEEL STEP IRONS AT SPACINGS OF 0.3m ARE REQUIRED IN ALL DRAINAGE PITS GREATER THAN 1.2m DEEP.

21. UNLESS SPECIFIED ALL DRAINAGE GRATES TO BE GALVANISED MILD STEEL TO AS 3996 AND CLASS B.

22. ALL CAST INSITU CONCRETE DRAINAGE PITS SHALL BE CONSTRUCTED TO THE FORMS AND DIMENSIONS SHOWN ON THE DRAWINGS. WHERE THE GROUND IS SOUND THE SUPERINTENDENT MAY PERMIT THAT BACK FORMS NEED NOT BE USED IN THE CONSTRUCTION OF PITS, THE CONCRETE BEING POURED AGAINST THE EARTH. WHERE THIS IS DONE, THE THICKNESS OF THE WALLS OF SUCH PITS SHALL BE INCREASED BY A MINIMUM OF 50MM GREATER THAN THE DIMENSION SHOWN ON THE DRAWINGS. ALL COSTS ASSOCIATED WITH THIS INCREASE IN THICKNESS SHALL BE BORNE BY THE CONTRACTOR.

23. ALL PRE-CAST PITS TO BE BCP PRE-CAST (OR APPROVED EQUIVALENT) WITH MINIMUM BASE HEIGHT OF 1150MM (IE. ORDER CODE PTC-1150) AND THE MINIMUM NMBER OF RISERS REQUIRED TO MAKE UP THE SPECIFIED PIT DEPTH.

24. uPVC PIPES SHALL CONFORM IN ALL RESPECTS WITH THE REQUIREMENTS OF AS1254. THE CLASS OF PIPES SHALL BE uPVC "STORMWATER HD" DESIGNED FOR SOLVENT WELD SPIGOT AND SOCKET CONNECTION UNLESS NOTED OTHERWISE.

25. uPVC PIPES SHALL BE SUPPLIED WITH SUFFICIENT QUANTITIES OF SOLVENT FOR MAKING OF THE PIPE JOINTS.

26. uPVC PIPE ENDS SHALL BE THOUROUGHLY CLEANED BEFORE THE JOINT IS MADE. JOINTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS USING JOINTING SOLVENT AND PRIMER.

27. uPVC PIPES SHALL BE TRANSPORTED, HANDLED AND STACKED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

28. uPVC PIPE LAYING SHALL BEGIN AT THE DOWNSTREAM END OF THE LINE WITH THE SOCKET END OF THE PIPE FACING UPSTREAM. WHEN THE PIPES ARE LAID, THE BARREL OF EACH PIPE SHALL BE IN CONTACT WITH THE BEDDING MATERIAL THROUGHOUT ITS FULL LENGTH.

29. THE uPVC PIPE ENDS SHALL BE THOROUGHLY CLEANED BEFORE THE JOINT IS MADE. JOINTING SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS DIRECTIONS USING JOINTING SOLVENT AND PRIMER.

ATLANTIS DETENTION TANKS

1. ALL ATLANTIS PRODUCTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATIONS.

2. FILTRATION UNIT TO BE 'ATLANTIS LARGE FILTRATION UNIT' (PART No. 6003A) WITH ALUMINIUM LID AND GEOTEXTILE BASKET.

3. ATLANTIS MATRIX TANK MODULES TO BE EITHER 'DOUBLE MODULE' (PART No. 70004) OR 'TRIPLE MODULE' (PART No. 70005) WITH A MINIMUM CRUSH STRENGTH OF 28.8t/m².

4. MINIMUM ATLANTIS CELL BACKFILL COVER IN NON-TRAFFICABLE AREAS IS TO BE 500MM

5. NON-WOVEN GEOTEXTILE TO BE PLACED AROUND ENTIRE PERIMETER OF FINISHED BLOCK OF ATLANTIS CELLS.

6. AT PENETRATIONS THROUGH THE OUTER GEOTEXTILE LAYER, ADDITIONAL GEOTEXTILE TO BE PLACED WITH MINIMUM OVERLAP OF 300MM BETWEEN ATLANTIS CELL & OBVERT OF INCOMING/OUTGOING PIPE.

EARTHWORKS

1. EXCAVATION IN ROCK SHALL BE MINIMISED. WHERE THE DESIGN WOULD REQUIRE EXTENSIVE EXCAVATION IN ROCK, THE SUPERINTENDENT SHALL BE INFORMED PRIOR TO PROCEEDING.

2. ALL EXCAVATION WORKS ADJACENT TO EXISTING STRUCTURES OR IN UNSTABLE CONDITIONS MUST INCLUDE SHORING.

3. THE CONTRACTOR SHALL OBTAIN CURRENT SERVICE LOCATIONS FROM ALL RELEVANT AUTHORITIES PRIOR TO THE COMMENCEMENT OF WORKS.

4. WHERE EXCAVATION WORK IS REQUIRED IN THE VICINITY OF EXISTING SERVICES, THE CONTRACTOR SHALL LOCATE AND SUPPORT ALL SERVICES DURING THE WORKS.

5. WHERE EXCAVATED MATERIAL IS TO BE USED FOR FILLING, THE MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO USE.

6. ALL WASTE MATERIALS SHALL BE DISPOSED OFF-SITE IN AN APPROPRIATE MANNER.

CONCRETE

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

2. CONCRETE USED IN THE WORKS SHALL BE EITHER MASS CONCRETE OR REINFORCED CONCRETE AS NOTED ON THE DRAWINGS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

PROPERTY	REINFORCED CONCRETE	MASS CONCRETE
EXPOSURE CLASSIFICATION	B2	A1
MINIMUM 28 DAY COMPRESSIVE STRENGTH	32 MPa	25 MPa
CEMENT TYPE	GENERAL PURPOSE	GENERAL PURPOSE
WATER / BINDER RATIO (MAX.)	0.40	0.40
CLEAR COVER TO REINFORCEMENT (MIN.)	50mm	-
SURFACE FINISH - FORMED	CLASS 2	CLASS 2
- UNFORMED	WOOD FLOAT	WOOD FLOAT

3. THE FINISHED CONCRETE SHALL BE DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. CONCRETE SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.

4. THE FINISHED CONCRETE SURFACE SHALL BE FREE OF CRACKS HAVING A CRACK WIDTH EQUAL TO OR GREATER THAN 0.1 mm AT TIME OF PRACTICAL COMPLETION. IF CRACKING EXCEEDS THIS LIMIT, THE CONTRACTOR SHALL MAKE GOOD THE CRACKS TO THE SATISFACTION OF THE SUPERINTENDENT WHICH MIGHT COMPRISE REPLACEMENT OF CONCRETE ELEMENT OR SEALING THE CRACKS WITH SILANE/SILICA FUME GEL OR OTHER WORKS.

5. TESTING AND ASSESSMENT FOR COMPLIANCE OF CONCRETE SHALL BE CARRIED OUT BY THE CONTRACTOR IN ACCORDANCE WITH AS 3600.

6. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC TIPPED MILD STEEL CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

7. CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 7 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 14 DAYS FOLLOWED BY A GRADUAL DRYING OUT. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC.

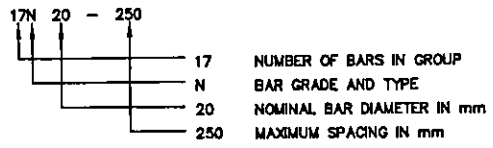
8. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

REINFORCEMENT

1. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

2. REINFORCEMENTS SYMBOLS:

- N DENOTES GRADE 500 N BARS TO AS/NZS 4671 DUCTILITY CLASS N
- R DENOTES GRADE 250 R HOT ROLLED PLAIN BARS TO AS 1302 DUCTILITY CLASS N
- SL DENOTES GRADE 500 L DEFORMED WELDED WIRE MESH TO AS/NZS 4671 DUCTILITY CLASS L
- SN DENOTES GRADE 500 N DEFORMED WELDED WIRE MESH TO AS/NZS 4671 DUCTILITY CLASS N
- LTM DENOTES GRADE 500 L DEFORMED WIRE TRENCH MESH TO AS/NZS 4671 DUCTILITY CLASS L



3. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.

4. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED AT NOT GREATER THAN 1M CENTRES BOTH WAYS. CONCRETE BLOCKS SHALL BE MADE FROM THE SAME CONCRETE TO BE POURED AROUND THE BLOCK. PLASTIC CHAIRS SHALL NOT BE USED. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

REINFORCEMENT (cont.)

6. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN OR OTHERWISE APPROVED IN WRITING BY THE SUPERINTENDENT. LAPS SHALL BE IN ACCORDANCE WITH AS 3600 AND NOT LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR AND SHALL BE AS FOLLOWS:-

BAR DIA.	LAP LENGTH
12	400
16	500

7. JOGGLES TO BARS SHALL BE 1 BAR DIAMETER OVER A LENGTH OF 12 BAR DIAMETERS.

8. FABRIC SHALL BE LAPPED 2 TRANSVERSE WIRES PLUS 50 mm. BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF THE WIRE.

9. WHERE TRANSVERSE TIE BARS ARE NOT SHOWN PROVIDE N12-400 SPLICED WHERE NECESSARY AND LAP WITH MAIN BARS 400 mm U.N.O.

10. THE FOLLOWING NOTATIONS MAY HAVE BEEN USED ON THE DRAWINGS:

LV	:	LENGTH VARIES
CV	:	COG VARIES
EW	:	EACH WAY
EF	:	EACH FACE
SV	:	SHAPE VARIES
B1	:	BOTTOM REINFORCEMENT - LAID FIRST
B2	:	BOTTOM REINFORCEMENT - LAID SECOND
T1	:	TOP REINFORCEMENT - LAID FIRST
T2	:	TOP REINFORCEMENT - LAID SECOND
T & B	:	TOP AND BOTTOM
ALT.	:	ALTERNATING BARS

FORMWORK

1. UNLESS NOTED OTHERWISE ALL CONCRETE FORMWORK SHALL BE FOR A CLASS '2' FINISH.

2. THE DESIGN CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE CONTRACTOR.

3. DESIGN AND CONSTRUCTION AND STRIPPING TIMES SHALL COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE NOTED OR APPROVED BY THE SUPERINTENDENT.

4. DURING CONSTRUCTION, SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORTED SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED, THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LIVE LOADS.

5. THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT THE PRIOR APPROVAL OF THE SUPERINTENDENT.

REINSTATEMENT WORKS

1. UNLESS OTHERWISE SPECIFIED ALL EXCAVATIONS ARE TO BE REINSTATED TO THE EXISTING GROUND SURFACE LEVEL.

2. IF FENCES ARE DAMAGED OR REMOVED DURING CONSTRUCTION THEY ARE TO BE REINSTATED AT THE COMPLETION OF THE WORKS AT THE CONTRACTORS EXPENSE.

3. UNLESS OTHERWISE SPECIFIED, ALL SURFACES ARE TO BE REINSTATED TO THE EXISTING SURFACE CONDITION (e.g. ROAD PAVEMENT, KERB AND GUTTER, GRASSED VERGE OR FOOTPATH).

4. ALL PAVEMENT RECONSTRUCTION TO BE IN ACCORDANCE WITH COUNCILS STANDARD SPECIFICATION, AUS-SPEC OR RTA SPECIFICATIONS AS DIRECTED BY THE SUPERINTENDENT.

ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM

CONTRACTOR SHALL CALL:
DIAL BEFORE YOU DIG 1100
PRIOR TO COMMENCEMENT OF WORK TO OBTAIN ALL CURRENT SERVICE AUTHORITY PLANS

DIAL1100 BEFORE YOU DIG

PITTWATER COUNCIL
CC 0545/06

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05
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consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET INTERALLOTMENT DRAINAGE DESIGN

Title: GENERAL NOTES AND SPECIFICATIONS

10 JAN 2007

Drawing No. 4670-01-02
Issue B
Cad File No. 4670-01-02
Xref.(s)

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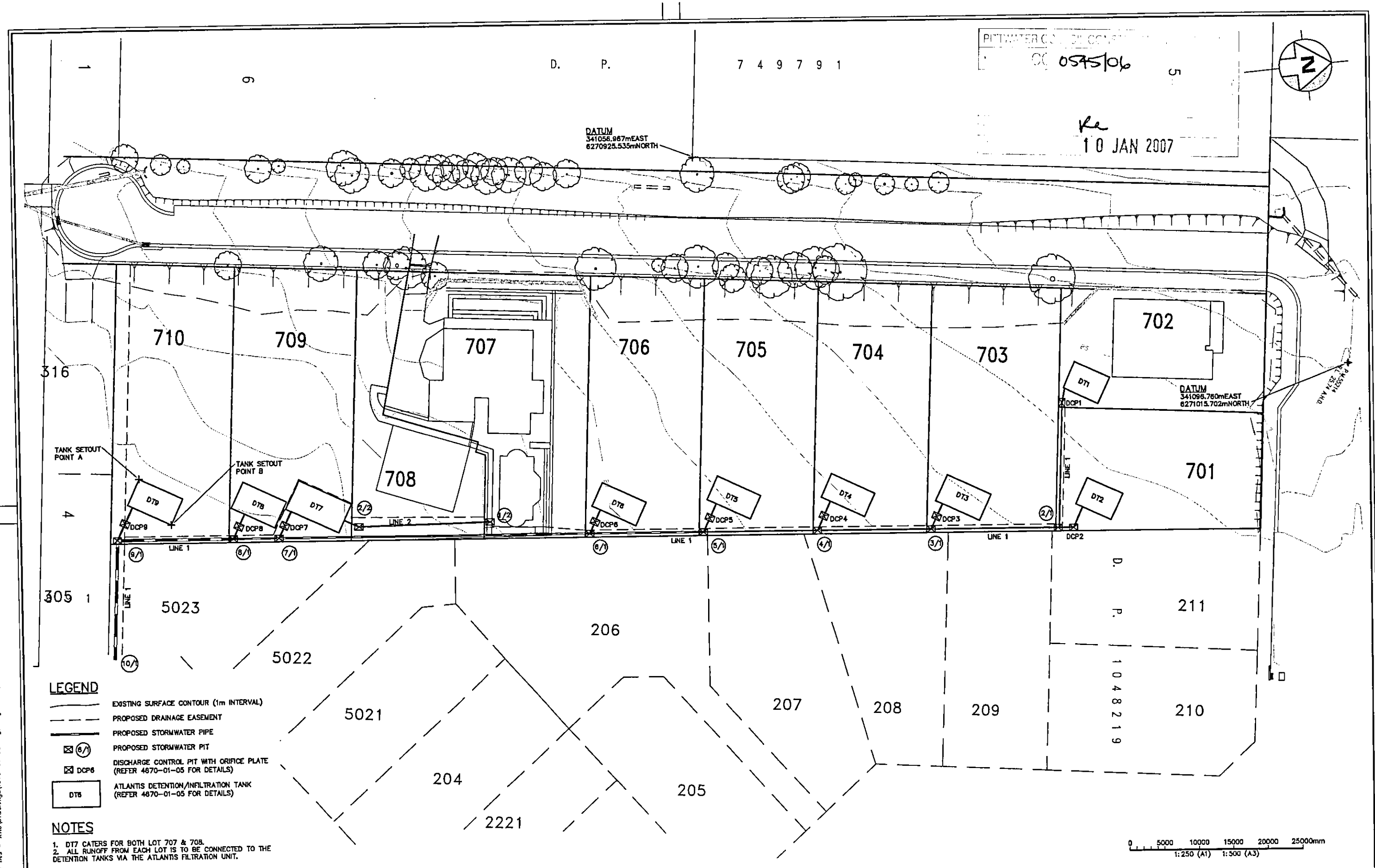
A1



PITTWATER COUNCIL RECEIVED
CC 0595/06
10 JAN 2007

LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- PROPOSED DRAINAGE EASEMENT
- PROPOSED STORMWATER PIPE
- 6/1 PROPOSED STORMWATER PIT
- DCP6 DISCHARGE CONTROL PIT WITH ORIFICE PLATE (REFER 4670-01-05 FOR DETAILS)
- DT6 ATLANTIS DETENTION/INFILTRATION TANK (REFER 4670-01-05 FOR DETAILS)

NOTES

1. DT7 CATERS FOR BOTH LOT 707 & 708.
2. ALL RUNOFF FROM EACH LOT IS TO BE CONNECTED TO THE DETENTION TANKS VIA THE ATLANTIS FILTRATION UNIT.

0 5000 10000 15000 20000 25000mm
1:250 (A1) 1:500 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05
A	ISSUED FOR REVIEW	DR	ARG	MS		30.08.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET
INTERALLOTMENT DRAINAGE DESIGN

Title: SITE PLAN

Drawing No. 4670-01-03
Issue B
Cad File No. 4670-01-03
Xref.(s)

N:\4670-01 Orchard St. Drainage Des - AHC\Drawings\4670-01-03.dwg, Layout, 8/09/2005 9:46:31 AM

A1

PIT SCHEDULE

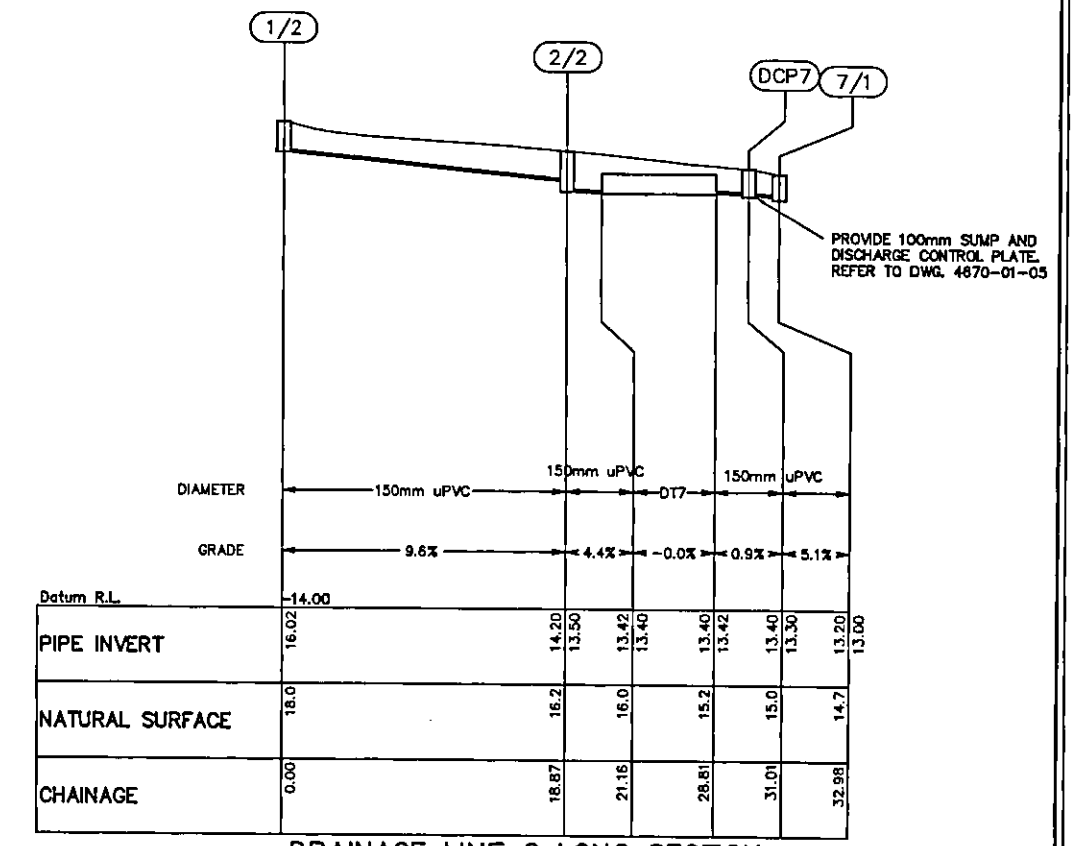
PIT No.	PIT SIZE	PIT DEPTH	PIT INVERT RL.	PIT TYPE	PIT LID	ORIFICE #	mEAST	mNORTH
DCP1	900x600	1300	22.84	PRE-CAST	GALVANISED GRATE	71	341097.801	6270974.240
2/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341115.422	6270971.585
3/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341113.551	6270953.359
4/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341111.579	6270937.059
5/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341110.205	6270920.764
6/1	900x600	1300	REFER LONG SECTION	PRE-CAST	SOLID COVER	-	341108.533	6270904.471
7/1	900x600	1700	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341103.994	6270880.260
8/1	900x600	1700	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341103.325	6270853.734
9/1	900x600	1500	REFER LONG SECTION	CAST-IN-SITU	SOLID COVER	-	341101.623	6270837.154
10/1	EXISTING	EXISTING	REFER LONG SECTION	EXISTING	EXISTING	-	EXISTING	EXISTING
1/2	900x600	2000	REFER LONG SECTION	CAST-IN-SITU	GALVANISED GRATE	-	341105.188	6270890.522
2/2	900x600	2700	REFER LONG SECTION	CAST-IN-SITU	GALVANISED GRATE	-	341103.701	6270871.713
DCP7	900x600	1800	13.20	CAST-IN-SITU	GALVANISED GRATE	103	341102.304	6270861.266
DCP2	900x600	1300	22.10	PRE-CAST	GALVANISED GRATE	71	341115.663	6270973.925
DCP3	900x600	1300	21.30	PRE-CAST	GALVANISED GRATE	81	341111.845	6270954.375
DCP4	900x600	1300	20.45	PRE-CAST	GALVANISED GRATE	77	341109.905	6270938.234
DCP5	900x600	1300	19.50	PRE-CAST	GALVANISED GRATE	77	341108.287	6270921.906
DCP6	900x600	1300	18.40	PRE-CAST	GALVANISED GRATE	78	341106.936	6270905.422
DCP8	900x600	1700	13.00	CAST-IN-SITU	GALVANISED GRATE	77	341101.855	6270854.728
DCP9	900x600	1800	12.30	CAST-IN-SITU	GALVANISED GRATE	75	341099.383	6270838.491

NOTES
1. REFER TO 4670-01-05 FOR DETAILS OF CAST-IN-SITU PITS.
2. ALL PIT LIDS TO BE A MINIMUM OF CLASS B ACCORDING TO AS 3996-1992.
3. PIT CO-ORDINATES ARE CENTRE OF LID.
4. ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.

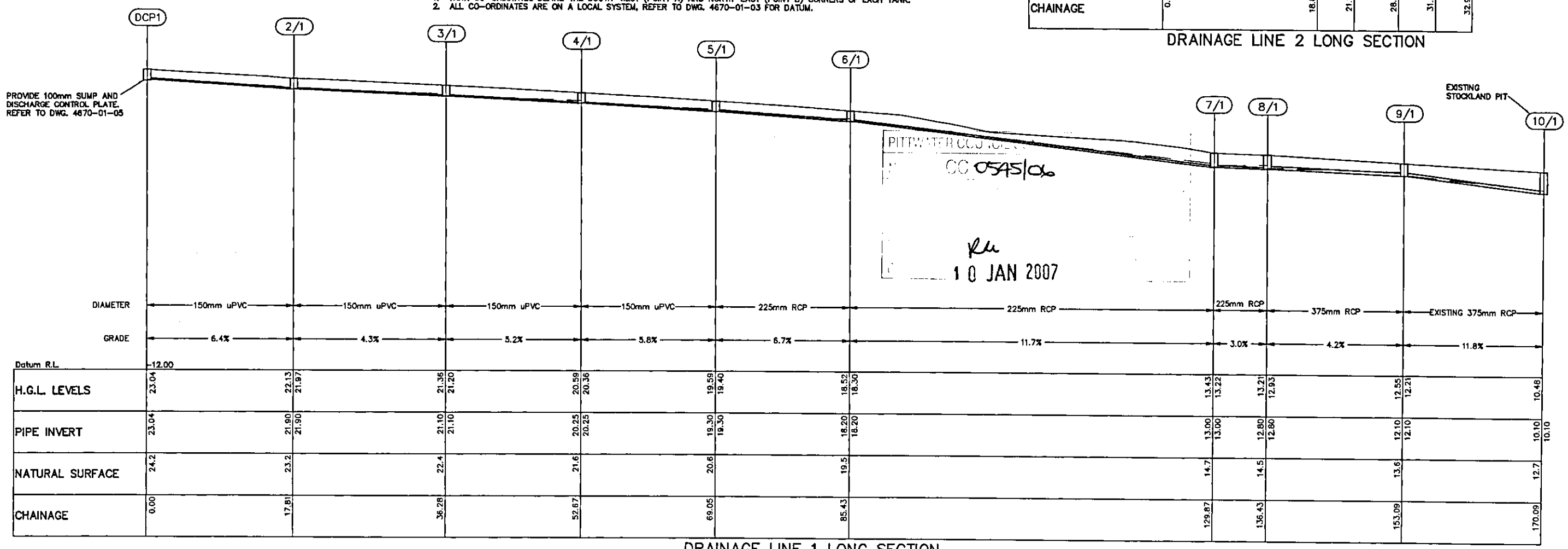
ATLANTIS DETENTION/INFILTRATION TANK SCHEDULE

TANK No.	TANK SIZE	TANK HEIGHT	TANK VOL.	MIN BASE RL.	POINT A mEAST	POINT A mNORTH	POINT B mEAST	POINT B mNORTH
DT1	4080x5480	880	18.3	23.14	341092.188	6270978.803	341098.477	6270978.424
DT2	4080x5480	880	18.4	22.30	341108.841	6270976.707	341115.150	6270978.329
DT3	4080x6850	880	23.9	21.50	341106.089	6270956.563	341113.099	6270980.362
DT4	3672x8850	880	21.4	20.65	341104.031	6270940.038	341110.690	6270944.043
DT5	3672x6850	880	21.8	19.70	341102.471	6270923.681	341109.131	6270927.888
DT6	3672x6850	880	22.1	18.80	341101.512	6270907.124	341108.172	6270911.131
DT7	4488x8220	1310	46.6	13.40	341096.136	6270863.979	341104.197	6270868.746
DT8	4080x6850	880	24.9	13.20	341095.425	6270858.039	341102.435	6270859.837
DT9	4080x6850	880	24.7	12.50	341093.276	6270841.245	341100.288	6270845.044

NOTES
1. TANK CO-ORDINATES DEFINE THE SOUTH-WEST (POINT A) AND NORTH-EAST (POINT B) CORNERS OF EACH TANK.
2. ALL CO-ORDINATES ARE ON A LOCAL SYSTEM, REFER TO DWG. 4670-01-03 FOR DATUM.



DRAINAGE LINE 2 LONG SECTION



DRAINAGE LINE 1 LONG SECTION

0 5000 10000 15000 20000 25000mm
1:250 (A1) 1:500 (A3)

PITTWATER COUNCIL
CC 0545/06
RECEIVED
10 JAN 2007

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Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
B	ISSUED FOR CC APPROVAL	DS	ARG	MS	M. TOOKER	08.09.05
A	ISSUED FOR REVIEW	OR	ARG	MS		30.08.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET INTERALLOTMENT DRAINAGE DESIGN

Title: DRAINAGE LONG SECTIONS

Drawing No. 4670-01-04
Issue B
Cad File No. 4670-01-04
Xref.(s)

A1

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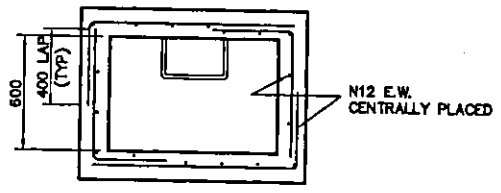
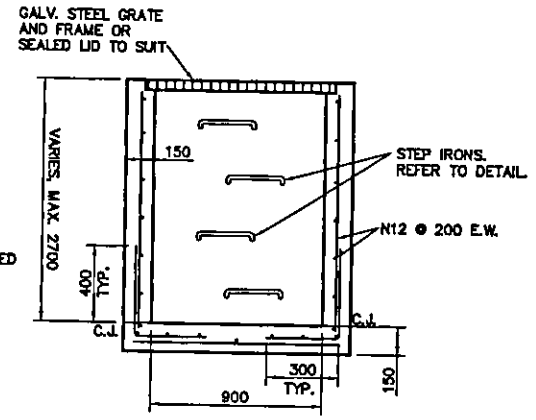
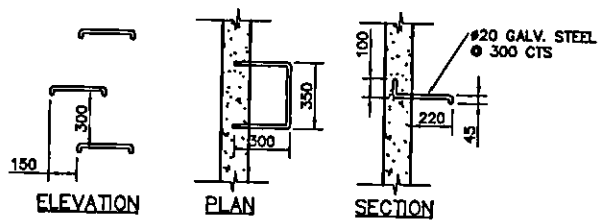


PLAN – WALL REINFORCEMENT
1:20

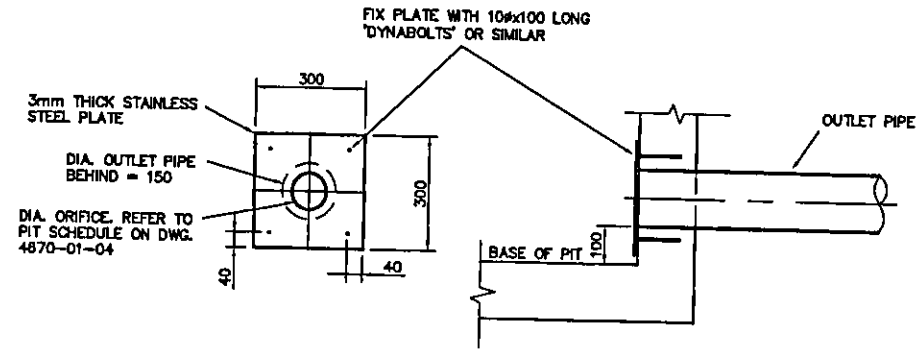


REINFORCEMENT
1:20

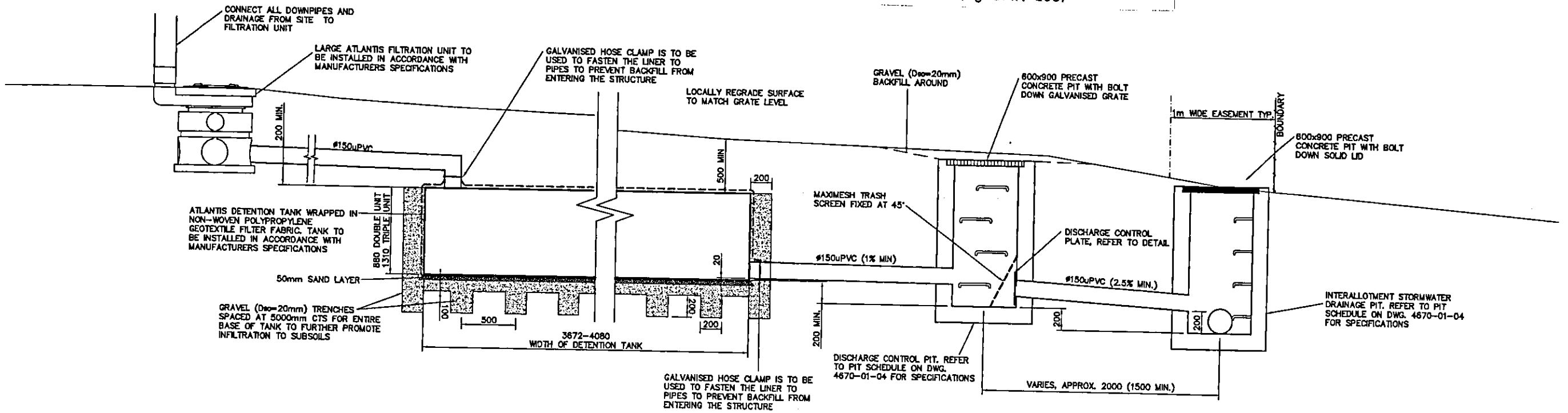
CAST-IN-SITU PIT DETAILS



TYPICAL STEP IRON DETAIL
1:20



DISCHARGE CONTROL PLATE DETAIL
N.T.S.



TYPICAL SECTION OF ATLANTIS DETENTION/INFILTRATION TANK ARRANGEMENT
1:20

0 500 1000 1500 2000mm
1:20 (A1) 1:40 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

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consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET
INTERALLOTMENT DRAINAGE DESIGN

Title: DRAINAGE DETAILS

Drawing No. 4670-01-05
Issue B
Cad File No. 4670-01-05
Xref.(s)

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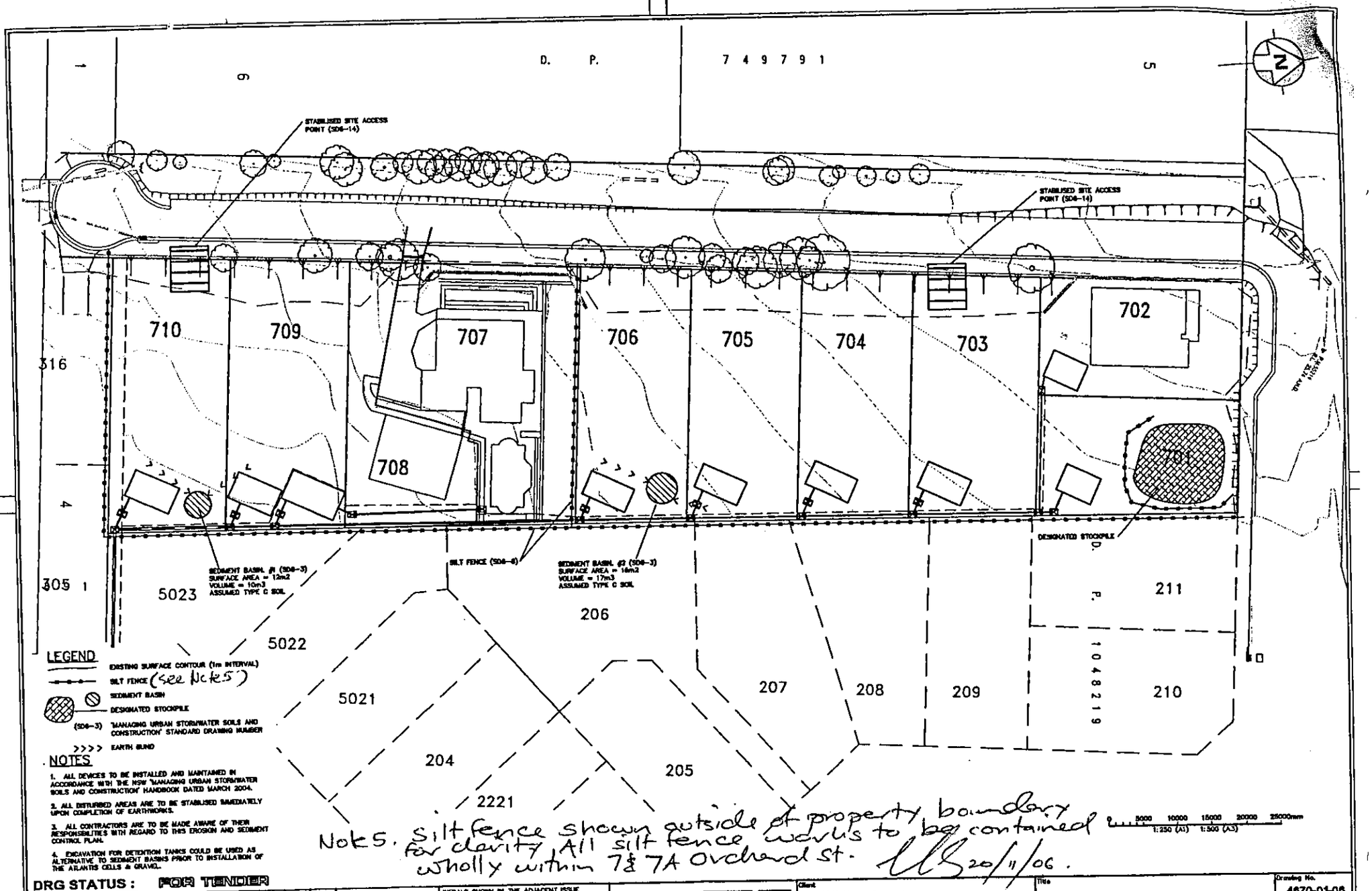
D. P. 749791
STABILISED SITE ACCESS POINT (SD6-14)
STABILISED SITE ACCESS POINT (SD6-14)
710
709
707
706
705
704
703
702
701
708
316
305
5023
5022
5021
206
207
208
209
210
211
204
205
2221
D. P. 1048219
SEDIMENT BASIN #1 (SD6-3) SURFACE AREA = 12m2 VOLUME = 10m3 ASSUMED TYPE C SOIL
SILT FENCE (SD6-8)
SEDIMENT BASIN #2 (SD6-3) SURFACE AREA = 16m2 VOLUME = 17m3 ASSUMED TYPE C SOIL
DESIGNATED STOCKPILE
LEGEND
EXISTING SURFACE CONTOUR (1m INTERVAL)
SILT FENCE (See Note 5)
SEDIMENT BASIN
DESIGNATED STOCKPILE
(SD6-3) 'MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION' STANDARD DRAWING NUMBER
EARTH BUND
NOTES
1. ALL DEVICES TO BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NSW 'MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION' HANDBOOK DATED MARCH 2004.
2. ALL DISTURBED AREAS ARE TO BE STABILISED IMMEDIATELY UPON COMPLETION OF EARTHWORKS.
3. ALL CONTRACTORS ARE TO BE MADE AWARE OF THEIR RESPONSIBILITIES WITH REGARD TO THIS EROSION AND SEDIMENT CONTROL PLAN.
4. EXCAVATION FOR DETENTION TANKS COULD BE USED AS ALTERNATIVE TO SEDIMENT BASINS PRIOR TO INSTALLATION OF THE ATLANTIS CELLS & GRAVEL.
Note 5. Silt fence shown outside of property boundary for clarity. All silt fence works to be contained wholly within 7 & 7A Orchard St. 20/11/06.
1:250 (A1) 1:500 (A3)
DRG STATUS : FOR TENDER
B ISSUED FOR TENDER DS PJH MS M. TOOKER 22.09.06
A ISSUED FOR CC APPROVAL DS ARG MS M. TOOKER 08.08.06
Issue Details of Issue Dsn'd Drn Chk'd Approved Date
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consulting engineers
Client V, D AND M BUBALO
Project 7 & 7A ORCHARD STREET STORMWATER MANAGEMENT DESIGN
Title SEDIMENT AND EROSION CONTROL PLAN
Drawing No. 4670-01-06
Issue B
Cad File No. 4670-01-06
Xref.(s)
A1

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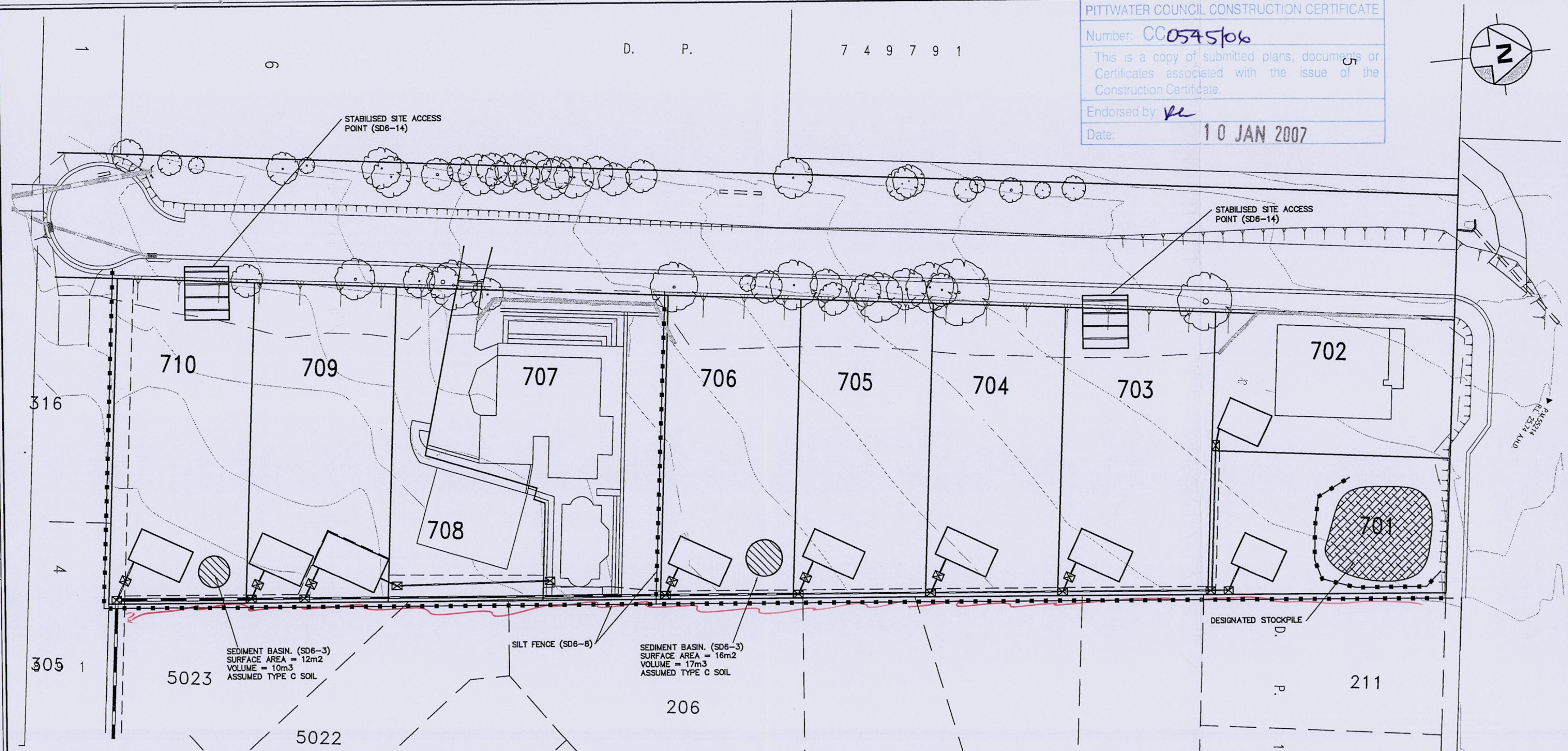

LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- SILT FENCE
- SEDIMENT BASIN
- DESIGNATED STOCKPILE
- (SD6-3) 'MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION' STANDARD DRAWING NUMBER

NOTES

1. ALL DEVICES TO BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE NSW 'MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION' HANDBOOK DATED MARCH 2004.
2. ALL DISTURBED AREAS ARE TO BE STABILISED IMMEDIATELY UPON COMPLETION OF EARTHWORKS.

0 5000 10000 15000 20000 25000mm
1:250 (A1) 1:500 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
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consulting engineers

Client: V, D AND M BUBALO

Project: 7 & 7A ORCHARD STREET INTERALLOTMENT DRAINAGE DESIGN

Title: **SEDIMENT AND EROSION CONTROL PLAN**

Drawing No. 4670-01-06
Issue A
Cad File No. 4670-01-06
Xref.(s)

A1

FIGURES

FIGURE 1

NOTE:

1. LEVELS SHOWN ARE BASED ON AUSTRALIAN HEIGHT DATUM
2. ORIGIN OF LEVELS – P.M.25544 R.L. 8.69 A.H.D. LOCATED NEAR THE INTERSECTION OF ORCHARD & GARDEN STREETS
3. CONTOURS ARE AT 1 METRE INTERVALS AND ARE APPROXIMATE ONLY – LEVELS CRITICAL TO DESIGN SHOULD BE DETERMINED BY SURVEY AND NOT BY INTERPOLATION
4. BASIC LEVEL & DETAIL SURVEY ONLY – THE POSITION OF IMPROVEMENTS ARE APPROXIMATE
5. FEATURES CRITICAL TO DESIGN SHOULD BE LOCATED BY A MORE ACCURATE SURVEY
6. NO FINITE LOCATION OF ROCK OUTCROPS, TREES OR OTHER SPECIFIC NATURAL FEATURES HAVE BEEN LOCATED FOR LOTS 1 & 2 D.P.715324 AND LOTS 5 & 6 D.P.749791 AS OUTLINED IN OUR FEE PROPOSAL DATED 27/2/98
7. SERVICES SHOWN HAVE BEEN LOCATED PARTLY BY SURVEY AND SCALED FROM INFORMATION PROVIDED BY THE RELEVANT SERVICE AUTHORITIES – THE SERVICE AUTHORITIES SHOULD BE CONTACTED TO DETERMINE THEIR EXACT LOCATION
8. THE ORIENTATION OF THE NORTH POINT HAS BEEN TAKEN FROM THE I.S.G. CO-ORDINATED OF P.M. 25544 AND S.S.M. 43671
9. UNLESS SHOWN OTHERWISE ALL TREES ARE EUCALYPTS
10. PIT & PIPE INVERTS ARE APPROXIMATE AS DIRECT MEASUREMENTS ARE DIFFICULT TO DETERMINE

LEGEND

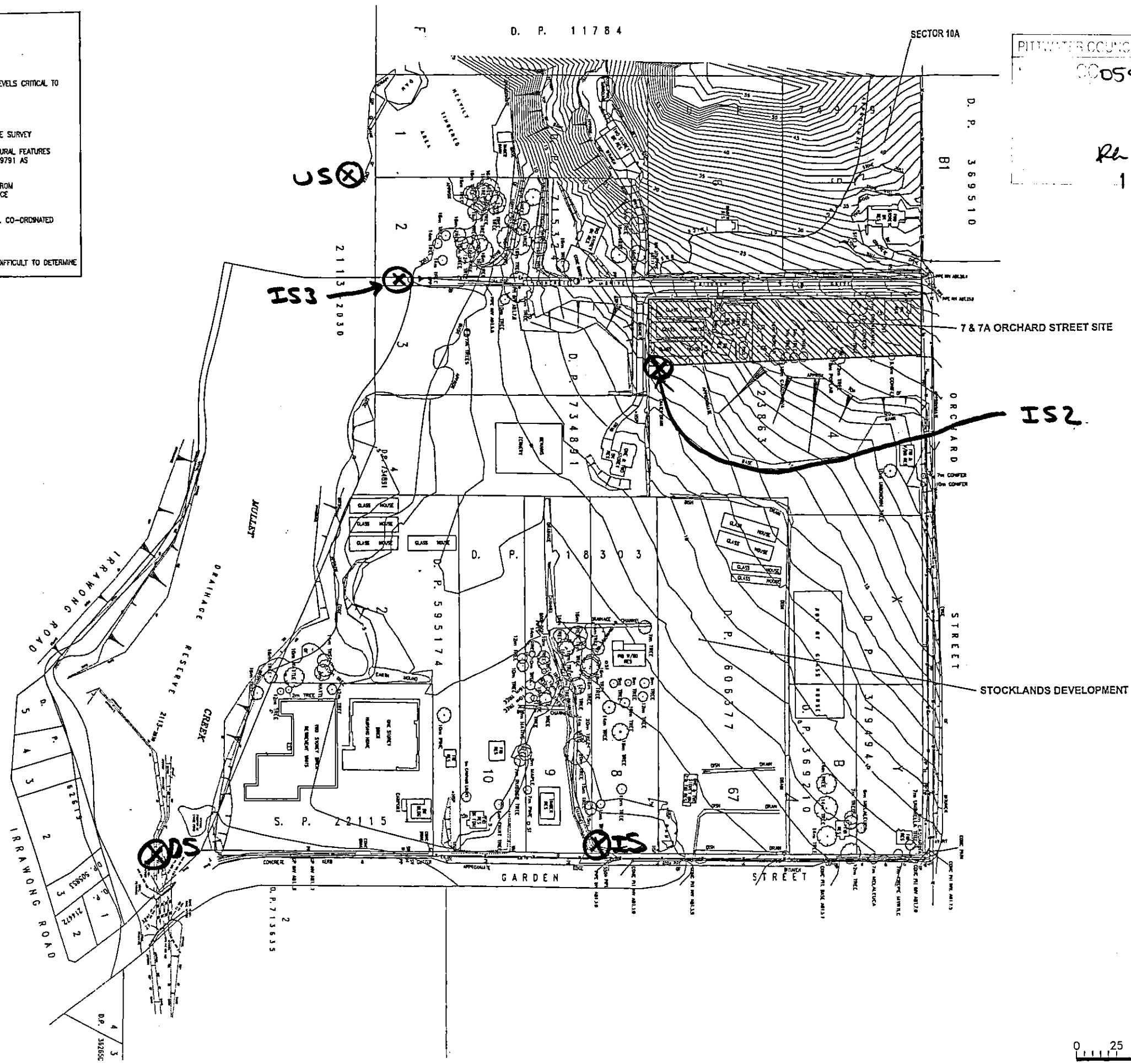
- dH – HYDRANT
- ST– SEPTIC TANK
- TP – TELSTRA PIT
- PP – POWER POLE
- HSP– HOUSE SERVICE POWER POLE
- SV – STOP VALVE
- SP – SEWER INSPECTION POINT
- GP – GULLY PIT
- —T—T— TELSTRA CABLE
- —Eo—Eo— OVERHEAD ELECTRICITY
- —To—To— OVERHEAD TELSTRA CABLE
- —W—W— WATER MAIN

FOR DETAILS OF EASEMENTS REFER TO TITLE INFORMATION

EASEMENT FOR ELECTRICITY PURPOSES 7.62 WIDE – VIDE TSFR J954099

EASEMENT FOR SERVICES 1.525 WIDE – REFER TITLE INFORMATION

SOURCE: PLAN No. A1–84650 & A1–846502 BYRNE & ASSOCIATES PTY LTD



LOCALITY PLAN

PITTWATER COUNCIL
DA 0545/06
RL
10 JAN 2007

4670-F1

PITTWATER COUNCIL CONSTRUCTION CERTIFICATE

Number: CC 0545/06

This is a copy of submitted plans, documents or Certificates associated with the issue of the Construction Certificate.

Endorsed by: RL

Date: 10 JAN 2007

APPENDIX A – CC CHECKLIST

PITTWATER COUNCIL CONSTRUCTION CERTIFICATE
Number: CC 0545/06
Lawson & Treloar Pty Ltd
This is a copy of submitted plans, documents or Certificates associated with the issue of the Construction Certificate
Endorsed by:
Date: 10 JAN 2007

DOCUMENTATION CHECKLIST - HANDOVER

(Detach and include with submissions)

Section	Item	Requirement	Check (√)
4.1	Water Cycle Assessment - Water Balance Modelling Pre & Post Development		
4.1.1	Stream Gauging, infiltration testing and use of local rainfall data for modelling		
4.2.1	Water Quality Monitoring Plan	♦♦♦♦♦♦♦♦	✓
4.2.1	Water Quality Monitoring Sites Shown on Plan (at least three)	♦♦♦♦♦♦♦♦	✓
4.2.1, 2, C	Water Quality Monitoring Data	♦♦♦♦♦♦♦♦	✓
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data	♦♦♦♦♦♦♦♦	✓
4.2.1, 2, C	Assessment and interpretation of water quality monitoring data from SQID's	♦♦♦♦♦♦♦♦	✓
4.3	Water Quality Management Assessment - Load Modelling Pre and Post Development		
4.3.1, 3	Justification of assumptions for Event Mean Concentrations		
4.3.2	Identification of and details for Stormwater quality facilities		✓
4.3.2, 4.4.5	Mosquito Risk Assessment for both Watercourse and Water Quality/Quantity features	♦♦♦♦♦♦♦♦	✓
4.3.6, 4.6.5	Inspection and Cleaning Reports for SQID's and OSD	♦♦♦♦♦♦♦♦	✓
4.3.6	Management Plan for Stormwater Quality Improvement Devices	♦♦♦♦♦♦♦♦	✓
4.3.5	Environmental Management Plan (Soil and Water Aspects)		
4.3.4	Erosion and Sediment Control Plan		
4.4.3, 4, 5	Existing and Proposed Creek Corridor in plan with cross/long sections with flood levels		
4.4.4	Proposed Creek Corridor Planting Schedule		
4.4.5	Creek Corridor Vegetation Monitoring and Management Plan	♦♦Note 1♦♦	NA
4.4.5	Vegetation and Creek Maintenance and Monitoring Reports	♦♦Note 1♦♦	NA
4.5	Flood Analysis – existing and design conditions		
4.5.2	Compliance of structures and creek corridor with flood planning levels		
4.5.4	Details of Interim Flood Protection Works	♦♦♦♦♦♦♦♦	NA
4.6.3	Design Storm Hydrological Modelling of Site - Pre and Post Development		
4.6.3	On-Site Detention Facilities		
4.6.4	Stormwater Retention Facilities		
4.7	Stormwater Concept Drainage Plan		

KEY:

	Preliminary Calculations/Assessment Required		*Work as Executed Plans*
	Concept Design Required	♦♦♦♦♦♦	*Required/Reviewed/Updated*
+++++++	*Detailed Assessment/Calculations/Design*		*Not required*

Note 1 Even if the works are not to be constructed by the Applicant on the land to be transferred to Council under the Material Public Benefit Option in the Section 94 Plan, preliminary investigation for Rezoning and concept design at DA stage is required

Completed by Principal Certifier:

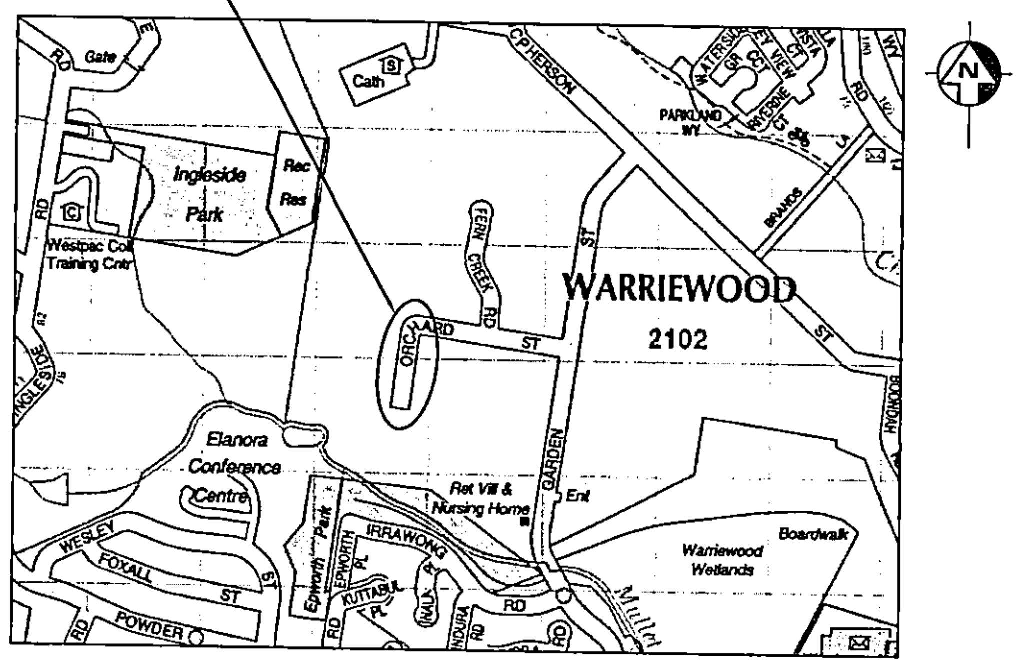
Name: Michael J Shaw
Title: Senior Associate, CPEng, NPER
Organisation: Patterson Britton + Partners

Signature:
Date: 9/1/07

APPENDIX B – CC ACCESS ROAD DRAWINGS

ORCHARD STREET ACCESS ROAD, WARRIEWOOD
CIVIL ROAD DESIGN
for
V, D AND M BUBALO

SITE



LOCALITY PLAN
NTS

DRAWING LIST:

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
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INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: TITLE SHEET, LOCALITY PLAN AND DRAWING LIST

Drawing No. 4670-01
Issue C
Cad File No. 4670-01
Xref.(s)

A1

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GENERAL NOTES

1. ALL WORKS SHALL BE IN ACCORDANCE WITH PITTWATER COUNCILS AUS-SPEC CONSTRUCTION SPECIFICATION, DETAILS SHOWN ON THESE DRAWINGS, AND TO THE DIRECTIONS OF THE PROJECT MANAGER.

2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS, SPECIFICATIONS AND WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.

3. ALL SET OUT DIMENSIONS SHOWN SHALL BE VERIFIED BY THE CONTRACTOR ON SITE BEFORE WORK COMMENCES. DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.

4. DURING CONSTRUCTION THE WORKS SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING AND BATTERS SHALL BE PROVIDED BY THE CONTRACTOR TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

5. ALL MATERIALS AND WORKMANSHIP USED IN THE CONSTRUCTION OF THIS DESIGN SHALL BE IN ACCORDANCE WITH ALL RELEVANT CURRENT AUSTRALIAN STANDARDS.

6. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

7. EXISTING SERVICES HAVE BEEN PLOTTED FROM SUPPLIED DATA. THE ACCURACY IS NOT GUARANTEED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. ALL CLEARANCES AND APPROVALS SHALL ALSO BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY PRIOR TO THE COMMENCEMENT OF WORK

8. THE CONTRACTOR SHALL OBTAIN SETOUT CO-ORDINATES FROM THE SUPERINTENDENT, AND ARRANGE ALL SURVEY SETOUT BY A REGISTERED SURVEYOR

9. ALL NEW AND EXHUMED SERVICES THAT CROSS EXISTING AND FUTURE ROADS/PAVEMENTS WITHIN THE SITE SHALL BE BACKFILLED WITH DGB20 MATERIAL TO SUBGRADE LEVEL AND COMPACTED TO 98% STANDARD DENSITY RATIO. SUBJECT TO PRIOR APPROVAL FROM RELEVANT AUTHORITY

10. ON COMPLETION OF SERVICES INSTALLATION. ALL DISTURBED AREAS SHALL BE RESTORED TO ORIGINAL, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AREAS, GRASSED AREAS AND ROAD PAVEMENTS.

11. WHERE NEW WORK ABUTS EXISTING, THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE FREE FROM ABRUPT CHANGES, IS OBTAINED.

12. CARE TO BE TAKEN WHEN EXCAVATING NEAR ENERGY AUSTRALIA, INTEGRAL ENERGY, TELSTRA AND AGL SERVICES. NO MECHANICAL EXCAVATION TO BE UNDERTAKEN OVER ENERGY AUSTRALIA. TELSTRA AND AGL SERVICES HAND EXCAVATE IN THESE AREAS. LIAISE WITH RELEVANT AUTHORITY.

13. THE CONTRACTOR SHALL NOT DISTURB ANY EXISTING SURVEY BENCH MARKS OR REFERENCE MARKS (UNLESS INDICATED FOR REMOVAL) WITHOUT LANDS DEPT APPROVAL IN WRITING.

14. THE CONTRACTOR TO FENCE AND SECURE SITE.

15. PUBLIC ROAD WORKS
THE CONTRACTOR'S ATTENTION IS DRAWN TO THE REQUIREMENTS OF PITTWATER COUNCIL. WHERE THE WORKS ARE LOCATED IN A ROAD RESERVE OR CROSSES THE PAVEMENT OF A PUBLIC ROADWAY OR FOOTWAY. THE CONTRACTOR SHALL OBTAIN A PERMIT COVERING THE NECESSARY WORKS AND COMPLY WITH ALL THE CONDITIONS COVERING THE ISSUE OF SUCH PERMIT. A CHARGE IS MADE FOR PERMITS ISSUED IN RESPECT OF PAVEMENT OPENINGS. THE CONTRACTOR SHALL OBTAIN DETAILS FROM COUNCIL. PAY ALL FEES. MEET ALL REQUIREMENTS AND CARRY OUT ALL LIAISON AT NO EXTRA COST. ALL PAVEMENT SURFACING IS TO BE UNDERTAKEN BY THE CONTRACTOR. ALL PAVEMENT REINSTATEMENT TO BE UNDERTAKEN BY THE CONTRACTOR. ALL TO PITTWATER COUNCIL'S STANDARDS AND APPROVAL.

16. PAVEMENT DESIGN REPORT BY GEOTECHNIQUE, JANUARY 2005 – THE CONTRACTOR SHALL ENSURE THAT THEY ARE FAMILIAR WITH THE CONTENTS OF THIS REPORT.

17. ALL CONSTRUCTION WORK SHALL BE CARRIED OUT SO THAT AT ANY TIME ADJOINING PROPERTY OWNERS ARE NOT DEPRIVED OF AN ALL-WEATHER ACCESS OR SUBJECTED TO ADDITIONAL OR POLLUTED STORM WATER RUNOFF DURING THE PERIOD OF CONSTRUCTION.

18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO COUNCIL'S INFRASTRUCTURE. SUCH REPAIR OR REINSTATEMENT TO BE CARRIED OUT IMMEDIATELY TO THE SATISFACTION OF COUNCIL.

19. THE CONTRACTOR IS TO PREPARE AND IMPLEMENT A TRAFFIC MANAGEMENT PLAN TO COUNCIL'S STANDARDS AND APPROVAL FOR ALL WORKS.

20. SITE SURVEY UPON WHICH DESIGN HAS BEEN BASED PREPARED BY BYRNE & ASSOCIATES, DECEMBER 2004.

SAFETY

1. ATTENTION IS DRAWN TO THE OCCUPATIONAL HEALTH AND SAFETY ACT (2000), WHICH REQUIRES THAT EMPLOYERS ENSURE THE HEALTH, SAFETY AND WELFARE OF THEIR EMPLOYEES.

2. THE CONTRACTOR MUST, AT ALL TIMES, EXERCISE ANY OTHER NECESSARY AND REASONABLE PRECAUTIONS APPROPRIATE TO THE NATURE OF THE WORK AND THE CONDITIONS UNDER WHICH THE CONTRACT IS TO BE PERFORMED FOR THE SAFETY OF ALL PERSONS ON THE WORK SITE, OR IN THE VICINITY.

QUALITY ASSURANCE

1. THE CONTRACTOR SHALL IMPLEMENT AND MAINTAIN A QUALITY ASSURANCE SYSTEM MEETING THE REQUIREMENTS OF AS 9002. THE QUALITY SYSTEM SHALL BE SUCH THAT RECORDS ARE KEPT OF ALL ASPECTS AND STAGES OF THE WORK.

2. THE RECORDS FOR EACH CONSTRUCTION TASK SHALL BE STAGED AND ITEMISED TO THE SATISFACTION OF THE CONTRACTOR ADMINISTRATOR. THE PROFORMAS FOR RECORDS SHALL BE SUBMITTED TO THE CONTRACTOR ADMINISTRATOR FOR APPROVAL AND WORK SHALL NOT COMMENCE UNTIL SUCH APPROVAL HAS BEEN GIVEN.

3. DURING THE COURSE OF CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN ACCURATE AND UP TO DATE RECORDS AND SHALL MAKE SUCH RECORDS AVAILABLE TO THE CONTRACTOR ADMINISTRATOR IF REQUESTED. FAILURE TO MAINTAIN RECORDS AS SPECIFIED WILL RESULT IN THE CONTRACTOR RE-INSPECTING COMPLETED WORKS IF INSTRUCTED TO DO SO BY THE CONTRACTOR ADMINISTRATOR.

4. AT THE COMPLETION OF EACH STAGE OF THE WORKS THE CONTRACTOR SHALL CERTIFY THAT THOSE WORKS HAVE BEEN UNDERTAKEN AND COMPLETED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATION AND INSTRUCTIONS ISSUED DURING THE COURSE OF THE CONTRACT.

EXISTING SERVICES AND FEATURES

1. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF EXCAVATION AND REMOVAL IF REQUIRED OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS WITHIN THE CONTRACT AREA AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT. ALL TO REGULATORY AUTHORITY STANDARDS AND APPROVAL.

2. MAINTAIN EXISTING STORMWATER DRAINAGE FLOWS THROUGH THE SITE AT ALL TIMES. MAKE DUE ALLOWANCE FOR ALL SUCH FLOWS AT ALL TIMES.

3. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL OBTAIN THE SUPERINTENDENT'S APPROVAL FOR HIS PROGRAMME FOR THE RELOCATION/CONSTRUCTION OF TEMPORARY SERVICES.

4. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES AS REQUIRED TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.

5. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE OR DAMAGE TO THE ADJACENT RESIDENCES. CONTRACTOR TO GAIN APPROVAL OF THE SUPERINTENDENT FOR TIME OF INTERRUPTION.

GENERAL STORMWATER NOTES

1. ALL STORMWATER WORKS ARE TO BE UNDERTAKEN GENERALLY IN ACCORDANCE WITH AS 3500 STORMWATER DRAINAGE.

2. UNLESS OTHERWISE APPROVED ALL DRAINAGE PIPES SHALL BE CLASS "2" APPROVED SPIGOT AND SOCKET RCP PIPES WITH RUBBER RING JOINTS.

3. CONTRACTOR TO SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION TO DISSIMILAR PIPEWORK.

4. ALL CONNECTIONS TO EXISTING DRAINAGE PITS SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND THE INTERNAL WALL OF THE PIT AT THE POINT OF ENTRY SHALL CEMENT RENDERED TO ENSURE A SMOOTH FINISH.

5. PRECAST PITS SHALL NOT BE USED. ALL DRAINAGE PITS TO BE CAST INSITU. LINTELS MAY BE PRECAST TO SUIT PROPOSED PITS.

6. STEP IRONS AT SPACINGS OF 0.3m ARE TO BE PROVIDED IN DRAINAGE PITS MORE THAN 1.2m DEEP.

7. PROVIDE 3.0M LENGTH OF 100DIA SUBSOIL DRAINAGE PIPE WRAPPED IN FABRIC SOCK AT UPSTREAM END OF EACH PIT.

8 ALL CONCRETE USED IN DRAINAGE PITS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 40MPa.

9. THE EXCAVATED TRENCH WIDTH FOR PIPE LAYING MUST BE AT LEAST 300mm WIDER THAN THE OUTER DIAMETER OF THE PIPE. PIPES ARE TO BE LAID CENTRALLY WITHIN THE EXCAVATED TRENCH.

10. ALL PIPES ARE TO BE LAID ON A MINIMUM BEDDING OF 75mm OF SAND GRADED IN ACCORDANCE WITH AS 3500.3. BEDDING SHALL BE COMPACTED TO AT LEAST 90% OF THE MAXIMUM DRY DENSITY.

11. BACKFILL FOR STORMWATER PITS AND PIPES SHALL BE COMPACTED TO AT LEAST 95% (98% UNER ROADS) OF THE MAXIMUM DRY DENSITY AND GRADED IN ACCORDANCE WITH AS 3500.3.

12. BACKFILL MATERIAL SHALL BE INSPECTED AND APPROVED BY THE SUPERINTENDENT PRIOR TO PLACING AND COMPACTION.

GENERAL STORMWATER NOTES (cont.)

13. THE CONTRACTOR SHALL ENSURE THAT ANY EXISTING STRUCTURES LOCATED ADJACENT TO EXCAVATED TRENCHES ARE SUPPORTED OR PROTECTED TO PREVENT DAMAGE TO OR MOVEMENT OF THESE STRUCTURES

14. UNLESS SPECIFIED ALL DRAINAGE GRATES TO BE HEAVY DUTY GALVANISED MILD STEEL TO AS 3996.

15. CHASES SHALL BE FORMED WHERE NECESSARY TO PREVENT SOCKETS, FLANGES OR THE LIKE FROM BEARING ON THE TRENCH BOTTOM OR THE UNDERLAY.

16. MATERIAL SHALL BE PLACED IN THE PIPE SURROUND IN LAYERS NOT MORE THAN 200mm LOOSE THICKNESS AND COMPACT WITHOUT DAMAGING OR DISPLACING THE PIPEWORK.

GENERAL COMPACTION NOTES

1. FOUNDATION MATERIAL DEEMED BY THE SUPERINTENDENT AS UNSUITABLE TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS LISTED BELOW.

2. UNLESS OTHERWISE APPROVED OR SPECIFIED. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING:
A) FREE FROM ORGANIC AND PERISHABLE MATTER
B) MAXIMUM PARTICLE SIZE 75MM
C) PLASTICITY INDEX BETWEEN 2% AND 20%
D) CBR > 10%

3. SELECT FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200MM LOOSE THICK LAYERS AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR – 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289E3.1 OF NOT LESS THAN THE FOLLOWING STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289E1.1:

LOCATION STANDARD DRY DENSITY
–AREAS OF SERVICE TRENCHES 98%
–ROAD AND CARPARKS 100%
–LANDSCAPED AREAS 90%

4. THE CONTRACTOR SHALL PROGRAMME THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS. ROLLER MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED BY THE CONTRACTOR AT HIS COST.

5. COMPACTION CONTROL TESTING SHALL BE CARRIED OUT BY AND AT THE COST OF THE CONTRACTOR TO CONFORM WITH LEVEL 1. AS DEFINED IN AS3798–1996.

CONCRETE NOTES

GENERAL

G1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600 AND THE SPECIFICATION. KEEP A COPY OF THE DOCUMENTS ON SITE.

G2. VERIFY ALL SETTING OUT DIMENSIONS WITH THE SUPERINTENDENT AND/OR THE SURVEYOR.

CONCRETE

C1. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH AS3600 CURRENT EDITIONS WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

C2. CONCRETE USED IN THE WORKS SHALL BE EITHER MASS CONCRETE OR REINFORCED CONCRETE AS NOTED ON THE DRAWINGS AND SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS:

PROPERTY	REINFORCED CONCRETE	MASS CONCRETE
EXPOSURE CLASSIFICATION	B2	B2
MIN 28 DAY COMPRESSIVE STRENGTH	40 MPa	32 MPa
CEMENT TYPE	GENERAL PURPOSE	GENERAL PURPOSE
CEMENT CONTENT (MIN.)	350kg/m3	300kg/m3
WATER / BINDER RATIO (MAX.)	0.45	0.55
CLEAR COVER TO REINFORCEMENT (MIN.)	45 mm	45 mm
SURFACE FINISH – FORMED	CLASS 2	CLASS 2
– UNFORMED	WOOD FLOAT	WOOD FLOAT
MAXIMUM COARSE AGGREGATE SIZE	20 mm	20 mm

C3. NO 'BRECCIA' TYPE AGGREGATE IS TO BE USED.

C4. CEMENT TO BE TYPE SL TO AS3972 MAX CONCRETE SHRINKAGE TO BE 600UM TO AS1012.

C5. NO ADMIXTURES ARE TO BE USED WITHOUT THE APPROVAL OF THE ENGINEERS.

C6. CURE ALL CONCRETE USING AN APPROVED METHOD IN ACCORDANCE WITH ACSE SPECIFICATION. CURING COMPOUNDS TO COMPLY WITH AS3799. PVA BASED CURING COMPOUNDS ARE NOT ACCEPTABLE.

CONCRETE NOTES (cont.)

C7. THE FINISHED CONCRETE SHALL BE DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. CONCRETE SHALL BE COMPACTED WITH MECHANICAL VIBRATORS

C7. THE FINISHED CONCRETE SURFACE SHALL BE FREE OF CRACKS HAVING A CRACK WIDTH EQUAL TO OR GREATER THAN 0.1 mm AT TIME OF PRACTICAL COMPLETION. IF CRACKING EXCEEDS THIS LIMIT, THE CONTRACTOR SHALL MAKE GOOD THE CRACKS TO THE SATISFACTION OF THE SUPERINTENDENT WHICH MIGHT COMPRISE REPLACEMENT OF CONCRETE ELEMENT OR SEALING THE CRACKS WITH SILANE/SILICA FUME GEL OR OTHER WORKS.

C8. TESTING AND ASSESSMENT FOR COMPLIANCE OF CONCRETE SHALL BE CARRIED OUT BY THE CONTRACTOR IN ACCORDANCE WITH AS 3600. SUBMIT ALL RESULTS TO THE SUPERINTENDENT.

C9. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON PLASTIC CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. PLASTIC TIPPED MILD STEEL CHAIRS SHALL NOT BE USED. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.

C10. MAINTAIN COVER TO REINFORCEMENT AT CHAMFERS, DRIP GROOVES, REGLETS, ETC.

C11. NO HOLES, CHASES OR EMBEDMENT OF PIPES OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE SUPERINTENDENT.

C12. CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE SUPERINTENDENT.

C13. DURING AND IMMEDIATELY FOLLOWING POURING, THE CONCRETE SHALL BE PROTECTED FROM WIND AND SUN. AWNINGS AND WIND BREAKS ARE TO BE UTILISED FOR THIS PURPOSE.

C14. CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF 7 DAYS, AND PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 14 DAYS FOLLOWED BY A GRADUAL DRYING OUT. POLYTHENE SHEETING OR WET HESSIAN MAY BE USED IF PROTECTED FROM WIND AND TRAFFIC. DO NOT USE APPLIED CURING AGENTS.

C15. THE SUPERINTENDENT SHALL BE GIVEN 24 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL IS OBTAINED.

FINISHING

F1. THE CONCRETE SHALL BE SCREEDED TO THE REQUIRED CROSS SECTION PROFILE FREE OF DEPRESSIONS AND HIGH AREAS TO SATISFY THE REQUIREMENTS OF AN INITIAL FINISH.

F2. FINAL FINISHING INCLUDES FLOATING AND TEXTURING THE PAVEMENT AND SHALL COMMENCE ONLY AS SOON AS THE WATER SHEEN HAS LEFT THE PAVEMENT SURFACE AND NOT IN ANY AREA WHERE THERE IS FREE SURFACE WATER.

FORMWORK

FM1. UNLESS NOTED OTHERWISE ALL CONCRETE FORMWORK SHALL BE CLASS '2' FINISH

FM2. THE DESIGN CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF THE FORMWORK AND FALSEWORK IS THE RESPONSIBILITY OF THE CONTRACTOR.

FM3. DESIGN AND CONSTRUCTION AND STRIPPING TIMES SHALL COMPLY WITH AS 3610 AND AS 3600 UNLESS OTHERWISE NOTED OR APPROVED BY THE SUPERINTENDENT.

FM4. DURING CONSTRUCTION SUPPORT PROPPING WILL BE REQUIRED WHERE LOADS FROM STACKED MATERIALS, FORMWORK AND OTHER SUPPORT SLABS INDUCE LOADS IN A SLAB OR BEAM WHICH EXCEED THE DESIGN LOAD FOR STRENGTH OR SERVICEABILITY AT THAT AGE. ONCE THE NOMINATED 28 DAY STRENGTH HAS BEEN ATTAINED THESE LOADS SHALL NOT EXCEED THE DESIGN SUPERIMPOSED LIVE LOADS.

FM5. THE FORMWORK SHALL NOT BE DESIGNED TO RELY ON RESTRAINT OR SUPPORT FROM THE PERMANENT STRUCTURE WITHOUT THE PRIOR APPROVAL OF THE SUPERINTENDENT.

PITTWATER RSL CLUB
0545/06
Ku
10 JAN 2007

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS
SHEET 1 OF 2

Drawing No. 4670-02
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ASPHALTIC CONCRETE NOTES

1. GENERAL
A) MINERAL AGGREGATES TO COMPLY WITH CLAUSE 2.1 – MATERIALS OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
B) MINERAL FILLER TO COMPLY WITH AS2357–1980 MINERAL FILLERS FOR ASPHALT AND CLAUSE 2.1.2 – FILLER OF RTA SPECIFICATION R116 "ASPHALT (DENSE AND OPEN GRADED)".
C) BITUMEN BINDER SHALL COMPLY WITH CLAUSE 2.1.3 – BINDER OF RTA SPECIFICATION R116 – "ASPHALT (DENSE AND OPEN GRADED)".

2. MIX PROPORTIONS
A) JOB MIX – 10mm & 14mm (AS SPECIFIED ON DRAWINGS) NOMINAL SIZE AGGREGATE MINIMUM BITUMEN CONTENT (%) BY MASS OF TOTAL MASS – 5.1%.
B) MIX STABILITY – BETWEEN 16KN AND 36KN AS DETERMINED BY RTA TEST METHODS T605 AND T607.
C) AIR VOIDS IN COMPACTED MIX – BETWEEN 4% AND 7% OF THE VOLUME OF THE MIX.
D) VOIDS FILLED IN BINDER – 65–80% OF AIR VOIDS IN THE TOTAL MINERAL AGGREGATE FILLED BY BINDER IN ACCORDANCE WITH RTA TEST METHOD T605 AND T607.

3. PAVEMENT PREPARATION
A) THE EXISTING SURFACE TO BE SEALED SHALL BE DRY AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER.
B) ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK–COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE.

4. TACK COAT
A) THE WHOLE OF THE AREA TO BE SHEETED WITH ASPHALTIC CONCRETE SHALL BE LIGHTLY AND EVENLY COATED WITH RAPID SETTING BITUMEN COMPLYING WITH RTA SPECIFICATIONS 3252, 3253, 3254, 3259 AND 3269. APPLICATION RATE FOR RESIDUAL BITUMEN SHALL BE 0.15 TO 0.30 LITRES/SQUARE METRE. APPLICATION SHALL BE BY MEANS OF A MECHANICAL SPRAYER WITH SPRAY BAR.

5. SPREADING
A) ALL ASPHALTIC CONCRETE SHALL BE SPREAD WITH A SELF PROPELLED PAVING MACHINE.
B) THE ASPHALTIC CONCRETE SHALL BE LAID AT A MIX TEMPERATURE AS SHOWN BELOW:

ROAD SURFACE TEMPERATURE IN SHADE A(OC)	MIX TEMPERATURES (OC)
5–10	NOT PERMITTED
10–15	150
15–25	145
OVER 25	140

C) ASPHALTIC CONCRETE SHALL NOT BE LAID WHEN THE ROAD SURFACE IS WET OR WHEN COLD WINDS CHILL THE MIX TO ADVERSELY AFFECT SPREADING AND COMPACTION.

6. JOINTS
A) THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM.
B) THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER.

7. COMPACTION
A) ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS.
B) INITIAL ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C.
C) SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 600C USE PNEUMATIC TYRED ROLLER.
D) MINIMUM CHARACTERISTICS VALUE OF RELATIVE COMPACTION OF A LOT WHEN TESTED IN ACCORDANCE WITH CLAUSE 4.9 – COMPACTION OF RTA SPECIFICATION 116 "ASPHALT (DENSE AND OPEN GRADED)" SHALL BE 95%.

8. FINISHED PAVEMENT PROPERTIES
A) FINISHED SURFACES SHALL BE SMOOTH DENSE AND TRUE TO SHAPE AND SHALL NOT VARY MORE THAN 10MM FROM THE SPECIFIED PLAN LEVEL AT ANY POINT AND SHALL NOT DEVIATE FROM THE BOTTOM OF A ORARY 3M STRAIGHT EDGE LAID IN ANY DIRECTION BY MORE THAN 5MM.

9. THE PROPOSED 1m WIDE ROAD SHOULDER AT THE WESTERN EDGE OF THE NEW ROAD IS TO BE STABILISED WITH A FLUSH SEAL FINISH.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED TO THE STANDARD RECOMMENDED BY THE NSW DEPARTMENT OF HOUSING'S 'BLUE BOOK' TITLE "MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION", 4TH EDITION, MARCH 2004.

2. THE CONTRACTOR AND ALL SUBCONTRACTORS SHALL INFORM THEIR STAFF OF THEIR OBLIGATIONS UNDER THIS EROSION AND SEDIMENT CONTROL SECTION.

3. SILT SOCKS AND GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED AT ALL DRAINAGE INLET PITS.

4. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION.

5. ALL SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED AFTER EACH RAINFALL EVENT FOR STRUCTURAL DAMAGE AND ALL TRAPPED SEDIMENT TO BE REMOVED TO THE APPROPRIATE STOCKPILE.

6. STABILISE ALL COMPLETED ROAD BATTERS WITH HYDROMULCH,

CONSTRUCTION MATERIALS

1. MATERIALS AND WORKMANSHIP SHALL BE THE BEST OF THEIR RESPECTIVE KINDS, AND, UNLESS OTHERWISE SPECIFIED, SHALL CONFORM TO THE RELEVANT AUSTRALIAN STANDARDS.

2. SUFFICIENT NOTICE SHALL BE GIVEN BY THE CONTRACTOR TO THE SUPERINTENDENT TO ENABLE ANY MATERIALS THAT ARE BROUGHT ON THE SITE TO BE EXAMINED. ALL MATERIALS ARE TO BE SUITABLY STACKED TO FACILITATE EXAMINATION.

3. WHERE THE CONTRACTOR SUPPLIES MATERIALS OF A MIXED OR POOR QUALITY, THE SUPERINTENDENT SHALL HAVE THE POWER TO REQUIRE THE CONTRACTOR TO PICK OUT AND STACK THOSE MATERIALS WHICH IN HIS OPINION ARE SUITABLE FOR THE WORKS, AND TO HAVE THOSE UNSUITABLE REMOVED FROM THE SITE OF THE WORKS.

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A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: GENERAL NOTES & SPECIFICATIONS
SHEET 2 OF 2

Drawing No. 4670-03
Issue C
Cad File No. 4670–02
Xref.(s)

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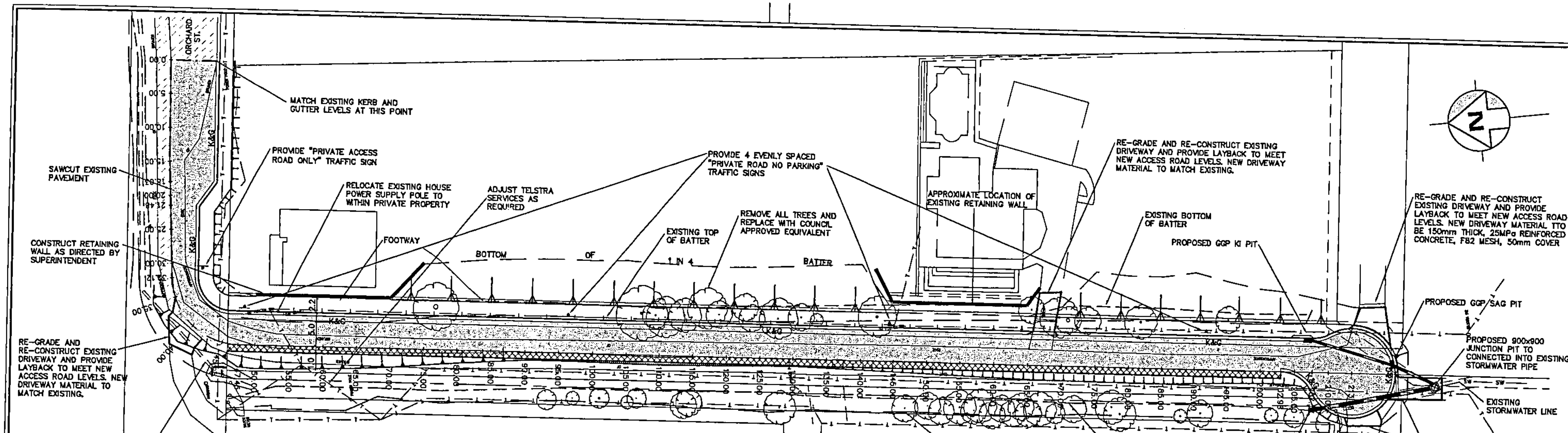
A1

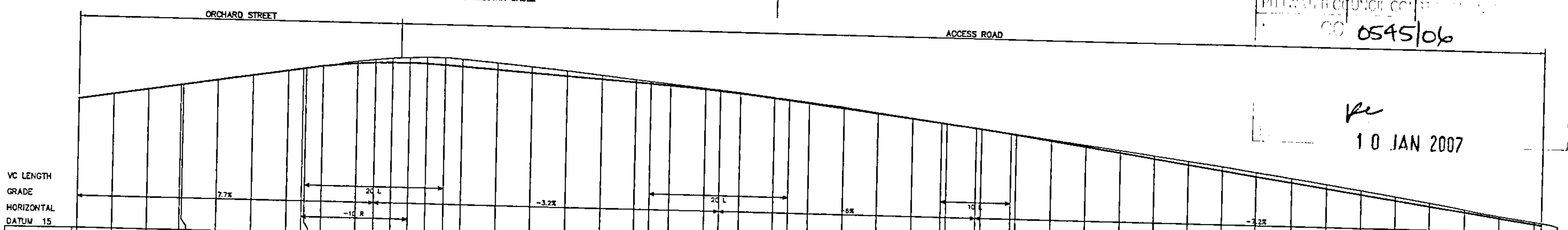


LEGEND

Symbol	Description
25.00	PROPOSED ACCESS ROAD ALIGNMENT AND CHAINAGE
	PROPOSED TOP OF BATTER
	PROPOSED BOTTOM OF BATTER
	PROPOSED SAWCUT
K&G	PROPOSED KERB AND GUTTER (150mm HIGH)
	PROPOSED STORMWATER PIT
	PROPOSED STORMWATER PIPE
— T — T —	APROXIMATE LOCATION OF EXISTING TELSTRA CABLE
	EXISTING TOP OF BATTER
	EXISTING BOTTOM OF BATTER
	EXISTING BITUMEN PAVEMENT TO BE RETAINED
	NEW PAVEMENT CONSTRUCTION
	NEW SHOULDER CONSTRUCTION

PITTWATER COUNCIL CC 0545/06

10 JAN 2007



CHAINAGE	DEPTH (+ = CUT)	EXISTING SURFACE	DESIGN
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5.00	0	24.54	24.54
10.00	0	24.93	24.92
14.67	0	25.29	25.28
15.00	0	25.31	25.31
20.00	0.01	25.71	25.70
25.00	0.02	26.1	26.08
30.00	0.02	26.48	26.47
32.12	-0	26.63	26.63
32.54	-0.01	26.66	26.66
35.00	0	26.84	26.84
40.00	0.14	27.23	27.09
42.54	0.22	27.38	27.16
45.00	0.31	27.51	27.20
47.45	0.37	27.58	27.21
50.00	0.45	27.64	27.18
52.54	0.51	27.63	27.12
55.00	0.51	27.55	27.04
60.00	0.47	27.35	26.88
65.00	0.43	27.15	26.72
70.00	0.37	26.93	26.56
75.00	0.28	26.68	26.40
80.00	0.19	26.43	26.24
82.14	0.15	26.32	26.17
85.00	0.11	26.19	26.08
90.00	0.08	25.96	25.88
92.14	0.07	25.86	25.79
95.00	0.07	25.72	25.65
100.00	0.06	25.44	25.38
102.14	0.07	25.33	25.26
105.00	0.08	25.17	25.09
110.00	0.1	24.89	24.79
115.00	0.07	24.57	24.49
120.00	0.05	24.24	24.19
124.25	0.03	23.97	23.94
125.00	0.02	23.92	23.89
129.25	0.02	23.64	23.63
130.00	0.02	23.59	23.58
134.25	0.04	23.32	23.28
135.00	0.05	23.27	23.23
140.00	0.08	22.95	22.87
145.00	0.12	22.63	22.51
150.00	0.16	22.32	22.15
155.00	0.21	22	21.79
160.00	0.25	21.69	21.44
165.00	0.29	21.36	21.08
170.00	0.3	21.02	20.72
175.00	0.3	20.66	20.36
180.00	0.3	20.3	20.00
185.00	0.29	19.93	19.64
190.00	0.27	19.55	19.28
195.00	0.25	19.17	18.92
200.00	0.18	18.75	18.57
205.00	0.14	18.35	18.21
210.00	0.15	18	17.85
211.06	0.15	17.92	17.77
213.45		17.68	

ACCESS ROAD LONGITUDINAL SECTION

SCALE HORIZONTAL 1:300
SCALE VERTICAL 1:150

HORIZONTAL 0 10 20 30m 1:300 (A1) 1:600 (A3)

VERTICAL 0 5000 10000 15000mm 1:150 (A1) 1:300 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: W. D. AND M. BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: SITE PLAN AND ACCESS ROAD LONGITUDINAL SECTION

Drawing No. 4670-04
Issue C
Cad File No. 4670-04
Xref.(s)

A1

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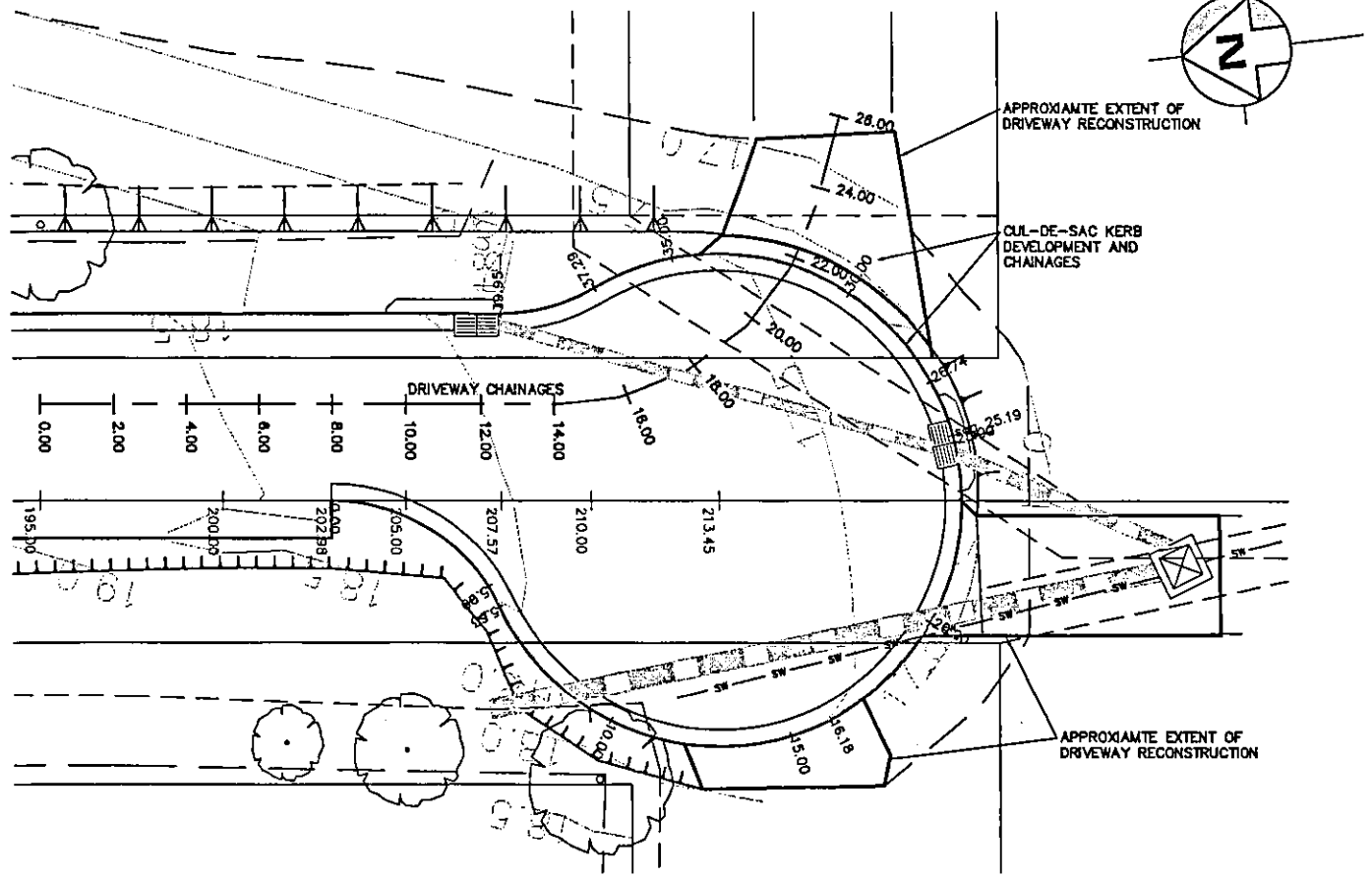
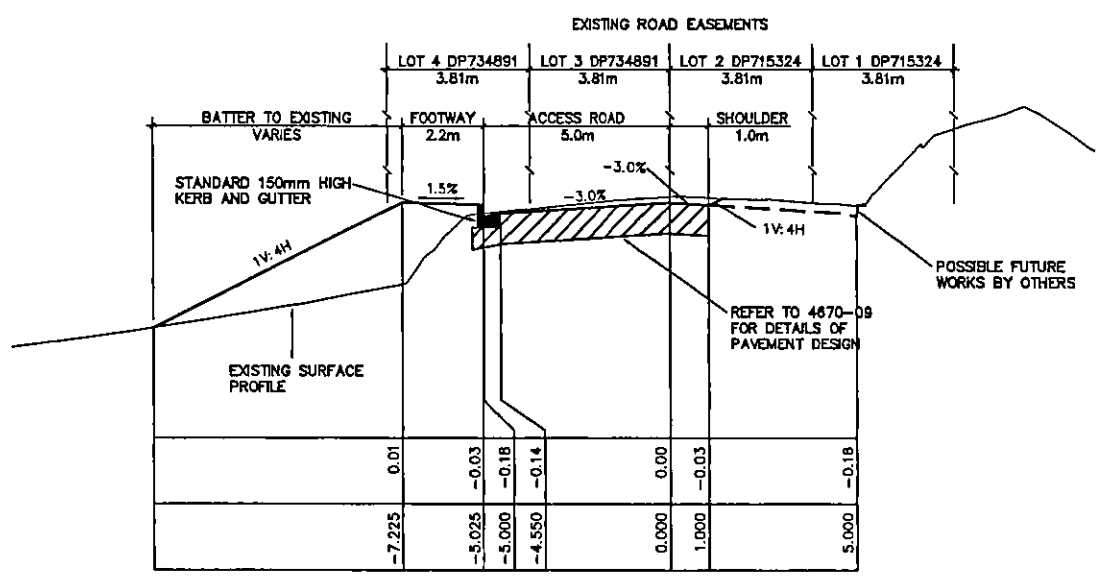
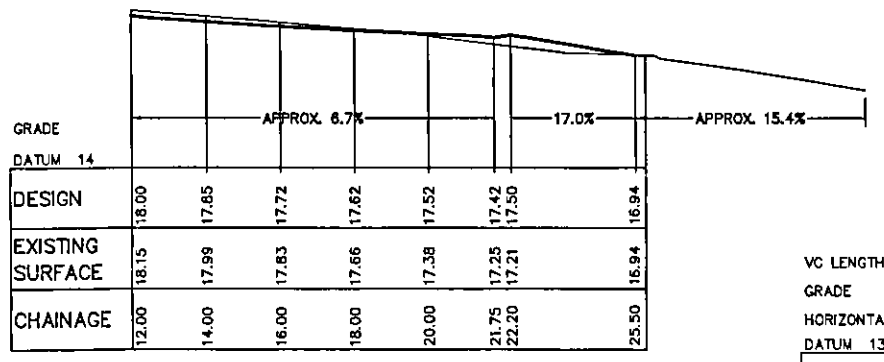


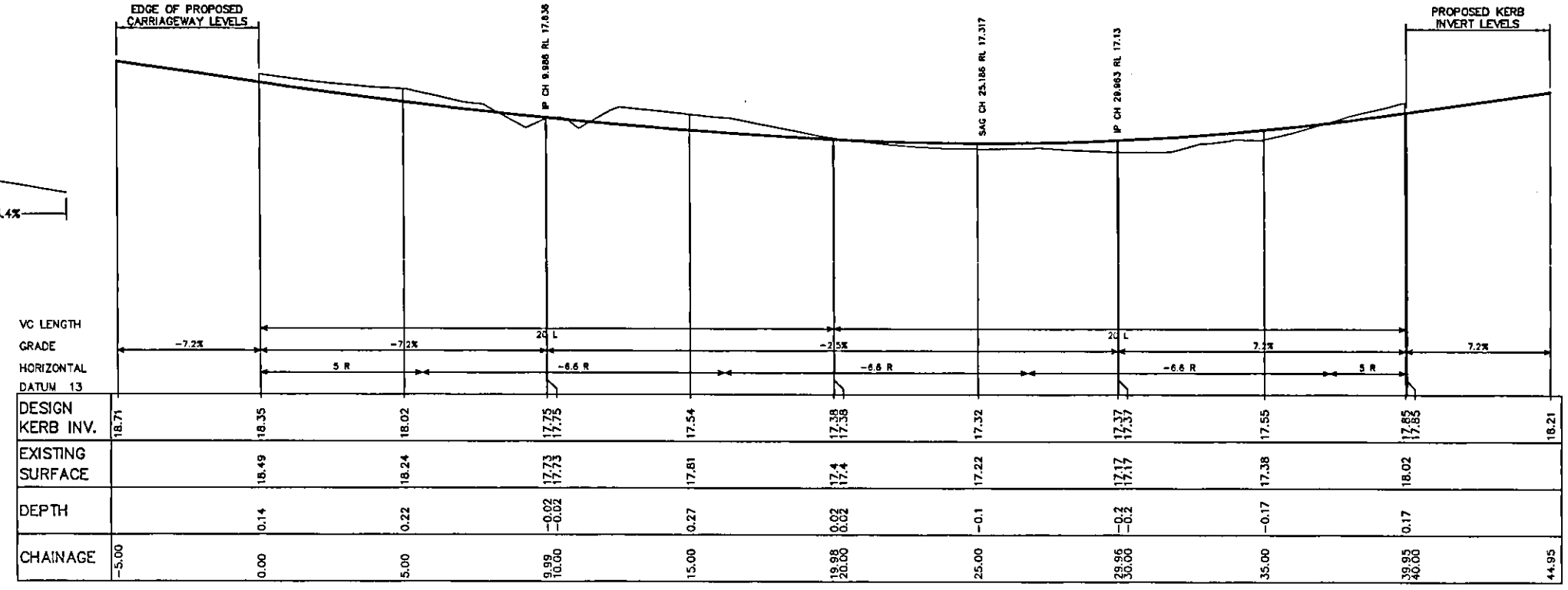
CUL-DE-SAC PLAN
1:100



ACCESS ROAD TYPICAL SECTION
HORIZONTAL 1:100
VERTICAL 1:50



DRIVEWAY LONG SECTION
SCALE HORIZONTAL 1:100
SCALE VERTICAL 1:100



CUL-DE-SAC KERB DEVELOPMENT
SCALE HORIZONTAL 1:100
SCALE VERTICAL 1:50

HORIZONTAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)
VERTICAL 0 1000 2000 3000 4000 5000mm
1:50 (A1) 1:100 (A3)

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Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: CUL-DE-SAC KERB DEVELOPMENT AND ACCESS ROAD TYPICAL CROSS SECTION

Drawing No. 4670-05
Issue C
Cad File No. 4670-05
Xref.(s)

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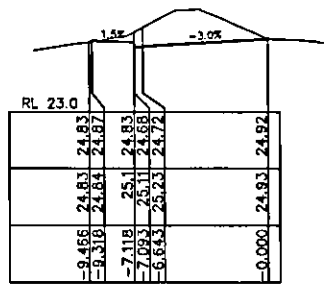
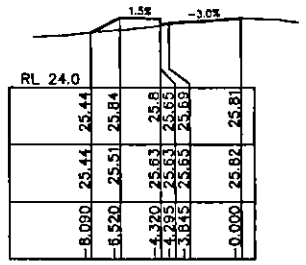
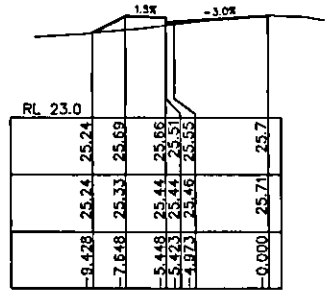
10 JAN 2007



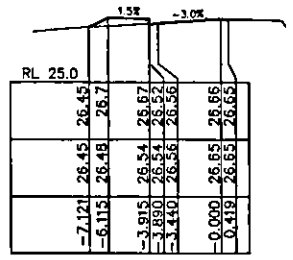
CH 10.00



CH 21.48



CH 20.00



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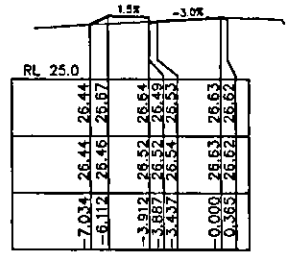

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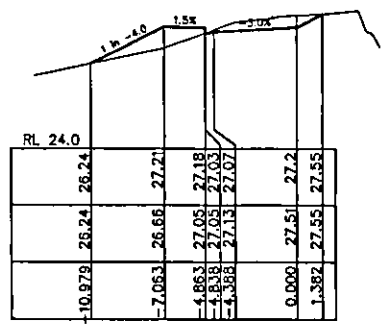

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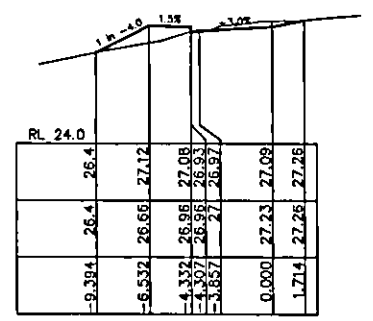

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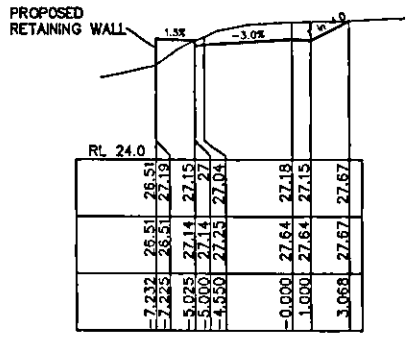

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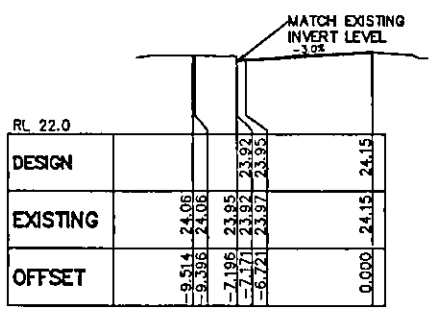

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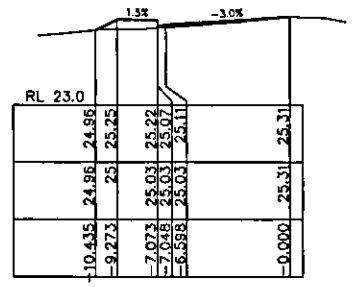

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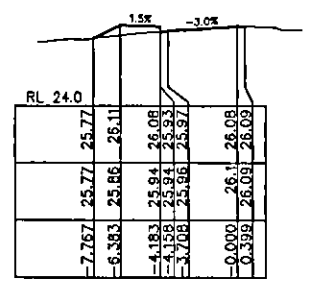

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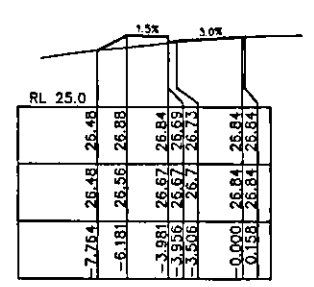

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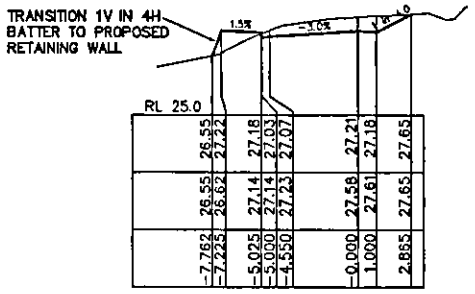

CH 47.45

HORIZONTAL 0 5000 10000 15000 20000mm
1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 1 OF 3

Drawing No. 4670-06
Issue C
Cad File No. 4670-06
Xref.(s)

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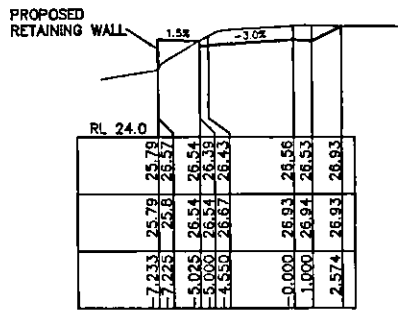

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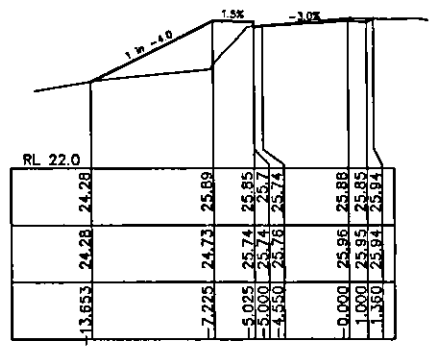

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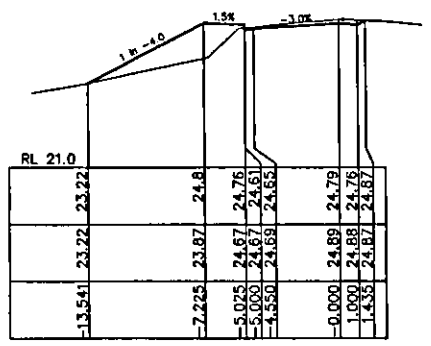

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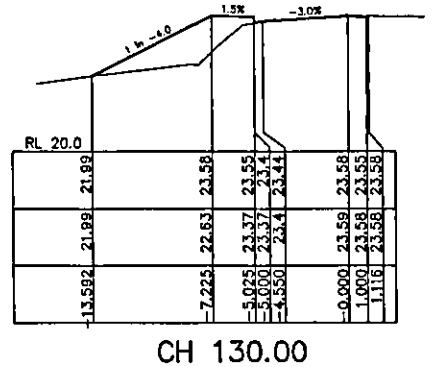

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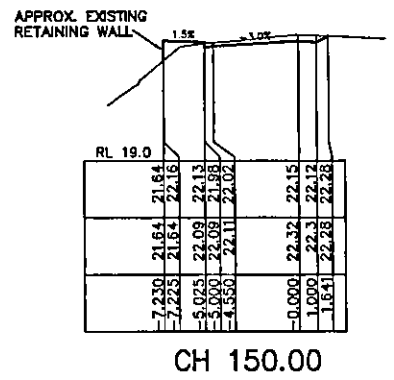

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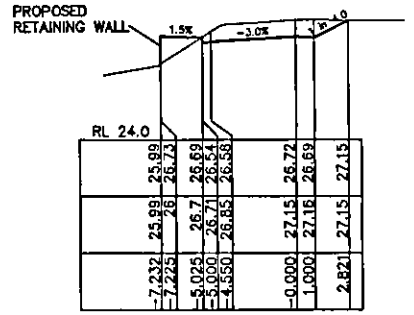

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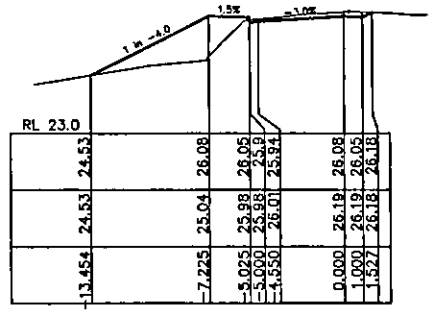
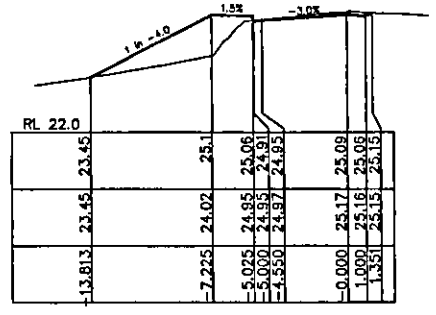


CH 85.00



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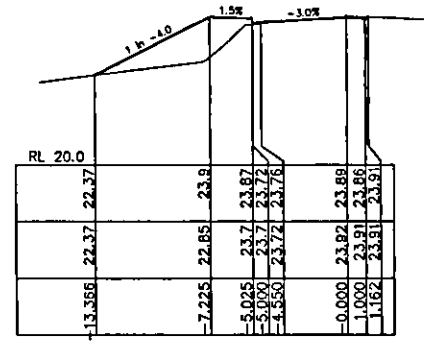

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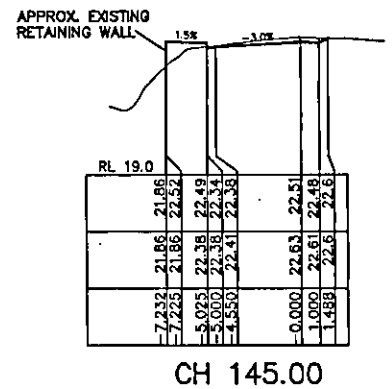


CH 145.00

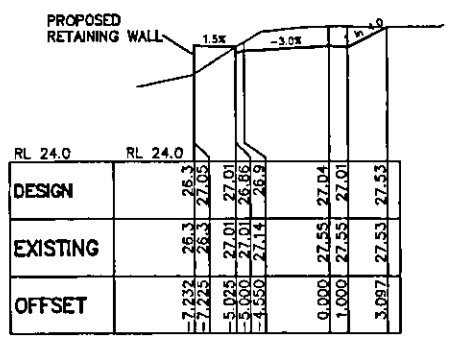
CH 60.00

CH 80.00

CH 100.00

CH 120.00

CH 140.00



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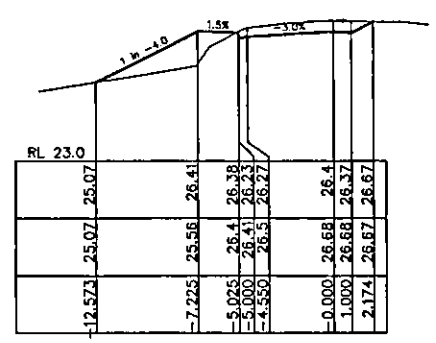

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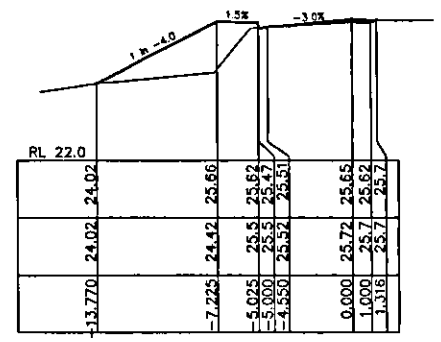
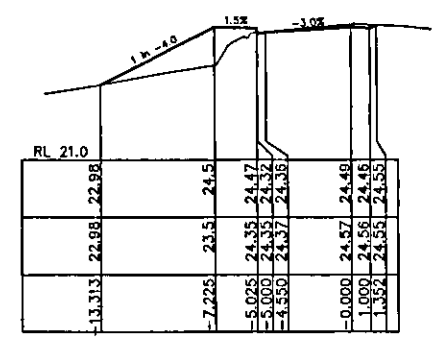
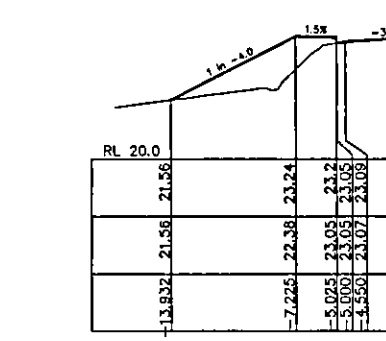


CH 95.00



CH 115.00



CH 135.00

HORIZONTAL 0 5000 10000 15000 20000mm
1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

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B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
B	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 2 OF 3

Drawing No. 4670-07
Issue C
Cad File No. 4670-06
Xref.(s)

A1

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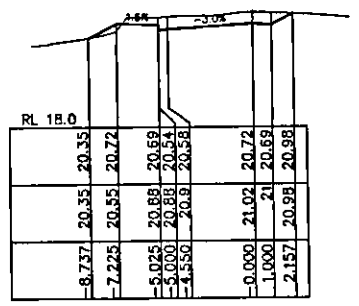
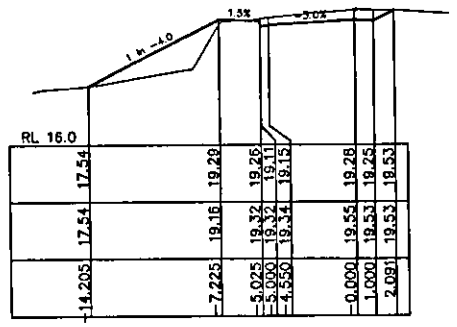
10 JAN 2007

DA 05451/06



CH 170.00



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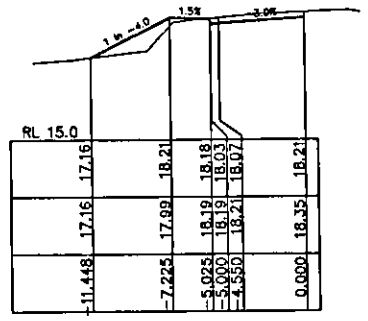

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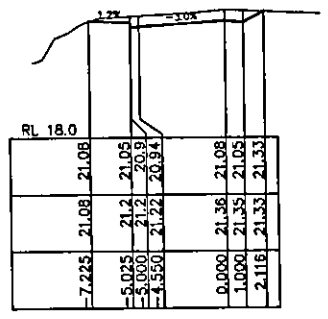

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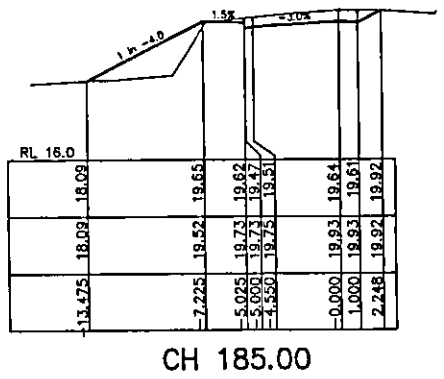

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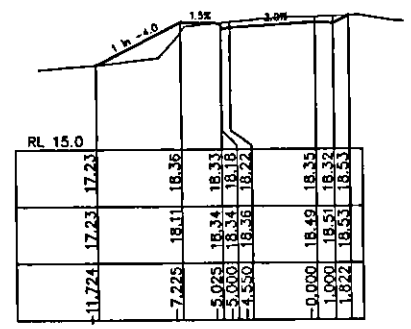

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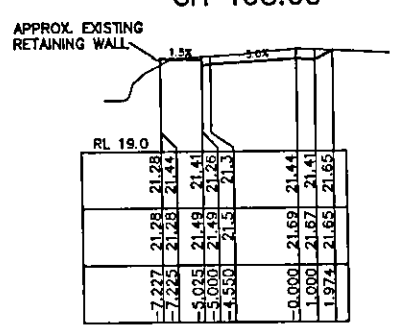

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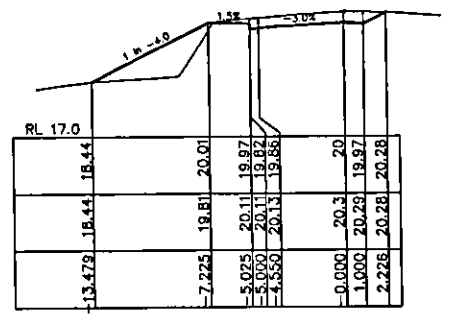

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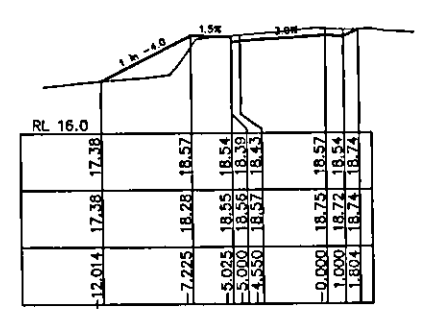

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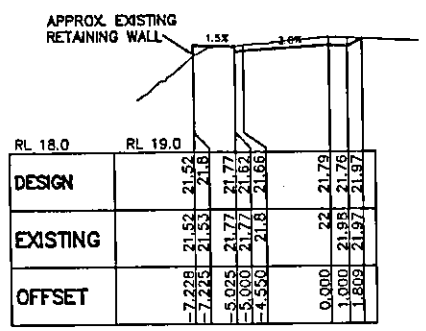

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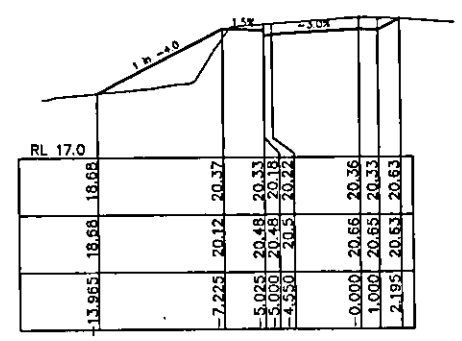

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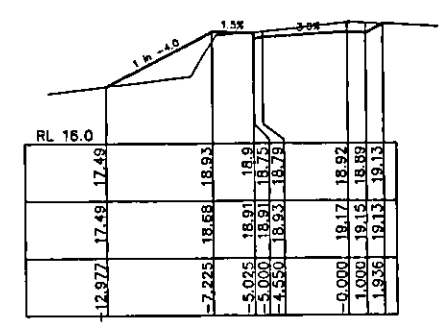

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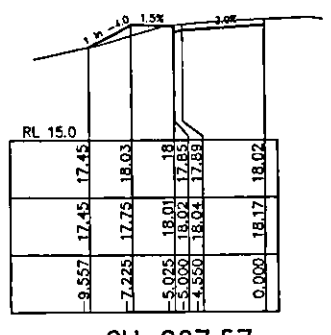

CH 207.57

HORIZONTAL 0 5000 10000 15000 20000mm
1:200 (A1) 1:400 (A3)

VERTICAL 0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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A.C.N. 003 220 228

Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: ACCESS ROAD
DESIGN CROSS SECTION
SHEET 3 OF 3

Drawing No. 4670-08
Issue C
Cad File No. 4670-06
Xref.(s)

A1

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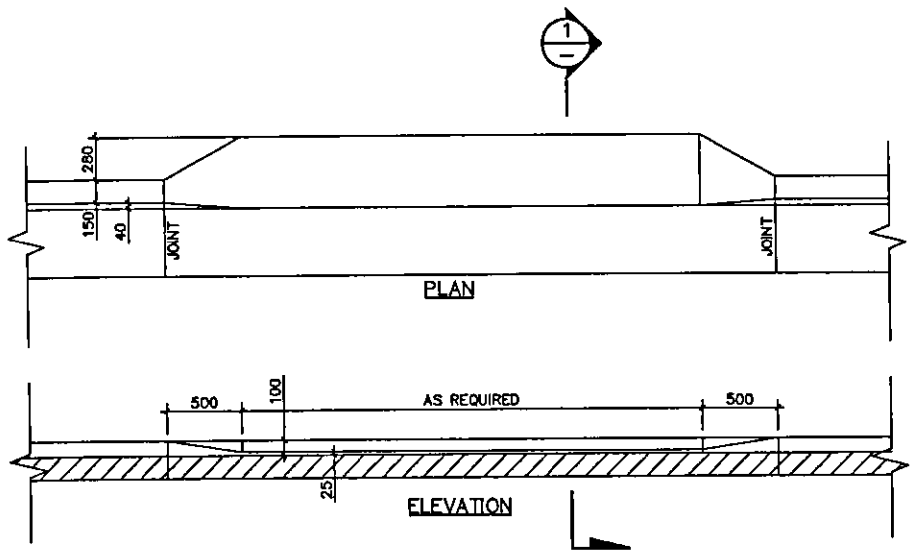
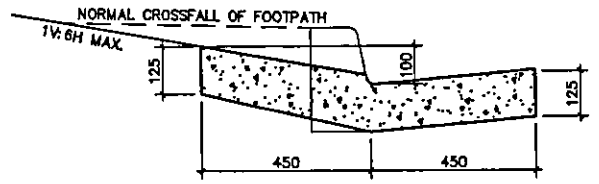
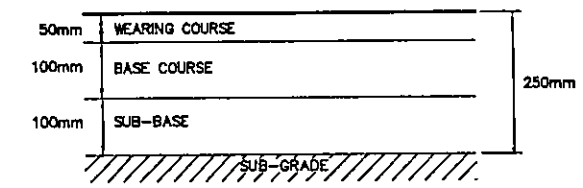


STANDARD VEHICULAR CROSSING
1:25



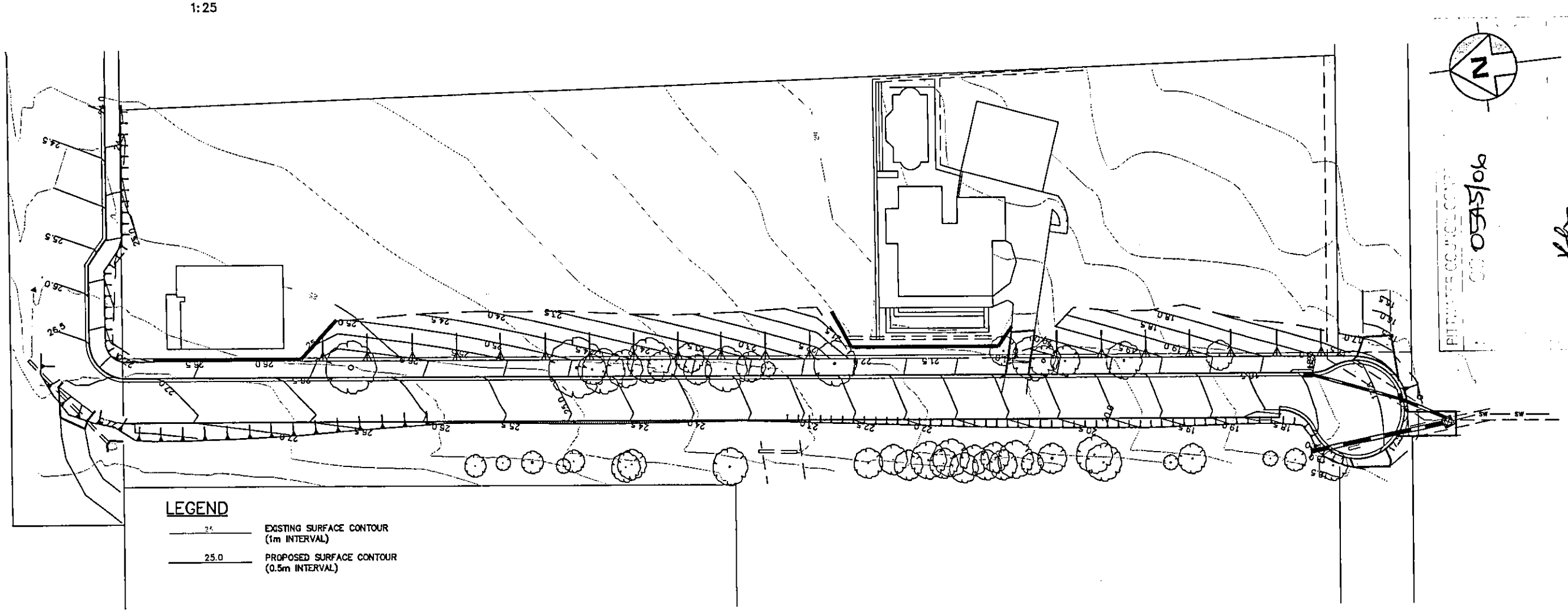
SECTION 1
1:10

STANDARD GUTTER CROSSING (LAYBACK)



TYPICAL ROAD PAVEMENT DETAIL

NOTE
1. THE BASE COURSE MATERIAL CAN BE DGB20 OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGB20 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION. THE SUB-BASE MATERIAL CAN BE CRUSHED SANDSTONE OR RECYCLED CONCRETE SATISFYING THE REQUIREMENTS OF DGS40 STANDARD PROVIDED IN THE RTA 3051 SPECIFICATION.
2. THE MINIMUM COMPACTION DRY DENSITY RATIO'S ARE AS FOLLOWS (AS1289.5.4.1-1993):
   - BASECOURSE 98% MODIFIED
   - SUB-BASE 95% MODIFIED
   - SUB-GRADE 100% STANDARD OR DENSITY RATIO OF 85%
3. PAVEMENT WEARING COURSE TO CONSIST OF A 30mm THICK LAYER OF AC14 OVERLAIN BY A 20mm THICK LAYER OF AC10.
4. FOR DETAILS OF THE REQUIRED ROAD PAVEMENT REFER TO PAVEMENT DESIGN REPORT PREPARED BY GEOTECHNIQUE PTY LTD, 14th JANUARY 2005.



PROPOSED SURFACE CONTOURS
1:300

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

INITIALS SHOWN IN THE ADJACENT ISSUE RECORDS INDICATE THE STAGES UNDERTAKEN IN THE DRAWING APPROVAL PROCESS. DRAWINGS ARE ONLY TO BE USED WHEN APPROVED BY PATTERSON BRITTON & PARTNERS AND THEN ONLY AS NOTED FOR DRG STATUS. THE ORIGINAL SIGNATURES CAN BE FOUND ON THE REVERSE SIDE OF THE ORIGINAL OF THE DRG REGISTER/TRANSMITTAL FORM No.5.2.2. HELD BY PATTERSON BRITTON & PARTNERS

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: PROPOSED SURFACE CONTOURS AND PAVEMENT DESIGN

Drawing No. 4670-09
Issue C
Cad File No. 4670-09
Xref.(s)

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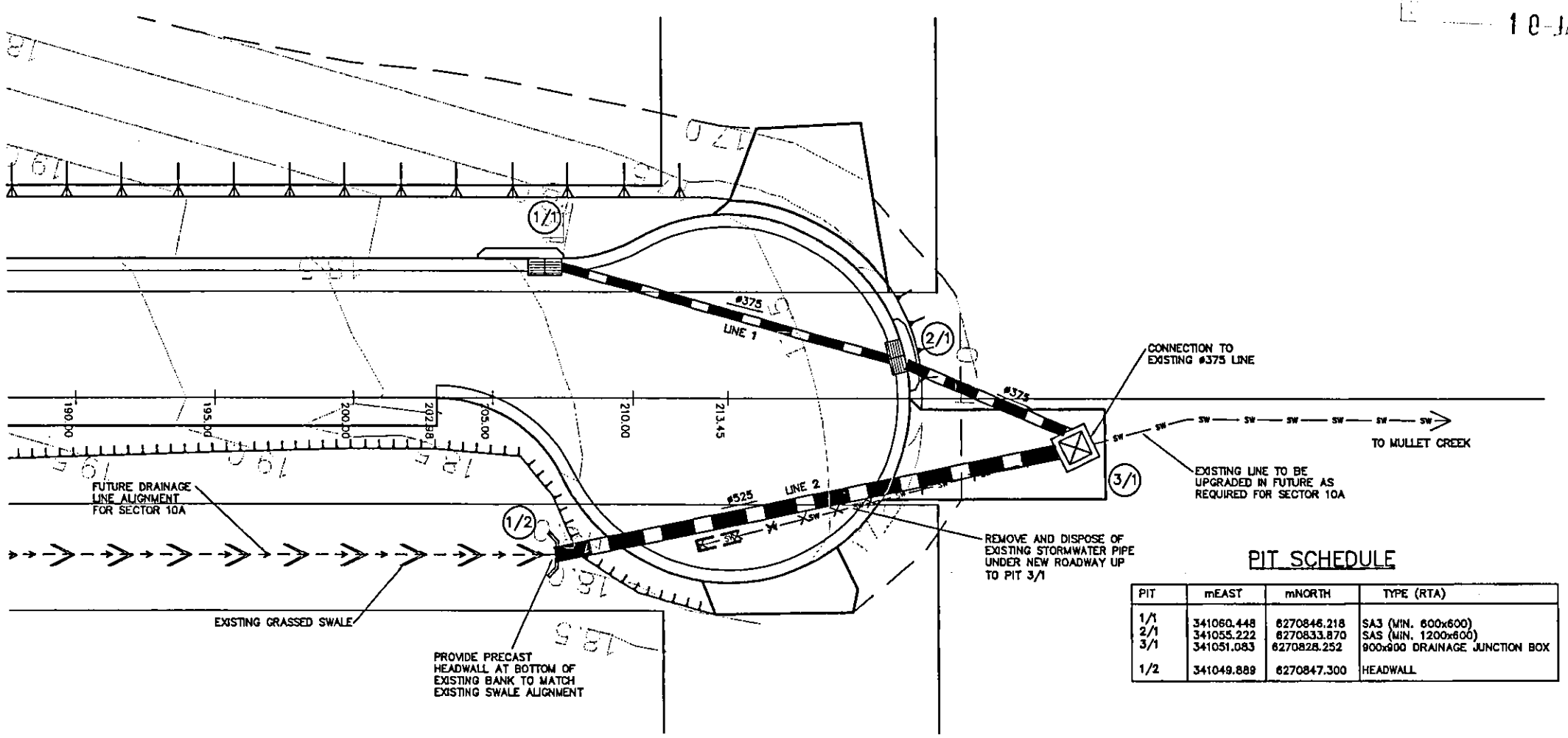

DRAINAGE PLAN
1:100

PITTWATER COUNCIL
0545/06

Rev
10-JAN 2007

PIT SCHEDULE

PIT	mEAST	mNORTH	TYPE (RTA)
1/1	341060.448	6270846.218	SA3 (MIN. 600x600)
2/1	341055.222	6270833.870	SA5 (MIN. 1200x600)
3/1	341051.083	6270828.252	900x900 DRAINAGE JUNCTION BOX
1/2	341049.889	6270847.300	HEADWALL

0 2000 4000 6000 8000 10000mm
1:100 (A1) 1:200 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDR	DS	ARG	MS		18.07.05
B	ISSUED FOR APPROVALS	FC	ARG	MS		18.02.05
A	ISSUED FOR REVIEW	ARG	ARG	MS		25.01.05

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Patterson Britton & Partners Pty Ltd
consulting engineers

Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD
WARRIEWOOD

Title: STORMWATER DRAINAGE PLAN

Drawing No. 4670-10
Issue C
Cad File No. 4670-10
Xref.(s)

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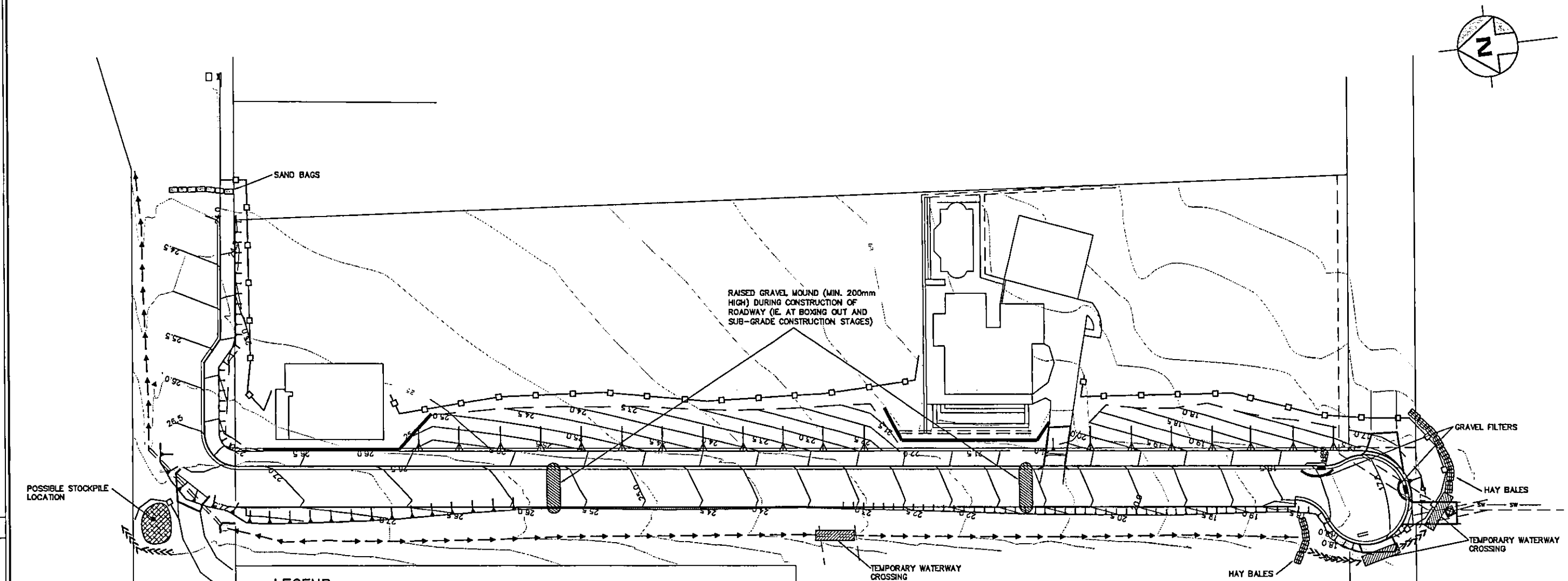

LEGEND

- EXISTING SURFACE CONTOUR (1m INTERVAL)
- PROPOSED SURFACE CONTOUR (0.5m INTERVAL)
- EXISTING DRAINAGE SWALE
- SAND BAGS
- HAY BALES AND GEOTEXTILE SEDIMENT FILTER (REFER TO FIG. SD6-7 IN THE 'BLUE BOOK')
- MESH AND GRAVEL INLET FILTER (REFER TO FIG. SD6-11 IN THE 'BLUE BOOK')
- DIVERSION DRAIN (REFER TO FIG. SD5-5 IN THE 'BLUE BOOK')
- SEDIMENT FENCE (REFER TO FIG. SD6-8 IN THE 'BLUE BOOK')
- POSSIBLE STOCKPILE LOCATION (REFER TO FIG. SD4-1 IN THE 'BLUE BOOK')
- TEMPORARY WATERWAY CROSSING (REFER TO FIG. SD5-1 IN THE 'BLUE BOOK')

0 10 20 30m
1:300 (A1) 1:600 (A3)

DRG STATUS : PRELIMINARY, NOT FOR CONSTRUCTION

Issue	Details of Issue	Des'd	Drn	Chk'd	Approved	Date
C	ISSUED FOR TENDER	DS	ARG	MS		18.07.05
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Patterson Britton & Partners Pty Ltd
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Client: V, D AND M BUBALO

Project: ORCHARD STREET ACCESS ROAD WARRIEWOOD

Title: EROSION AND SEDIMENT CONTROL PLAN

Drawing No. 4670-12
Issue C
Cad File No. 4670-12
Xref.(s)

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APPENDIX C – SECTOR 10 (STOCKLAND) MONITORING RESULTS SUMMARY

Table 1 – Pre Construction Water Quality Monitoring Results

Parameter	Units	Short-Term Goal	Medium-Term Goal	Long-Term Goal*	15-Sep-99 3:00 PM		21-Sep-99		11-Oct-99 3:30 PM		18-Oct-99 1:30 PM		20-Oct-99 2:30 PM		14-Jun-01 11:30 AM	11 October-01		7 Nov-01 1:17 to 6:21 PM (rising limb)			8 Nov-01 8:26 to 9:07AM (falling limb)			20 Nov-01 3:00PM (rising limb)			21 Nov-01 9:30AM (falling limb)			7 Jan-02 5:00AM (rising limb)			7 Jan-02 5:00PM (falling limb)		
					W1US	W1DS	W2US	W2DS	WS3US	WS3DS	WS4US	WS4DS	WS5US	WS5DS	WSI	WS10US	WS10DS	WSUS (MC2)	WSDS (MC1)	WSIS (MC3)	WSUS (MC2)	WSDS (MC1)	WSIS (MC3)	WSUS 20	WSDS 20	WSIS 20	WSUS 21	WSDS 21	WSIS 21	WSUS 30	WSDS 30	WSIS 30	WSUS 31	WSDS 31	WSIS 31
Total rain over 5 day's preced. sampling	mm				2.6	2.6	14.8	14.8	2.0	2.0	0.0	0.0	38.0	38.0	7.2	3.2	3.2	17.2	17.2	17.2	21.6	21.6	21.6	41.8	41.8	41.8	67.4	67.4	67.4	21.2	21.2	21.2	21.2	21.2	21.2
Ammonia - N	mg/L	<2.3	<0.3	<0.3	0.039	0.087	0.022	0.060	0.047	0.16	0.031	0.082	0.025	0.042	0.014	-	-	0.04	0.02	0.01	0.12	0.05	0.03	0.015	0.027	0.026	0.018	0.012	0.047	0.017	0.034	0.24	0.043	0.058	0.28
Total Nitrogen	mg/L	SQ	<1.6	1.0	0.953	0.610	0.464	1.08	0.66	1.01	0.50	0.79	0.76	0.49	*1.9*	-	-	0.54	0.66	1.34	0.53	0.79	*1.92*	0.42	0.37	0.49	0.58	0.37	0.8	0.84	0.87	*2.5*	0.63	0.62	*2.7*
NOx	mg/L	NS	NS	NS	0.493	0.020	0.024	0.46	0.22	0.01	0.09	0.01	0.30	0.02	0.79	-	-	0.02	0.03	0.07	<0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Filterable Phosphorous	mg/L	NS	NS	NS	0.014	0.037	0.02	0.07	<0.02	0.08	<0.05	0.079	0.065	0.052	0.069	-	-	0.044	0.05	0.235	0.035	0.031	0.125	<0.02	0.021	0.13	<0.02	0.025	0.11	<0.05	0.062	0.73	<0.05	<0.05	1
Non-Filterable Phosphorous	mg/L	NS	NS	NS	0.006	0.013	0.04	0.06	<0.02	0.11	<0.05	0.12	0.075	0.043	0.071	-	-	0.024	0.024	0.184	0.014	0.009	0.1	0.013	0.033	0.112	0.033	0.026	0.08	0.026	0.058	0.06	-	0.06	-
Total Phosphorous	mg/L	SQ	<0.1	0.04	0.020	0.050	0.06	*0.13*	<0.02	*0.19*	<0.05	*0.20*	*0.14*	0.095	*0.14*	-	-	0.074	*0.110*	*0.479*	0.066	0.069	*0.441*	0.033	0.054	0.018	0.035	0.051	*0.19*	0.076	*0.12*	*0.79*	0.066	*0.11*	*1.1*
Total Dissolved Solids	mg/L	<1000	<1000	<1000	193	221	184	199	196	210	200	220	180	180	240	-	-	235	248	273	258	270	281	180	200	100	200	200	170	140	140	190	140	180	210
Suspended Solids		SQ	<20	<6	<2	<2	<2	<2	<2	6	2	11	4	4	17	-	-	3	6	10	4	4	13	<2	<2	12	2	<2	*41*	4	6	*83*	2	2	*120*
Turbidity	NTU	SQ	<50	<20	1.4	3.6	2.0	5.0	2.0	6.6	5.6	12	4.7	4.0	8.1	-	-	5.3	*68.4*	*171.5*	2.1	4.8	12.5	6	4	15	10	4	23	4	5	28	5	5	22
Faecal Coliforms	cfu/100 ml	<1000	<150	<150	4	*220*	*300*	77	40	29	*530*	14	*690*	*360*	90	-	-	3200	6400	9000	*550*	1000	*990*	*230*	*930*	4700	*450*	*530*	6100	5500	15000	4500	2200	7500	*870*
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	0.46	0.59	0.44	0.62	0.44	1.0	0.41	0.78	0.46	0.47	1.1	-	-	0.52	0.63	1.27	0.53	0.78	1.91	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH unit	6.6-8	6.6-8	6.6-8	7.4	6.8	7.6	7.3	7.0	6.4	7.2	6.7	7.4	6.7	7.4	-	-	6.37	6.42	6.84	6.42	6.49	6.89	7.4	6.8	7.4	7.4	6.9	7.3	6.7	6.4	6.6	6.8	6.7	6.7
Dissolved Oxygen (field)	mg/L	SQ	<90% sat.	<90% s	-	-	-	2.51	5.14	0.26	4.78	0.13	-	1.70	2.0	-	-	1.4	2.6	1.6	1.0	0.8	1.5												
Temperature (field)	°C	SQ	SQ	SQ	-	-	-	9.1	21.1	19.1	22.4	20.3	-	17.2	18.1	-	-	17.47	17.59	16.86	16.39	16.48	15.6	17	17.1	16.5	18	18	17.4	18	19	20.3	17	17.1	17.1
Arsenic	ug/L	SQ	50%SQ	50	-	-	-	-	-	-	-	-	-	-	-	<1	<1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chromium	ug/L	SQ	50%SQ	10	-	-	-	-	-	-	-	-	-	-	-	<1	<1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Copper	ug/L	SQ	50%SQ	2	-	-	-	-	-	-	-	-	-	-	-	1	<1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lead	ug/L	SQ	50%SQ	1	-	-	-	-	-	-	-	-	-	-	-	<1	<1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mercury	ug/L	SQ	50%SQ	0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zinc	ug/L	SQ	50%SQ	50	-	-	-	-	-	-	-	-	-	-	-	3.8	7.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Organo chlorine Pesticides (OC)	ug/L	SQ	50%SQ	NS	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.01	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenols	ug/L	SQ	50%SQ	NS	-	-	-	-	-	-	-	-	-	-	-	<2	<2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Organo phosphate Pesticides (OP)	ug/L	SQ	50%SQ	NS	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hardness	mg/L	NS	NS	NS	-	-	-	-	-	-	-	-	-	-	-	80	110	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorophyll A	mg/L	15	15	10	-	-	-	-	-	-	-	-	-	-	-	0.001	0.002	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in **Bold** do not achieve the short term goal or where SQ is the short term goal
6. Rainfall data obtained from Bureau of Meteorology. Sampling Station – Observatory Hill.
7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), NR = Not Required by Council's WMS for wet weather sampling

Table 2– Construction Stage Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal*	8 Apr-02 (Dry)			17 Apr –02 4:00PM (rising limb)	18 Apr –02 10:00AM (falling limb)	28 May-02 1:30PM (rising limb)		29 May-02 9:00AM (falling limb)		3/7/02 Physical Properties (DRY)		28/10/02 (Dry)		
						Mullet Creek		DS of Internal Creek	DS of Internal Creek	DS of Internal Creek	Mullet Creek		Mullet Creek		Mullet Creek		Mullet Creek		DS of Internal
						WSUS100	WSDS100	S12D1US (ds of IS)	200S12US (ds of IS)	202USS12 (ds of IS)	WS500US	WS500 DS	WS600US	WS600 DS	US	DS	WS700US	WS700DS	WS700IS (ds of IS)
Total rain over 5 days preceding sampling	mm					2.2	2.2	2.2	6.6	13.8	33.6	33.6	47.0	47	0	0			
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.015	0.12	0.26	0.14	0.21	0.024	0.006	0.045	0.021	-	-	0.19	0.10	0.18
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.5	0.7	**12**	**4.0**	**7.5**	0.67	0.40	1.1	0.48	-	-	0.59	0.54	*5.0*
Nitrate	mg/L	NS	NS	NS	NS	0.094	<0.005	6.3	1.8	5.8	0.025	0.018	0.41	0.064	-	-	0.01	<0.005	3.5
Nitrite	mg/L	NS	NS	NS	NS	<0.005	0.008	2.7	0.22	1.2	<0.005	<0.005	0.015	<0.005	-	-	<0.005	<0.005	0.071
Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.05	0.09	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	0.027	0.043	<0.02
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.05	0.08	0.26	0.49	0.071	<0.05	<0.05	<0.05	<0.05	-	-	-	-	-
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	<0.05	**0.17**	**0.31**	**0.54**	0.076	<0.05	0.053	0.083	0.063	-	-	0.097	0.17	0.043
Phosphate – Ortho as P	mg/L	NS	NS	NS	NS	0.007	0.021	0.03	0.016	0.009	0.009	0.007	0.014	0.01	-	-	0.014	0.012	<0.005
Total Dissolved Solids	mg/L	NS	<1000	<1000	<1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suspended Solids		<100	SQ	<20	<6	<2	8	**550**	**570**	17	6	4	14	4	-	-	7	10	40
Turbidity	NTU	NS	SQ	<50	<20	-	-	-	-	-	-	-	-	-	-	-			-
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	50	40	*420*	**24000**	*850*	<10	<10	**2900**	120	-	-	20	470	<10
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.4	0.7	3.0	2.0	0.5	0.65	0.38	0.68	0.42	-	-	0.58	0.54	1.4
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	-	-	-	-	-	-	-	-	-	7.96	7.2	6.5	6.5	4.9
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	-	-	-	-	-	-	-	-	-	11.7	2.2	-	-	-
Temperature (field)	°C	NS	SQ	SQ	SQ	-	-	-	-	-	-	-	-	-	8.4	9.0	-	-	-
Conductivity @25deg C		NS				-	-	0.67	0.43	0.56	0.33	0.30	0.31	0.28	0.4	0.4	0.33	0.37	0.58
Salinity (ppt)		NS						-	-	-	-	-	-	-	0.18	0.18	-	-	-
ORP (mV)		NS						-	-	-	-	-	-	-	110	92	-	-	-
Arsenic	ug/L	NS	SQ	50%SQ	50	-	-	0.008	NR	NR	NR	NR	NR	NR	-	-	<1	<1	-
Chromium	ug/L	NS	SQ	50%SQ	10	-	-	0.016	NR	NR	NR	NR	NR	NR	-	-	<1	<1	-
Copper	ug/L	NS	SQ	50%SQ	2	-	-	0.018	NR	NR	NR	NR	NR	NR	-	-	<1	<1	-
Lead	ug/L	NS	SQ	50%SQ	1	-	-	0.048	NR	NR	NR	NR	NR	NR	-	-	<1	<1	-
Mercury	ug/L	NS	SQ	50%SQ	0.1	-	-	<0.0001	NR	NR	NR	NR	NR	NR	-	-	<0.1	<0.1	-
Zinc	ug/L	NS	SQ	50%SQ	50	-	-	0.064	NR	NR	NR	NR	NR	NR	-	-	<1	1	-
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	-	-	<0.01 (apart from Dieldrin at 0.051)	NR	NR	NR	NR	NR	NR	-	-	<0.01	<0.01	-
Phenols	ug/L	NS	SQ	50%SQ	NS	-	-	<2.0	NR	NR	NR	NR	NR	NR	-	-	<2	<2	-
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	-	-	<0.1	NR	NR	NR	NR	NR	NR	-	-	<0.1	<0.1	-
Hardness	mg/L	NS	NS	NS	NS	-	-	200	NR	NR	NR	NR	NR	NR	-	-	89	100	-
Chlorophyll A	mg/L	NS	15	15	10	-	-	<0.001	NR	NR	NR	NR	NR	NR	-	-	-	-	
Oil and Grease	mg/L	NS	NS	NS	NS	-	-	<5	NR	NR	NR	NR	NR	NR	-	-	<5	<5	-

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2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in **Bold** do not achieve the short term goal or where SQ is the short term goal
6. Rainfall data obtained from Bureau of Meteorology.
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Table 3 – First Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	16-1-03 (Dry)		
						Mullet Creek		New Internal Site
						WSP1US	WSP1DS	WSP1IS
Total rain over 5 days preceding sampling	mm					0	0	0
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	<0.1	*0.3*	<0.1
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.4	*27*	*5.2*
Nitrate	mg/L	NS	NS	NS	NS	0.04	0.09	4.7
Nitrite	mg/L	NS	NS	NS	NS	<0.005	<0.005	0.09
Oxidised Nitrogen	mg/L	NS	NS	NS	NS	0.04	0.09	4.8
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.4	27	0.4
Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.05	<0.05	<0.05
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.05	0.1	<0.05
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	<0.05	*0.1*	<0.05
Phosphate – Ortho as P	mg/L	NS	NS	NS	NS	<0.05	<0.05	<0.05
Suspended Solids / NFR		<100	SQ	<20	<6	<1	9	4
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	20	*150*	120
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	-	-	-
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	-	-	-
Temperature (field)	°C	NS	SQ	SQ	SQ	-	-	-
Conductivity @25deg C		NS	NS	NS		-	-	-
Salinity (g/L)		NS	NS	NS		0.1	0.7	0.2
ORP (mV)		NS	NS	NS		-	-	-
Arsenic	ug/L	NS	SQ	50%SQ	50	<1	<1	2
Chromium	ug/L	NS	SQ	50%SQ	10	<1	<1	<1
Copper	ug/L	NS	SQ	50%SQ	2	<1	<1	3
Lead	ug/L	NS	SQ	50%SQ	1	<1	<1	<1
Mercury	ug/L	NS	SQ	50%SQ	0.1	<0.1	<0.1	<0.1
Zinc	ug/L	NS	SQ	50%SQ	50	<1	<1	<1
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1
Phenols	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	60	110	140
Chlorophyll A	ug/L	NS	15	15	10	13	31	2
Oil and Grease	mg/L	NS	NS	NS	NS	<3	<3	<3
Total PAH's	mg/L	NS	NS	NS	NS	<0.02	<0.02	<0.02
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	380	1500	230

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3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in Bold do not achieve the short term goal or where SQ is the short term goal
6. Rainfall data obtained from Bureau of Meteorology.
7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication)

Table 4 – Second Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	17 February 2003 (Wet Weather Rising Limb)							18 February 2003 (Wet Weather Falling Limb)							21 February 2003 (Wet Weather)		21 March, 2003 (Dry Weather)		
						Mullet		Internal	WQCP1		WQCP2		Mullet		Internal	WQCP1		WQCP2		WQCP1		Mullet		Internal
						WSP2US	WSP2DS	WSP2IS	WSP21IN	WSP21OUT	WSP22IN	WSP22OUT	WSP3US	WSP3DS	WSP3IS	WSP31IN	WSP31OUT	WSP32IN	WSP32OUT	WSP41IN	WSP41OUT	WSP6US	WSP6DS	WSP6IS
Total rain over 5 days preceding sampling	mm					2	2	2	2	2	2	2	5.4	5.4	5.4	5.4	5.4	5.4	5.4	10.2	10.2	7.4 (4 days =0)	7.4 (4 days =0)	7.4 (4 days =0)
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	*0.4*	0.1	0.1	0.1	0.1	<0.1	<0.1	*0.7*	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	*0.3*	<0.1
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	1.0	*1.6*	*7.1*	*2.4*	1.0	*1.5*	1.0	*2.0*	*2.2*	*6.1*	*2.6*	0.7	1.0	1.4	*2.6*	*1.6*	0.07	*2.2*	*7.1*
Nitrate	mg/L	NS	NS	NS	NS	<0.01	<0.01	6.0	<0.01	0.03	0.13	<0.01	<0.01	<0.01	5.9	<0.01	0.03	0.23	<0.01	0.38	1.0	0.07	0.15	7.0
Nitrite	mg/L	NS	NS	NS	NS	<0.005	<0.005	0.099	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.11	<0.005	<0.005	0.005	<0.005	0.016	<0.005	<0.005	<0.005	0.12
Oxidised Nitrogen	mg/L	NS	NS	NS	NS	<0.005	<0.005	6.1	<0.005	0.03	0.13	<0.005	<0.005	<0.005	6.0	<0.005	0.03	0.23	<0.005	0.4	1.0	0.07	0.15	7.1
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	1.0	1.6	1.0	2.4	1.0	1.4	1.0	2.0	2.2	0.1	2.6	0.7	0.8	1.4	2.2	0.6	<1.0	2.0	<1.0
Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.1	0.2	0.2	0.1	0.07	0.05	0.05	0.08	0.1	0.05	0.1	0.05	0.07	0.08	0.3	<0.05	0.05	<0.05	<0.05
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.1	0.3	<0.1	0.3	<0.1	0.15	0.15	0.12	0.5	0.05	0.3	<0.05	<0.05	0.12	1.5	<0.1	0.01	0.07	0.06
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	*0.2*	*0.5*	*0.2*	*0.4*	*0.1*	*0.2*	*0.2*	*0.2*	*0.6*	*0.1*	*0.4*	0.06	0.09	*0.2*	*1.8*	0.04	0.06	0.07	0.06
Phosphate – Ortho as P	mg/L	NS	NS	NS	NS	0.06	0.31	<0.05	0.11	<0.05	<0.05	<0.05	0.05	0.39	0.05	0.16	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.05
Suspended Solids / NFR		<100	SQ	<20	<6	16	15	*130*	*77*	<1	*62*	*130*	19	*23*	*51*	*100*	2	*22*	*85*	*1000*	3	11	3	*33*
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	2200	6600	8400	2300	6900	7700	30	*230*	*170*	*250*	*390*	1400	10	*40*	30000	*340*	*590*	*260*	*180*
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.5	7	4.4	4.43	7.2
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	3.0	0.8	2.3
Temperature (field)	°C	NS	SQ	SQ	SQ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.0	7.0	19.3	19.6	18
Conductivity @25deg C	us/cm	NS	NS	NS		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	266	365	250
Salinity (g/L)		NS	NS	NS		0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.3	0.2
ORP (mV)		NS	NS	NS																-	-	409	409	400
Arsenic	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	5	<1
Chromium	ug/L	NS	SQ	50%SQ	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Copper	ug/L	NS	SQ	50%SQ	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1	4	1
Lead	ug/L	NS	SQ	50%SQ	1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	4
Mercury	ug/L	NS	SQ	50%SQ	0.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.1	<0.1	<0.1
Zinc	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	2	48	19
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Phenols	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	90	170	140
Chlorophyll A	ug/L	NS	15	15	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.5	5.6	<0.5
Oil and Grease	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<3	45	52
Total PAH's	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0	740	460

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3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in **Bold** do not achieve the short term goal or where SQ is the short term goal
6. Rainfall data obtained from Bureau of Meteorology.
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Table 5 – Third Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	16-7-03 (Dry)		
						Mullet Creek		New Internal Site
						WSP7US	WSP7DS	WSP7IS
Total rain over 5 days preceding sampling	mm							
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	<0.01	0.01	<0.01
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	1.2	1.2	*4*
Nitrate	mg/L	NS	NS	NS	NS	0.61	0.09	3.53
Nitrite	mg/L	NS	NS	NS	NS	0.01	<PQL	0.07
Oxidised Nitrogen	mg/L	NS	NS	NS	NS	-	-	-
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.6	1.2	0.3
Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.01	0.03	0.05
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.01	<0.01	0.01
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	0.02	0.04	0.06
Phosphate – Ortho as P	mg/L	NS	NS	NS	NS	-	-	-
Suspended Solids	mg/L	<100	SQ	<20	<6	9	5	7
Turbidity (field)	NTU	NS	SQ	50	20	*111*	*74.9*	SH
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	*320*	110	20
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	6.66	6.64	SH
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	20	15.9	SH
Temperature (field)	°C	NS	SQ	SQ	SQ	11.73	11.98	SH
Conductivity @25deg C	ms/cm	NS	NS	NS	NS	0.4	0.4	SH
Salinity (g/kg)		NS	NS	NS	NS	<1	<1	<1
ORP (mV)		NS	NS	NS	NS	55	57	SH
Arsenic	ug/L	NS	SQ	50%SQ	50	2	3	3
Chromium	ug/L	NS	SQ	50%SQ	10	<5	<5	<5
Copper	ug/L	NS	SQ	50%SQ	2	<5	<5	<5
Lead	ug/L	NS	SQ	50%SQ	1	<2	<2	5
Mercury	ug/L	NS	SQ	50%SQ	0.1	<1	<1	<1
Zinc	ug/L	NS	SQ	50%SQ	50	<10	<10	20
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	<1	<1	-
Phenols	ug/L	NS	SQ	50%SQ	NS	<PQL	<PQL	<PQL
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	<10	<10	-
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	79	68	150
Chlorophyll A	ug/L	NS	15	15	10	<5	<5	<5
Oil and Grease	mg/L	NS	NS	NS	NS	<5	6	12
Total PAH's	ug/L	NS	NS	NS	NS	<1	<1	-
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	702	265	139

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined achieve the short and medium-term water quality goal.
4. Figures in *italics* achieve the short-term water quality goal.
5. Figures in Bold do not achieve the short term goal or where SQ is the short term goal
7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), <PQL = Less than practical quantitation limit, SH – Too Shallow to take readings with equipment

Table 6 – Fourth Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	15-10-03 (Dry)		
						Mullet Creek		New Internal Site
						WSP8US	WSP8DS	WSP8IS
Total rain over 5 days preceding sampling	mm					32.8	32.8	32.8
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.06	0.07	0.09
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	1.2	0.6	*3.8*
Nitrate	mg/L	NS	NS	NS	NS	0.46	<0.01	2.69
Nitrite	mg/L	NS	NS	NS	NS	0.01	<0.01	0.03
Oxidised Nitrogen	mg/L	NS	NS	NS	NS	-	-	-
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.8	0.6	1.2
Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.14	0.05	0.39
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.01	<0.01	<0.01
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	*0.15*	0.06	*0.40*
Phosphate – Ortho as P	mg/L	NS	NS	NS	NS	-	-	-
Suspended Solids	mg/L	<100	SQ	<20	<6	13	4	*190*
Turbidity (field)	NTU	NS	SQ	50	20	*75*	6	-
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	90	*160*	*370*
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	7.85	7.26	-
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	6.62	1.83	-
Temperature (field)	°C	NS	SQ	SQ	SQ	15.2	14.8	-
Conductivity @25deg C	ms/cm	NS	NS	NS	NS	0.233	0.243	-
Salinity (g/kg)		NS	NS	NS	NS	0	0	-
ORP (mV)		NS	NS	NS	NS	-	-	-
Arsenic	ug/L	NS	SQ	50%SQ	50	<2	<2	4
Chromium	ug/L	NS	SQ	50%SQ	10	<5	<5	<5
Copper	ug/L	NS	SQ	50%SQ	2	≤5	≤5	9
Lead	ug/L	NS	SQ	50%SQ	1	3	≤2	18
Mercury	ug/L	NS	SQ	50%SQ	0.1	<1	<1	<1
Zinc	ug/L	NS	SQ	50%SQ	50	<10	<10	160
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1
Phenols	ug/L	NS	SQ	50%SQ	NS	<5	<5	<5
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	<10	<10	<10
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	75	70	160
Chlorophyll A	ug/L	NS	15	15	10	10	<5	<5
Oil and Grease	mg/L	NS	NS	NS	NS	<3	<3	<3
Total PAH's	ug/L	NS	NS	NS	NS	<1	<1	<1
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	348	334	134

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.

2. Figures in normal case satisfy any short, medium and long-term water quality goals.

3. Figures underlined achieve the short and medium-term water quality goal.

4. Figures in *italics* achieve the short-term water quality goal.

5. Figures in Bold do not achieve the short term goal or where SQ is the short term goal

7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), <PQL = Less than practical quantitation limit, SH – Too Shallow to take readings with equipment

Table 7 – Fifth Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	27/11/03 – Wet Weather Rising Limb							28/11/03 – Wet Weather Falling Limb							15/1/04 Dry			15/1/04 Dry (Physical Only)	
						WSP9US	WSP9DS	WSP9IS	WSP9WQ CP1IN	WSP9WQ CP1OUT	WSP9WQ CP2IN	WSP9WQ CP2OUT	WSP10US	WSP10DS	WSP10IS	WSP10W QCP1IN	WSP10W QCP1OUT	WSP10W QCP2IN	WSP10W QCP2OUT	WSP11US	WSP11DS	WSP11IS	WQCP1 IN	WQP1 OUT
Total rain over 5 days preceding sampling	mm					75.6	75.6	75.6	75.6	75.6	75.6	75.6	49.2	49.2	49.2	49.2	49.2	49.2	49.2	0.8	0.8	0.8	0.8	0.8
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.04	0.02	0.05	*0.38*	<0.01	<0.01	<0.01	0.02	0.04	0.03	*0.39*	<0.01	0.02	0.01	0.07	0.10	0.02	-	-
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.6	0.9	*2.6*	1.4	0.6	0.5	0.3	1.0	0.7	*4.4*	*2.2*	0.8	0.8	0.7	0.6	1.2	*5.2*	-	-
Nitrate	mg/L	NS	NS	NS	NS	0.01	0.28	2.14	0.27	<0.01	<0.01	<0.01	0.17	<0.01	3.28	0.2	<0.01	<0.01	<0.01	<0.01	0.01	5.09	-	-
Nitrite	mg/L	NS	NS	NS	NS	<0.01	<0.01	0.05	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.08	-	-
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.6	0.6	0.5	1.2	0.6	0.5	0.3	0.9	0.7	1.0	2.0	0.8	0.8	0.7	0.6	1.2	0.1	-	-
Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.08	0.13	0.08	0.20	0	0.14	0.07	0.08	0.08	0.05	0.21	0.28	0.12	0.11	0.05	0.18	0.01	-	-
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.01	0.04	0.02	0.23	0.18	<0.01	<0.01	0.02	0.01	0.02	0.24	0.02	<0.01	<0.01	<0.01	<0.01	0.01	-	-
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	0.09	*0.17*	*0.10*	*0.43*	*0.18*	*0.14*	0.07	*0.1*	0.09	0.07	*0.45*	*0.30*	*0.12*	*0.11*	0.05	*0.18*	0.02	-	-
Suspended Solids	mg/L	<100	SQ	<20	<6	5	9	7	11	10	*21*	13	5	4	2	15	6	9	10	8	*31*	2	-	-
Turbidity (field)	NTU	NS	SQ	50	20	42	8	-	35	35	*109*	41	16	4	-	31	14	29	*89*	32	*89*	-	41	10
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	*180*	*300*	*440*	*740*	120	*570*	*740*	80	*400*	1100	1200	*280*	*480*	7500	100	*470*	*560*	-	-
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	7.78	6.36	-	7.36	6.99	7.34	7.09	7.24	6.47	-	7.38	6.76	7.3	7.13	7.4	5.99	-	7.05	10.07
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% s	8.14	2.72	-	4.24	5.12	6.53	5.5	6.76	1.82	-	4.35	4.0	6.15	5.64	7.6	4.3	-	3.98	2.01
Temperature (field)	°C	NS	SQ	SQ	SQ	16.0	15.9	-	19.9	17.9	20.5	21.3	15.9	16.1	-	19.8	17.9	20.1	20.8	19	18.4	-	20.1	22.5
Conductivity	ms/cm	NS	NS	NS	NS	0.298	0.226	-	0.168	0.149	0.217	0.194	0.277	0.229	-	0.165	0.153	0.213	0.196	0.302	0.27	-	0.202	0.312
Salinity (%)		NS	NS	NS	NS	0.01	0	-	0	0	0	0	0.01	0	-	0	0	0	0	0	0	-	0	0.01
Arsenic	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<2	<2	<2	-	-
Chromium	ug/L	NS	SQ	50%SQ	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<5	<5	<5	-	-
Copper	ug/L	NS	SQ	50%SQ	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<2	<2	<2	-	-
Lead	ug/L	NS	SQ	50%SQ	1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1	<1	1	-	-
Mercury	ug/L	NS	SQ	50%SQ	0.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.05	<0.05	<0.05	-	-
Zinc	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<10	<10	<10	-	-
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1	-	-
Phenols	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<50	<50	<50	-	-
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<10	<10	<10	-	-
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	87	96	170	-	-
Chlorophyll A	ug/L	NS	15	15	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.005	0.067	<0.005	-	-
Oil and Grease	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	-	-
Total PAH's	ug/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1	-	-
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	384	0	4	-	-

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined do not achieve the long term water quality goal.
4. Figures in italics do not achieve the medium-term water quality goal.
5. Figures in Bold do not achieve the short term goal
6. Rainfall for Nov and Dec 2003 is from the Ingleside Rainfall Station, whilst Jan 04 is from Newport Bowling Club.
7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), <PQL = Less than practical quantitation limit, SH – Too Shallow to take readings with equipment, NR=Not required by specification in wet weather

Table 8 – Sixth Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	15/4/04 Dry			15/4/04 Dry (Physical Only)			
						WSP12US	WSP12DS	WSP12IS	WQCP1 IN	WQCP1 OUT	WQCP2 IN	WQCP2 OUT
Total rain over 5 days preceding sampling	mm					0	0	0	0	0	0	0
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.03	0.07	0.05	-	-	-	-
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.7	1.2	*5.4*	-	-	-	-
Nitrate	mg/L	NS	NS	NS	NS	0.06	<0.01	5.13	-	-	-	-
Nitrite	mg/L	NS	NS	NS	NS	<0.01	<0.01	0.07	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.6	1.2	0.1	-	-	-	-
Filterable Phosphorous	mg/L	NS	NS	NS	NS				-	-	-	-
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.01	0.02	<0.01	-	-	-	-
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	0.08	*0.15*	0.03	-	-	-	-
Suspended Solids	mg/L	<100	SQ	<20	<6	3	10	<1	-	-	-	-
Turbidity (field)	NTU	NS	SQ	50	20	4	8	SH	53	5	25	77
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	40	30	60	-	-	-	-
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	6.3	6.0	SH	6.96	6.51	6.99	6.92
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% sat	3.37	0.85	SH	4.11	5.12	5.88	8.31
Temperature (field)	°C	NS	SQ	SQ	SQ	17.8	18.1	SH	21.9	18.5	20.4	22.1
Conductivity	ms/cm	NS	NS	NS	NS	0.273	0.264	SH	0.078	0.117	0.142	0.115
Salinity (%)		NS	NS	NS	NS	0.01	0.01	SH	0	0	0	0
Arsenic	ug/L	NS	SQ	50%SQ	50	<2	4	2	-	-	-	-
Chromium	ug/L	NS	SQ	50%SQ	10	<5	<5	<5	-	-	-	-
Copper	ug/L	NS	SQ	50%SQ	2	<2	<2	<2	-	-	-	-
Lead	ug/L	NS	SQ	50%SQ	1	<1	<1	4	-	-	-	-
Mercury	ug/L	NS	SQ	50%SQ	0.1	<0.05	<0.05	<0.05	-	-	-	-
Zinc	ug/L	NS	SQ	50%SQ	50	<10	<10	<10	-	-	-	-
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1	-	-	-	-
Phenols	ug/L	NS	SQ	50%SQ	NS	<10	<10	<10	-	-	-	-
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	<10	<10	<10	-	-	-	-
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	91	93	170	-	-	-	-
Chlorophyll A	ug/L	NS	15	15	10	<5	14	<5	-	-	-	-
Oil and Grease	mg/L	NS	NS	NS	NS	7	8	6	-	-	-	-
Total PAH's	ug/L	NS	NS	NS	NS	<1	<1	<1	-	-	-	-
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	-	-	-	-	-	-	-

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined do not achieve the long term water quality goal.
4. Figures in italics do not achieve the medium-term water quality goal.
5. Figures in bold do not achieve the short term goal
6. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), SH – Too shallow to take readings with equipment

Table 9 – Seventh Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	8/7/04 Dry			8/7/04 Dry (Physical Only)			
						WSP13US	WSP13DS	WSP13IS	WQCP1 IN	WQCP1 OUT	WQCP2 IN	WQCP2 OUT
Total rain over 5 days preceding sampling	mm					0	0	0	0	0	0	0
Ammonia - N	mg/L	NS	<2.3	<0.3	<0.3	0.3	0.07	<0.01	-	-	-	-
Total Nitrogen	mg/L	<1.6	SQ	<1.6	1.0	0.7	1.0	*5.2*	-	-	-	-
Nitrate	mg/L	NS	NS	NS	NS	<0.01	<0.01	4.99	-	-	-	-
Nitrite	mg/L	NS	NS	NS	NS	<0.01	<0.01	0.04	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.7	1.0	<0.1	-	-	-	-
Filterable Phosphorous	mg/L	NS	NS	NS	NS				-	-	-	-
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	<0.01	0.01	<0.01	-	-	-	-
Total Phosphorous	mg/L	<0.1	SQ	<0.1	0.04	0.06	*0.11*	0.03	-	-	-	-
Suspended Solids	mg/L	<100	SQ	<20	<6	7	12	2	-	-	-	-
Turbidity (field)	NTU	NS	SQ	50	20	*74*	*70*	SH	21	25	10	30
Faecal Coliforms	cfu/100ml	<150	<1000	<150	<150	40	50	*160*	-	-	-	-
pH	pH unit	NS	6.6-8	6.6-8	6.6-8	7.2	6.8	SH	7.02	6.80	6.48	6.47
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% sat	1.17	1.32	SH	5.02.	5.15	6.24	7.21
Temperature (field)	°C	NS	SQ	SQ	SQ	10.2	10.3	SH	20.1	21.5	20.4	22.1
Conductivity	ms/cm	NS	NS	NS	NS	0.234	0.277	SH	0.121	0.102	0.122	0.135
Salinity (%)		NS	NS	NS	NS	0.00	0.01	SH	0	0	0	0
Arsenic	ug/L	NS	SQ	50%SQ	50	<2	<2	<2	-	-	-	-
Chromium	ug/L	NS	SQ	50%SQ	10	<5	<5	<5	-	-	-	-
Copper	ug/L	NS	SQ	50%SQ	2	<2	<2	<2	-	-	-	-
Lead	ug/L	NS	SQ	50%SQ	1	<1	<1	6	-	-	-	-
Mercury	ug/L	NS	SQ	50%SQ	0.1	<0.05	<0.05	<0.05	-	-	-	-
Zinc	ug/L	NS	SQ	50%SQ	50	<10	<10	<10	-	-	-	-
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	<1	<1	<1	-	-	-	-
Phenols	ug/L	NS	SQ	50%SQ	NS	<10	<10	<10	-	-	-	-
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	<10	<10	<10	-	-	-	-
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	57	85	140	-	-	-	-
Chlorophyll A	ug/L	NS	15	15	10	<5	<5	<5	-	-	-	-
Oil and Grease	mg/L	NS	NS	NS	NS	<5	<5	<5	-	-	-	-
Total PAH's	ug/L	NS	NS	NS	NS	<1	<1	<1	-	-	-	-
ALGAL ID/Count	Cells/mL	NS	NS	NS	NS	-	-	-	-	-	-	-

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined do not achieve the long term water quality goal.
4. Figures in italics do not achieve the medium-term water quality goal.
5. Figures in bold do not achieve the short term goal
6. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), SH – Too shallow to take readings with equipment

Table 10 – Eighth Quarter Water Quality Monitoring Results

Parameter	Units	During Const.	Short-Term Goal	Medium-Term Goal	Long-Term Goal	16/08/04 – Wet Weather Rising Limb							17/08/04 – Wet Weather Falling Limb							18/10/04 Dry		
						WSP14US	WSP14DS	WSP14IS	WSP14WQCP1IN	WSP14WQCP1OUT	WSP14WQCP2IN	WSP14WQCP2OUT	WSP15US	WSP15DS	WSP15IS	WSP15WQCP1IN	WSP15WQCP1OUT	WSP15WQCP2IN	WSP15WQCP2OUT	WSP16US	WSP16DS	WSP16IS
						14.4	14.4	14.4	14.4	14.4	14.4	14.4	48.6	48.6	48.6	48.6	48.6	48.6	48.6	33.2	33.2	33.2
Total rain over 5 days preceding sampling	mm					<0.01	0.08	0.04	*1.06*	0.22	<0.01	<0.01	0.03	0.01	*0.89*	0.13	*1.02*	0.01	<0.01	0.1	0.06	*0.12*
Ammonia - N	mg/L	NS	2.3	0.3	0.3	0.7	1	3	*2.6*	1.4	1	0.5	*1.8*	1.2	*2.6*	1.2	*2*	1.6	1	*2.2*	1.4	*2.0*
Total Nitrogen	mg/L	1.6	SQ	1.6	1.0	0.19	0.26	2.17	0.15	0.36	0.3	<0.01	0.73	0.33	0.67	0.16	0.18	0.51	0.2	0.85	0.36	1.06
Nitrate	mg/L	NS	NS	NS	NS	0.01	0.01	0.04	0.03	0.02	0.01	<0.01	0.02	0.01	0.03	0.02	0.02	0.01	<0.01	0.03	0.02	0.03
Nitrite	mg/L	NS	NS	NS	NS	0.5	0.7	0.9	2.6	1	0.8	0.5	1.2	0.8	1.8	1.2	1.8	1	0.8	1.2	1.0	1.0
Total Kjeldahl Nitrogen	mg/L	NS	NS	NS	NS	0.04	0.09	0.05	0.27	0.15	0.21	<0.01	0.15	0.05	0.29	0.3	0.29	0.16	0.22	0.13	0.02	0.07
Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.03	0.02	0.37	0.2	0.04	0.15	<0.01	0.67	0.21	0.18	0.42	0.15	0.23	0.16	0.11	0.1	0.15
Non-Filterable Phosphorous	mg/L	NS	NS	NS	NS	0.07	*0.11*	*0.42*	*0.47*	*0.19*	*0.36*	<0.01	*0.82*	*0.26*	*0.47*	*0.72*	*0.44*	*0.39*	*0.38*	*0.24*	*0.12*	*0.22*
Total Phosphorous	mg/L	0.1	SQ	0.1	0.04	9	10	*62*	*58*	*20*	*80*	11	*20*	17	*110*	*72*	*33*	*79*	*84*	9	5	*30*
Suspended Solids	mg/L	100	SQ	20	6	29	36	SH	*239*	47	*405*	32	*113*	42	SH	*340*	*255*	*198*	*372*	*53*	13	SH
Turbidity (field)	NTU	NS	SQ	50	20	2700	2100	2200	1200	*310*	1900	<10	6900	2600	1500	1500	1000	1900	3500	7900	1300	8400
Faecal Coliforms	cfu/100ml	150	1000	150	150	7.76	7.45	SH	7.85	8.56	7.92	8.07	7.66	6.64	SH	7.34	6.89	7.50	7.64	7.97	6.92	SH
pH (field)	pH unit	NS	6.6-8	6.6-8	6.6-8	7.88	5.07	SH	6.70	4.57	7.86	9.00	8.21	6.08	SH	7.71	5.56	7.35	7.99	6.64	3.83	SH
Dissolved Oxygen (field)	mg/L	NS	SQ	<90% sat.	<90% sat.	12.2	12.3	SH	15.4	12.3	13.9	14.8	11.4	11.4	SH	11.9	11.8	12.5	11.9	15.5	15.5	SH
Temperature (field)	°C	NS	SQ	SQ	SQ	0.185	0.158	SH	0.096	0.166	0.186	0.187	0.159	0.159	SH	0.095	0.096	0.150	0.071	0.221	0.209	SH
Conductivity (field)	ms/cm	NS	NS	NS	NS	0	0	SH	0	0	0	0	0	0	SH	0	0	0	0	0	0	SH
Salinity (field)	%	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<2	<2	<2
Arsenic	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<5	<5	<5
Chromium	ug/L	NS	SQ	50%SQ	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<2	<2	6
Copper	ug/L	NS	SQ	50%SQ	2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Lead	ug/L	NS	SQ	50%SQ	1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.05	<0.05	<0.05
Mercury	ug/L	NS	SQ	50%SQ	0.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	10	10	40
Zinc	ug/L	NS	SQ	50%SQ	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Organo chlorine Pesticides (OC)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<50	<50	<50
Phenols	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<10	<10	<10
Organo phosphate Pesticides (OP)	ug/L	NS	SQ	50%SQ	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	68	62	80
Hardness (CaCO3)	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<0.005	<0.005	0.005
Chlorophyll A	mg/L	NS	15	15	10	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<5	<5	<5
Oil and Grease	mg/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	<1	<1	<1
Total PAH's	ug/L	NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0	Very low	Very Low
ALGAL ID		NS	NS	NS	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR			

1. Long-Term water quality goals are derived from ANZECC, 1992 guidelines and Councils WMS Table C2 – Feb 2001.
2. Figures in normal case satisfy any short, medium and long-term water quality goals.
3. Figures underlined do not achieve the long term water quality goal.
4. Figures in italics do not achieve the medium-term water quality goal.
5. Figures in Bold do not achieve the short term goal
6. Rainfall for Nov and Dec 2003 is from the Ingleside Rainfall Station, whilst Jan 04 is from Newport Bowling Club.
7. NS – Not Specified by Council, SQ – Status Quo, TF – To be forwarded when available (not available at time of report publication), <PQL = Less than practical quantitation limit, SH – Too Shallow to take readings with equipment, NR=Not required by specification in wet weather

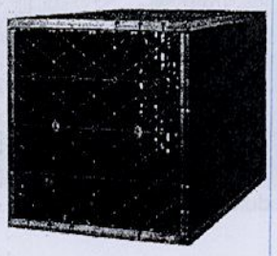
APPENDIX D – ATLANTIS CELLS

Water Management for Life

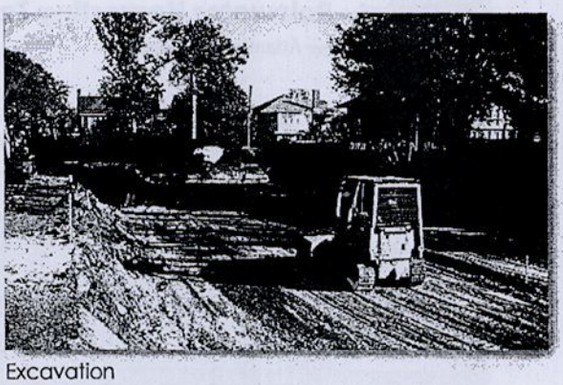
Modular Undeground Tank System

Infiltration • Detention • Rainwater Harvesting

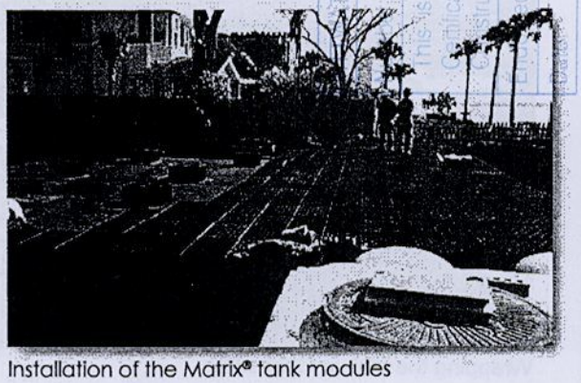
The Atlantis underground tank system is a modular sub surface system that can be constructed to hold any volume required. The sub surface location of the tank frees up space for landscaping or driveway use while also ensuring optimal conditions for retaining water is always maintained. All macro and micro pollutants are completely kept out of the system through an Atlantis Filtration Unit.



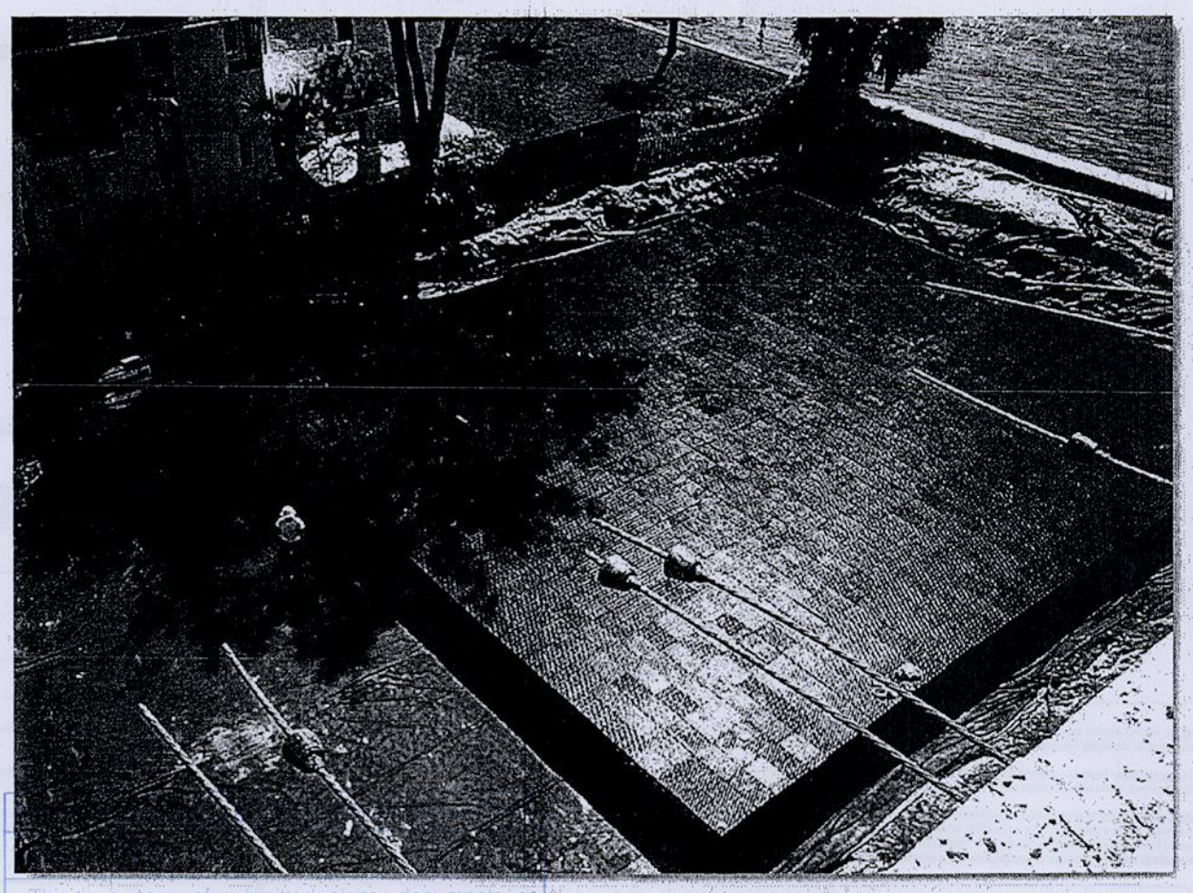
Matrix® tank module



Excavation



Installation of the Matrix® tank modules



Atlantis Water Management

Atlantis® Water Management for Life

Atlantis® Filtration Unit

*Pre filters stormwater **"at source"** allowing clean water to enter the **Atlantis®** Rainwater Tank system...*

The Atlantis® Filtration Unit
The Atlantis Filtration Unit is a pre-filter system specifically designed to capture gross pollutants, dissolved solids and silt from roofs and stormwater surface pits allowing clean water to enter the Atlantis Rainwater Tank system.

How it Works!
The unit features a removable trash screen for easy cleaning, which ensures litter free water enters the tank system.

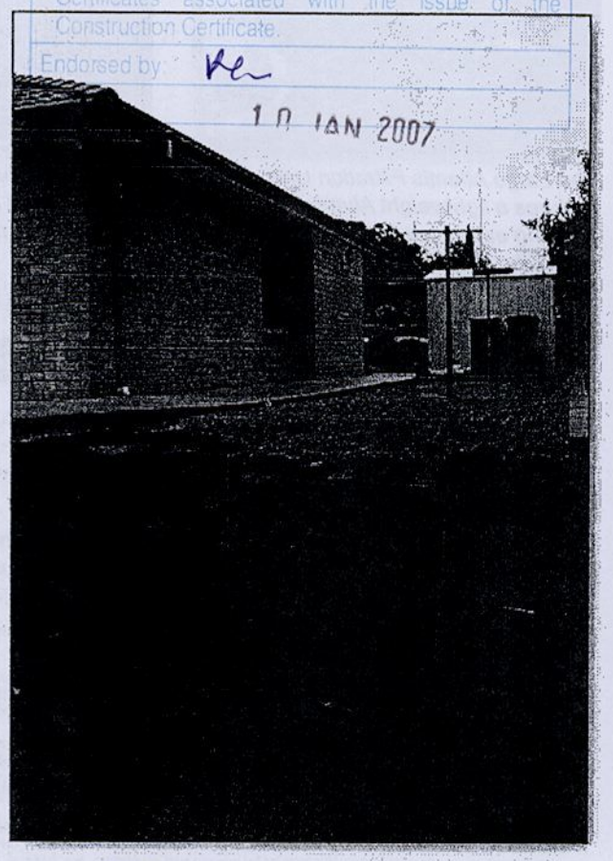
The unit also contains a filtration system that bio-remediates soluble stormwater contaminants. This filtration chamber provides primary macro and secondary biological water remediation. The unit delivers decontaminated water to the Atlantis Rainwater Tank System where tertiary remediation occurs continuously.

Easy to Use!
The Atlantis Filtration Unit is user friendly, easy to install and provides years of trouble free service requiring low maintenance.

Benefits:

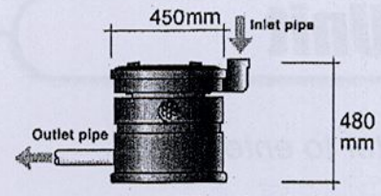
- Filters stormwater *"at source"*
- Easy installation
- User friendly maintenance

Installation of Atlantis Filtration Unit in Warriewood Sub-Division, Sydney NSW.

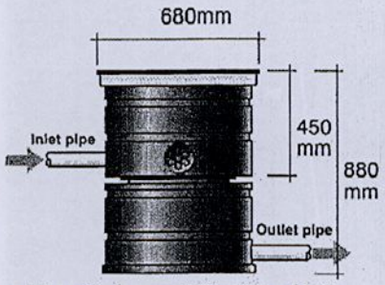


*An **Atlantis®** Filtration Unit installed into the garden area.*

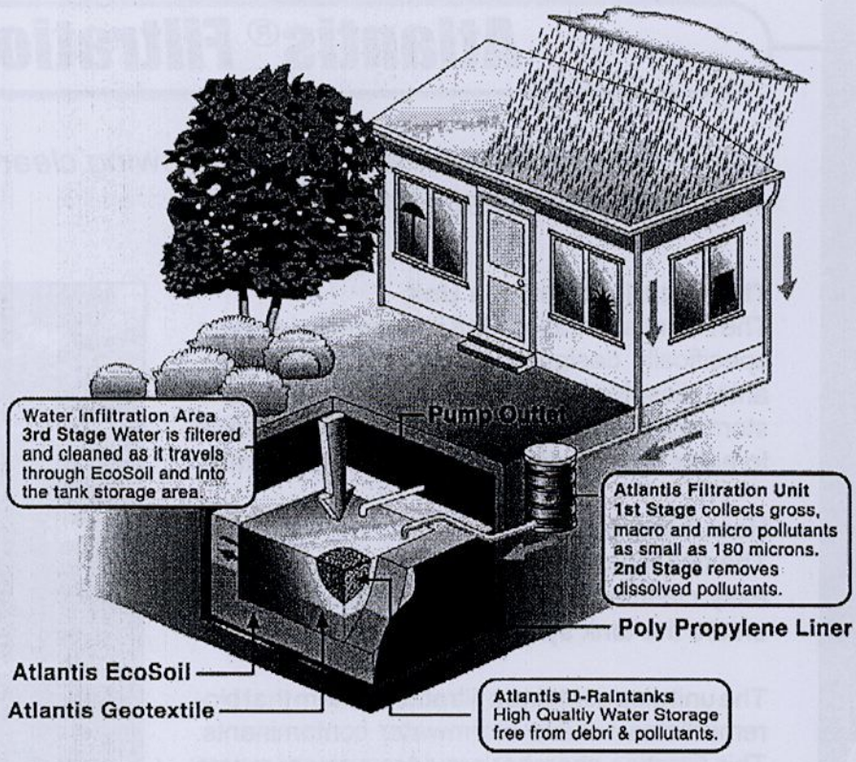
www.atlantiscorp.com.au



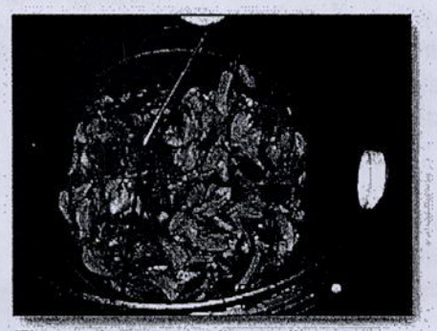
Atlantis Small Filtration Unit



Atlantis Large Filtration Unit



The Large Atlantis Filtration Unit features a lightweight Aluminium lid allowing easy access and long life durability.



The trash screen collects all gross pollutants and micro pollutants as small as 180 microns.

The removable trash screen features a long handle for easy maintenance.

Atlantis® Filtration Units

Item No.	Description	Picture
60002	**Small Filtration Unit** (Single down Pipe) Suitable for single pipe applications of 12 l/sec. Size (W)480mm x (H)450mm	
60003	**Large Filtration Unit** (Multiple down Pipes) Suitable for flow situations of 20 l/sec. (150mm outlet pipe). Size (W)680mm x (H)880mm	

Note: *The Atlantis® **Matrix®** Tank Modules are manufactured from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.*
Safety Factors: *Engineers, designers and geotechnical engineers should design and calculate safety factors to serviceable limited state to suit specific project. In case of doubt, consult your nearest distributor or Atlantis.*
Disclaimer: *All information provided in this publication is correct to the best of the Company's Knowledge and is given out in Good Faith. This information is intended only as a general guide, no responsibility can be accepted for any errors, omissions or incorrect assumption. As each project is unique, and as Rebirth Pty Ltd, Atlantis Water Management, Atlantis Corporation Pty Ltd and its Distributors and Agents World Wide have no direct control over the methods employed by the User in Specifying, Installing or Supervising of its products hence no Responsibility is accepted by Rebirth Pty Ltd, Atlantis Water Management, Atlantis Corporation Pty Ltd and its Distributors and Agents World Wide. Users should satisfy themselves as to the suitability of the product for their purpose.*

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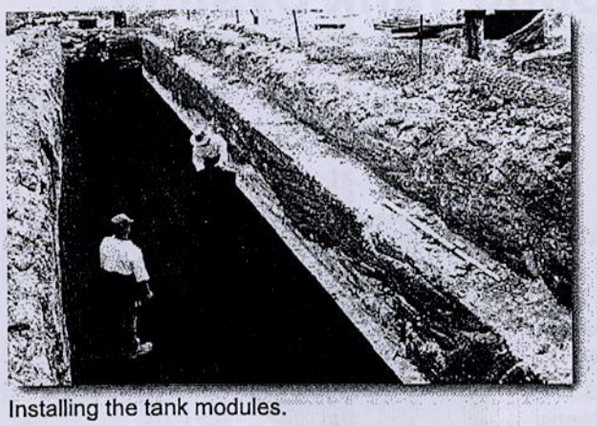
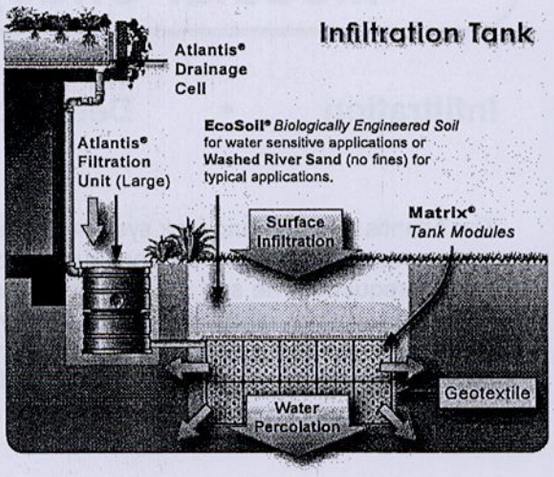
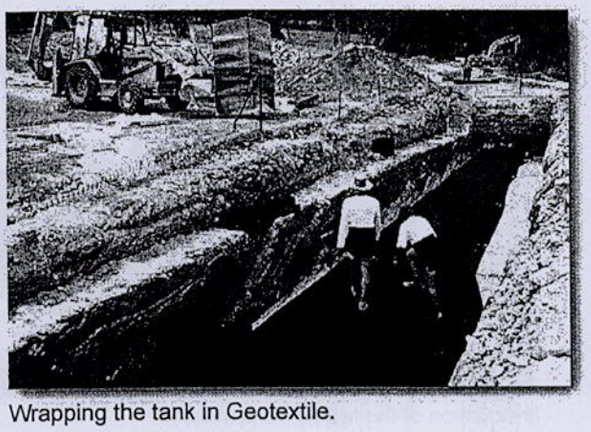
Atlantis Water Management

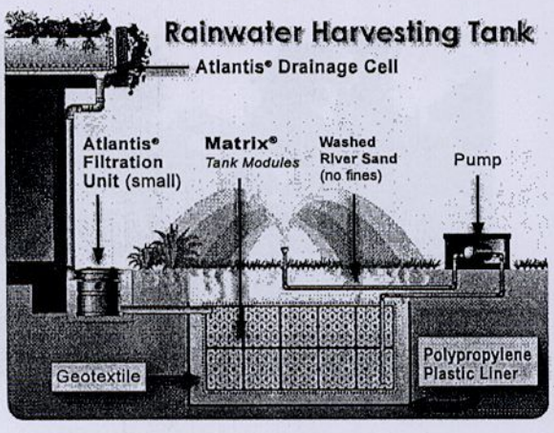


Installing the tank modules.

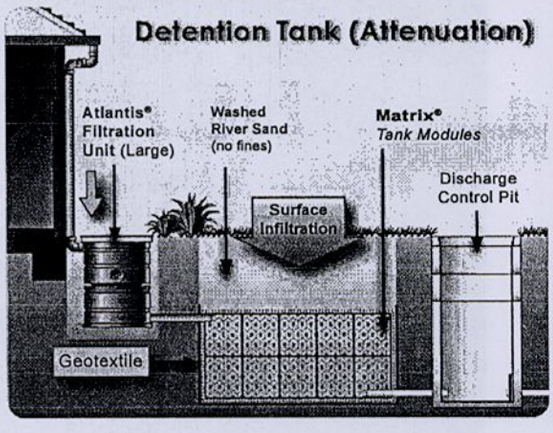




Wrapping the tank in Geotextile.



The completed tank covered with free draining material.



Part No	Size in mm	Units per /m³	Strength	Flow Rate
70003	(L)685 x (H)450 x (W)408	8 boxes /m³	26.8 t / m²	2280 l /min
70004	(L)685 x (H)880 x (W)408	4.06 boxes /m³	26.8 t / m²	4560 l /min
70005	(L)685 x (H)1310 x (W)408	2.73 boxes /m³	26.8 t / m²	6840 l /min

(L) Length, (H) Height, (W) Width

Note: Atlantis® products are manufactured from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.

Safety Factors: Engineers, designers and geotechnical engineers should design and calculate safety factors to a serviceable limited state to suit specific project. In case of doubt, consult your nearest distributor or Atlantis representative.

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