VIC LILLI
&PARTNERS

Our Ref: J100147

6 April 2010

Manly Council
DX 9205
MANLY

MANLY COUNCIL
REGISTERED BY RECORDS
9 APR 2010
RESPONSIBLE OFFICER
DOCUMENT NUMBER

Attention: Customer Service

Dear Sir/Madam,

Subject: **Construction Certificate J100147**
Development Consent Permit 107/08
22 Montpelier Place Manly

Reference is made to the application for a Construction Certificate in respect of the above property. In that regard we confirm that a Construction Certificate No J100147 was issued on 6 April 2010 pursuant to Development Consent 107/08.

Please find enclosed a copy of the Construction Certificate issued including all documentation assessed in the determination of the application.

You are advised the Construction Certificate attached is only for Bulk Excavation works only. This Construction Certificate excludes the following items,

a) The Home Owners Warranty - The bulk excavation is being carried out by a Civil Contractor under the direction of Lend Lease. The detailed excavation and the building works will be carried out once a licensed builder has been appointed and home owners warranty will be gained prior to the release of the next Construction Certificate.

b) The Notice to Commence Building Works and Appointment of Principal Certifying Authority will be issued once a builder has been has been appointed and prior to the release of the next Construction Certificate.

Also please find enclosed a cheque for $30.00 being the registration fee for the above. It would be appreciated if a receipt in this regard could be forwarded to our firm as soon as possible.

6/4/4

Should you require any further information please contact the undersigned.

Yours faithfully,

Paul Ladogna
for **Vic Lilli & Partners**

Cc: Lend Lease Development Pty Ltd
Level 4, 30 The Bond, 30 Hickson Road
MILLERS POINT NSW 2000

CERTIFIER

$30

R. 684485

9-4-10

Encl.

Our Ref: J100147

6 April 2010

VIC LILLI
&PARTNERS

Lend Lease Development Pty Ltd
Level 4, 30 The Bond, 30 Hickson Road
MILLERS POINT NSW 2000

Attention: Peter Nash

Dear Peter,

Subject: **Construction Certificate J100147**
Development Consent Permit 107/08
22 Montpelier Place Manly

We refer to our engagement in respect of the above and enclose the Construction Certificate for such works.

Mandatory inspection of works

The Environmental Planning and Assessment Act 1979 require that the inspections detailed below, known as Critical Stage Inspections, be carried out by the Principal Certifying Authority (PCA).

The provision of certificates in lieu of mandatory inspections (i.e. Engineer's or waterproofing certificates) is not acceptable at any time.

It is necessary for the following inspections to be carried out in relation to the proposed works.

Class 1 & 10 buildings

- After excavation for, and prior to the placement of, any footings, and
- Prior to pouring any in-situ reinforced concrete building element, and
- Prior to covering of the framework for any floor, wall, roof or other building element, and
- Prior to covering waterproofing in any wet areas, and
- Prior to covering stormwater drainage connections, and
- in the case of a swimming pool, after the construction of the swimming pool is completed and the barrier (if one is required under the *Swimming Pools Act 1992*) has been erected and before the pool is filled with water

After the building work has been completed and prior to any occupation certificate being issued in relation to the buildings.

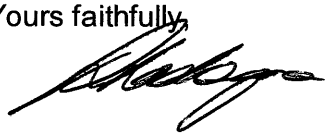
VIC LILLI
&PARTNERS

Builder to Arrange Critical Stage Inspections

The Principal Contractor for the building site is responsible for ensuring that the Principal Certifying Authority is given notice of at least **at least 48 hours** if a Critical Stage Inspection is required.

Should you require any further information please contact the undersigned.

Yours faithfully,



Paul Ladogna
for **Vic Lilli & Partners**

Encl.

VIC LILLI & PARTNERS - Accredited Building Certifiers

T 02 9715 2555 **E** info@viclilli.com.au Locked Bag 3013 Burwood NSW 1805. DX 8505
F 02 9715 2333 **W** www.viclilli.com.au Suite 1. Level 5. 56 Railway Parade Burwood NSW 2134
A division of Mondan Management Pty Ltd ABN 40 119 432 094

VIC LILLI
&PARTNERS

CONSTRUCTION CERTIFICATE NO. J100147

FOR

LEND LEASE DEVELOPMENT PTY LTD

PREMISES

22 MONTPELIER PLACE MANLY

Date: 6 APRIL 2010

Ref: J100147

CONSTRUCTION CERTIFICATE No J100147

CONSTRUCTION CERTIFICATE

Issued under the Environmental Planning and Assessment Act 1979
Section 109C(1), 81A(2) AND 81a(4)

VIC LILLI &PARTNERS

Property to which this certificate relates

Address 22 Montpelier Place Manly NSW 2095
Lot No 22 DP/SP 1105469

Applicant

Name Lend Lease Development Pty Ltd
Address Level 4, 30 The Bond, 30 Hickson Road Millers Point NSW 2000

Description of Development

This certificate is limited to the bulk excavation works only, associated with the construction of the dwelling house, basement parking and swimming pool as approved pursuant to Development Consent 107/08 issued by Manly Council on 4 August 2008.

Consent details

Development Consent No 107/08
Date of determination 4 August 2008
Consent authority Manly Council

Building classification **1a & 10b**

Certification

I ***Paul Ladogna*** certify that work completed in accordance with the documentation contained in the annexures (with such modifications verified by me as may be shown on the documentation) will comply with the requirements of the Environmental Planning & Assessment Regulation 2000 as referred to in Section 81A(5) of the Environmental Planning & Assessment Act 1979.

Certificate Number J100147

Date of endorsement 6 April 2010

Signature
Accredited Certifier *Paul Ladogna*
Accredited Body Building Professionals Board
Registration No *BPB0219*

VIC LILLI & PARTNERS - Accredited Building Certifiers
T 02 9715 2555
F 02 9715 2333
E info@viclilli.com.au
W www.viclilli.com.au
Locked Bag 3013 Burwood NSW 1805. DX 8505
Suite 1. Level 5. 56 Railway Parade Burwood NSW 2134

CONSTRUCTION CERTIFICATE No J100147

VIC LIL
&PARTN

Documentation assessed in the determination of Construction Certificate Application J100147

Annexure 1 - Plans and Specification that form part of Construction Certificate 1 page

Annexure 2 – Supporting Documentation

Construction Certificate Application
Construction Certificate Application 4 pages

Other Supporting Documentation
Insurance Details
Miller & Associates
Dated 8 December 2008 2 pages

Planning Agreement
Manly Council
Dated 15 December 2006 17 pages

Geotechnical Report
Douglas Partners
Dated November 1999 41 pages

Translocation Plan
Total Earth Care Pty Ltd
Dated November 2006 71 pages

Construction Environmental Management Plan
HLA- Envirosciences Pty ltd
Dated 5 April 2007 82 pages

Evidence of payment of Council Fees
Long service levy payment
Council Security Deposits and Contributions 2 pages

VIC LILLI
&PARTNERS

ANNEXURE 1

Plans and Specification that form part of Construction Certificate

VIC LILL &PARTNERS

PLANS AND SPECIFICATION THAT FORM PART OF THIS CERTIFICATE:

Bulk Excavation documentation & specification as prepared by **Hughes Trueman Consulting Engineers Planners & Managers**

Drawing No.	Revision	Title	Date
C200	0	Bulk Earthworks Plan	26.03.10

Erosion and Sediment Control documentation & specification as prepared by **Hughes Trueman Consulting Engineers Planners & Managers**

Drawing No.	Revision	Title	Date
DAC40	B	Erosion and Sediment Concept Control Plan, Notes and Details	16.12.07

Driveway Sections documentation & specification as prepared by **Hughes Trueman Consulting Engineers Planners & Managers**

Drawing No.	Revision	Title	Date
DAC41	A	Driveway Plan and Long Section Lots 22	14.03.08

VIC LILLI
&PARTNERS

ANNEXURE 2

Supporting Documentation

CONSTRUCTION CERTIFICATE APPLICATION FORM

RECEIVED
01 APR 2010
BY:

VIC LILLI &PARTNERS

In accordance with Clause 139, Part 8, Division 2 of the Environmental Planning and Assessment Regulation 2000

I/we hereby make application to Vic Lilli & Partners for a Construction Certificate relating to the following:

Description of property to which this application relates

Address: 22 Montpelier Place
MANLY, NSW 2095

Title details: Lot No./s 22 DP 1105469

Applicant

Applicant Name: Lend Lease Development Pty Ltd

Address: Level 4, 30 The Bond, 30 Hickson Road
MILLERS POINT, NSW 2000

Contact Numbers: Phone 9236 6111 Fax 9383 8259
E-mail Peter.nash@lendlease.com.au Mobile 0421 572 289

Owner

Owner Name: Trustees of the Roman Catholic Church for the Archdiocese of Sydney

Address: Level 16, Polding Centre, 133 Liverpool St
SYDNEY NSW 2000

Contact Numbers: Phone 02 9390 5186 Fax 02 9261 8312
E-mail Michael@ado.syd.catholic.org.au Mobile 0408 975 139

Description of Development

Construction of a two (2) storey dwelling with basement parking and swimming pool (This Construction Certificate applies for Bulk Excavation works only)

BCA Classification 1a & 10b

Consent Details

Development Consent No. 107/08 Date of Determination 4/8/08

Consent Authority: Manly Council

Value of Building Works $1,200,000.00

VIC LILLI & PARTNERS - Accredited Building Certifiers
T 02 9715 2555 E info@viclilli.com.au Locked Bag 3013 Burwood NSW 1805. DX 8505
F 02 9715 2333 W www.viclilli.com.au Suite 1. Level 5. 56 Railway Parade Burwood NSW 2134
A division of Mondan Management Pty Ltd ABN 60 119 432 094

CONSTRUCTION CERTIFICATE APPLICATION FORM

VIC LILLI &PARTNERS

In accordance with Clause 139, Part 8, Division 2 of the Environmental Planning and Assessment Regulation 2000

Builder Details

Builders Name	Ford Civil Contracting Pty Ltd			
Address	9 Hattersley Street ARNCLIFFE, NSW 2205			
Contact numbers	Phone	02 9597 4122	Fax	02 9597 4966
	E-mail	mmoult@fordcivil.com.au	Mobile	0416 133 939

As owner(s) of the land to which the application relates, I/we consent to the making of this application. I/we also give consent for officers/certifiers of Vic Lilli & Partners to enter the land to carry out inspections relating to this application. We confirm that building works have not commenced upon the subject site.

SECRETARY OF THE TRUSTEES ARCHDIOCESE OF SYDNEY THE ROMAN CATHOLIC CHURCH

Owner's Signature 1/4/10 **Date**

Trustees of the Roman Catholic Church for the Archdiocese of Sydney
Owner's Name

If signed on behalf of a Body Corporate or company, the common seal must be stamped on this section where appropriate.

SIGNED BY THE APPLICANT

I apply for approval to carry out the development or works described in this application. I declare that all information I have provided is true and correct.

Applicant's Signature 31/3/10 **Date**

Andrew Tobin - Lend Lease Development
Applicant's Name

CONSTRUCTION CERTIFICATE APPLICATION FORM

VIC LILLI & PARTNERS

In accordance with Clause 139, Part 8, Division 2 of the Environmental Planning and Assessment Regulation 2000

The following Schedule is required to be completed for the purposes of providing information to the Australian Bureau of Statistics – Residential Use Only.

PART A

Particulars of development

Area of land	501.5sqm	Gross floor area of building	214sqm

Current use of all or parts of the building (s)/land (if vacant state 'vacant')?

Location	Use VACANT
•	•
•	•
Does the site contain a dual occupancy?	
Gross floor area of addition of new building?	

What are the proposed uses of all parts of the building(s)/land?

Location	**Use** RESIDENTIAL
•	•
•	•
No. of pre-existing dwellings	-
No. of dwellings to be demolished	-
How many dwellings are proposed?	1
How many storeys will the building consist of?	2

PART B

Materials to be used - (place a tick in the ( ) which best describes the materials the new work will be constructed of).

Walls		**Code**	**Roof**		**Code**
Brick veneer	( )	12	Aluminium	( )	70
Full brick	✓	11	Concrete	( )	20
Single brick	( )	11	Concrete tiles	( )	10
Concrete block	( )	11	Fibrous cement	( )	30
Concrete/masonry	( )	20	Fibreglass	( )	80
Concrete	( )	20	Masonry/terra cotta shingle tile	( )	10
Steel	( )	60	Slate	( )	20
Fibrous cement	( )	30	Steel	✓	60
Hardiplank	( )	30	Terra cotta tile	( )	10
Timber/weatherboard	( )	40	Other	( )	80
Cladding-aluminium	( )	70	Unknown	( )	90
Curtin glass	( )	50			
Other	( )	80			
Unknown	( )	90			
Floor			**Frame**		
Concrete	✓	20	Timber	( )	40

CONSTRUCTION CERTIFICATE APPLICATION FORM

VIC LILLI &PARTNERS

In accordance with Clause 139, Part 8, Division 2 of the Environmental Planning and Assessment Regulation 2000

Timber	( )	10	Steel	✓	60
Other	( )	80	Other	( )	80
Unknown	( )	90	Unknown	( )	90

Miller & Associates
Insurance Broking Pty Limited
ABN 57 089 245 465

Level 16, 383 Kent Street
Sydney
NSW 2000
Telephone: (02) 9262 5555
Facsimile: (02) 9262 2811

TO WHOM IT MAY CONCERN

CONFIRMATION OF INSURANCE

This document serves to confirm the currency of the insurance detailed below and confers no rights upon the holder: It does not amend, extend or alter the coverage afforded by the policy listed below.

INSURED	Ford Civil Contracting Pty Limited, FCC Holdings Pty Limited and all subsidiary and/or related companies plus others as defined within the Policy.
POLICY TYPE	Third Party Public & Products Liability
POLICY NO	08GCOM0417
INSURER	Lloyds of London
PERIOD	From 30 November 2008 at 4.00pm AEST To 31 May 2010 at 4.00pm AEST
SUM INSURED	Public Liability: $20,000,000 any one occurrence/unlimited in the aggregate and Products Liability: $20,000,000 any one occurrence and in the aggregate.
SITUATION	Anywhere in Australia
SIGNED	Maverardo
DATED	8 December 2008

An independent company working in association with Miller

This confirmation provides a summary of the policy cover and is not intended to amend, replace or override the policy terms and conditions contained in the actual policy document. This certificate is issued as a matter of information only and confers no rights upon the certificate holder.

CERTIFICATE OF CURRENCY

FORD CIVIL CONTRACTING PTY LTD
PO Box 26
ARNCLIFFE NSW 2205

Dear Sir/Madam,

1. STATEMENT OF COVERAGE

The following policy of insurance covers the full amount of the employer's liability under the Workers Compensation Act 1987.

This Certificate is valid from 6/7/2009 to 30/6/2010.

The information provided in this Certificate of Currency is correct at: 06/07/2009.

2. EMPLOYERS INFORMATION

POLICY NUMBER WGB020720346122

LEGAL NAME FORD CIVIL CONTRACTING PTY LTD

TRADING NAME

ABN 24002542814

ACN/ARBN 002542814

WorkCover Industry Classification Number (WIC)	Industry	Numbers of Workers*	Wages**
412100	Road and Bridge Construction	73	$6,540,000.00

* Number of workers includes contractors/deemed workers
**Total wages estimated for the current period

3. IMPORTANT INFORMATION

Principals relying on this certificate should ensure it is accompanied by a statement under section 175B of the Workers Compensation Act 1987. Principals should also check and satisfy themselves that the information is correct and ensure that the proper workers compensation insurance is in place, ie. compare the number of employees on site to the average number of employees estimated; ensure that the wages are reasonable to cover the labour component of the work being performed; and confirm that the description of the industry/industries noted is appropriate.

A principal contractor may become liable for an outstanding premium of the sub contractor if the principal has failed to obtain a statement or has accepted a statement where there was reason to believe it was false.

Yours Faithfully

LESLIE MCGREGOR

NSW WorkCover Scheme

CGU Workers Compensation (NSW) Ltd – Agent for the NSW WorkCover Scheme
ABN 83 564 379 108/007
Phone: 1300 666 506 Fax: 1800 240 387

Manly Council

MPa Section 94 Contributions

Council Offices
1 Belgrave Street
Manly NSW 2095

Correspondence to
General Manager
PO Box 82
Manly NSW 1655

DX 9205 Manly

Telephone 02 9976 1500
Facsimile 02 9976 1400

www.manly.nsw.gov.au
records@manly.nsw.gov.au

ABN 43 662 868 065

Reference: 151206 EA:LB
Enquiries: Environmental Services

David Rolls
Lend Lease Development
The Bond
30 Hickson Road
MILLERS POINT NSW 2000

Dear Sir,

RE: St Patrick's Estate Planning Agreement

I refer to your letter of 13 December, 2006, requesting Council execute the Sec 93F Planning Agreement for the St Patrick's Estate, Darley Road, Manly. Attached is a copy of the Agreement executed as requested.

The signing of the Agreement by Lend Lease and the Council results in all of the contributions required to be made towards the provision of public facilities and services being governed by the terms of the agreement in respect of the development of Precincts 1, 3, 5, 6, 10, 12 & 13 of the St Patrick's Estate. The Agreement takes the place of any contribution which might be sought under Council Sec 94 Contributions Plan 2004 for those Precincts.

As a consequence of the above where Council imposed a condition requiring the payment of a Sec 94 Contribution in consents for development within those precincts, it can be taken that the S93F Planning Agreement will satisfy that condition. This applies to the following Applications

(i) Precincts 1 & 13 – DA277/04, DA278/04, DA279/04, DA280/04, DA 281/04, DA 282/04, DA283/04, DA284/04,
(ii) Precincts 3 & 12 – DA 62/04.

The development of Precincts 5, 6, and 10 is governed by condition No 296 of the consent to DA482/04 which directly refers to the Planning Agreement.

Council suggests that a copy of this letter be provided to the PCA for the above consents in order to ensure that it is clear to all parties the manner in which the obligations of Lend Lease Development P/L to contribute to the provision of public services and facilities will be met.

Yours faithfully,

Date: 15.12.06.

4/9/07
Actions:
Pay $143,636 Tue 08 and apply for refund of BG.

Stephen Clements
Executive Manager
Environmental Services

MAKINSON & d'APICE

LAWYERS

Planning Agreement

MANLY COUNCIL
(Council)

LEND LEASE DEVELOPMENT PTY LIMITED
(LLD)

MAKINSON & d'APICE
Level 12
135 King Street
SYDNEY NSW 2000

DX: 296 SYDNEY
Tel: (02) 9233 7788
Fax: (02) 9233 1550
Email: mail@makdap.com.au
Ref: WDA:50530

Version 7
22138_7:WDA:WDA

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THIS AGREEMENT dated 2006

PARTIES

MANLY COUNCIL ABN 43 662 868 065 of 1 Belgrave Street, Manly NSW 2095 **(Council)**

LEND LEASE DEVELOPMENT PTY LIMITED ABN 33 000 311 277 of 30 The Bond, 30 Hickson Road, Millers Point NSW 2000 **(LLD)**

INTRODUCTION

A. St Patricks Estate has been the subject of various development proposals since the mid 1980s.

B. LLD has made and will make Development Applications to the Council for Development Consent to carry out the Development on St Patrick's Estate.

C. Development Consent has been granted in respect of Development on some precincts but Development Applications have yet to be lodged and Development Consent is yet to issue in respect of Development on other Precincts or part of Precincts.

D. Development Consent has been granted for the Precinct 2 Development. The Precinct 2 Development has been completed and there are no further Development Contributions required in respect of that Development.

E. Council adopted the Contributions Plan in 2005.

F. LLD offered to enter into this Agreement to make Development Contributions to Council upon the terms of this Agreement.

OPERATIVE PROVISIONS

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

In this document, unless otherwise indicated by the context:

Act means the *Environmental Planning and Assessment Act* 1979 (NSW).

Agreed Value means that this value is agreed between the parties and is not subject to proof of value or expenditure.

Business Day means a day on which banks are open for business in Sydney.

Cerretti Precinct means Precincts 3 and 12.

College Street Oval means the area hatched as view corridor in Sheet 4 of 5 of Amendment No. 24 to the LEP.

Contributions Plan means the Manly Section 94 Contributions Plan effective from 16 April 2005.

15

Development means and includes the following proposed development upon the following Precincts:

(a) Cerretti Precinct: 60 apartments;

(b) Montpelier Precinct: 26 dwellinghouses; and

(c) Spring Cove Precinct: 22 dwellinghouses and 16 apartments.

Development Application has the same meaning as in the Act.

Development Consent has the same meaning as in the Act.

Development Contribution means a monetary contribution, the dedication of land free of cost or the provision of a material public benefit.

Development Precinct means Cerretti Precinct, Montpelier Precinct and/or Spring Cove Precinct as the context permits.

LEP means the Manly Local Environmental Plan 1988 as amended.

Material Public Benefit means:

(a) public pathways and walkways at a Works Value of $1,616,814;

(b) pedestrian access to the College Street Oval at an Agreed Value of $500,000;

(c) bush regeneration – national park to a Works Value of $290,987;

(d) endangered species management and amelioration – long nosed bandicoot at a Works Value of $326,838.

Montpelier Precinct means Precincts 1 and 13.

Plan means the plan being Sheet 1 of 5 incorporated in Amendment No. 24 of the LEP.

Precinct means the precincts as identified in the Plan and the numbering of precincts shall mean and relate to the numbering of precincts on the Plan.

Precinct 2 Development means the attached dwellings and apartments constructed on Precinct 2.

Quantity Surveyor means the person appointed by LLD under clause 6(c).

Scope of Works means the scope of works outlined in the attached Appendix 1 that describes the extent of works to be undertaken to fulfil the items of Material Public Benefit (excluding pedestrian access to the College Street oval)

Spring Cove Precinct means Precincts 5, 6 and 10.

St Patrick's Estate means (for the purpose of this Agreement only) the area edged in black on the Plan.

Works Value means the value of items of Material Public Benefit other than the College Street Oval as assessed by the Quantity Surveyor in accordance with clause 6.

1.2 Interpretation

In this document, unless otherwise indicated by the context:

(a) words importing the singular include the plural and vice versa;

(b) headings are for convenience only and do not affect interpretation of this document;

(c) a reference to a clause, paragraph, schedule or annexure is a reference to a clause, paragraph or schedule of or annexure to this document;

(d) a reference to "$" is to Australian dollars;

(e) an expression importing a natural person includes a body corporate, partnership, joint venture or association;

(f) a reference to a statute or regulation includes all amendments, consolidations or replacements thereof;

(g) a reference to a party to a document includes that party's successors and permitted assigns;

(h) no rule of construction applies to the disadvantage of a party because that party was responsible for the preparation of this document;

(i) a covenant, agreement, representation or warranty on the part of or in favour of two or more persons binds them or is for the benefit of jointly and severally;

(j) if an event must occur on a stipulated day which is not a Business Day, then the stipulated day will be taken to be the next Business Day; and

(k) a reference to a body, whether statutory or not:

(i) which ceases to exist; or

(ii) whose powers or functions are transferred to another body,

is a reference to the body which replaces it or which substantially succeeds to its powers or functions.

2. PLANNING AGREEMENT UNDER THE ACT

The parties agree that this Agreement is a planning agreement governed by Subdivision 2 of Division 6 of Part 4 of the Act.

3. APPLICATION OF THIS AGREEMENT

This Agreement applies to the Development on Cerretti Precinct, Montpelier Precinct and Spring Cove Precinct.

4. OPERATION OF THIS AGREEMENT

This Agreement shall take effect on and from the date of execution of the Agreement.

5. DEVELOPMENT CONTRIBUTIONS

LLD shall pay Development Contributions of $4,171,000.00 in the following manner:

(a)	Cash component at the times provided herein	$1,436,362.00
(b)	Material Public Benefit	$2,734,638.00

6. PROVISION OF MATERIAL PUBLIC BENEFIT

(a) The parties acknowledge that LLD has arranged for pedestrian access to the College Street Oval (Refer DP1032990 88B registered on 1 February 2002).

(b) LLD has in part provided items of Material Public Benefit to date. The balance of the items of Material Public Benefit will be provided progressively with the completion of the associated development phases.

(c) Completion of the Scope of Works by LLD as certified by the Quantity Surveyor will satisfy the obligations of LLD under **clause 6(b)** of this agreement.

(d) In the event that the extent of works undertaken (excluding College Street Oval) is less than that outlined in the Scope of Works, upon completion of the Development, LLD will make a cash payment forthwith at that time to Council for the amount of any shortfall as assessed in value by the Quantity Surveyor.

(e) Notwithstanding **clause 6(c)** but subject to **clause 6(d)**, the cash component is fixed at the amount described in **clause 5(a)**.

7. CASH COMPONENT OF DEVELOPMENT CONTRIBUTIONS

(a) It is agreed between the parties that the cash component of the Development Contributions for each of the Development Precincts are as follows:

Cerretti Precinct	$718,181.00
Montpelier Precinct	$287,272.00

Spring Cove Precinct $430,909.00

(b) Notwithstanding anything herein to the contrary, it is agreed that if Development Consent issues for any of the Development Precincts which results in a reduced number of dwellings or apartments, the cash component will reduce in respect of each dwelling or apartment by the sum of $11,339.70 for Spring Cove Precinct and $11,048.90 for Montpelier Precinct and $11,969.68 in respect of Cerretti Precinct.

(c) Cash components of the Development Contributions will be payable in respect of each Development Precinct in the following amounts at the following times:

(i) 50% of the cash component for that Development Precinct upon the issue of an occupation certificate for the first dwelling in that Development Precinct;

Paid $143,636.00 12/06.

(ii) the balance of the cash component for that Development Precinct to be paid on or before a date 18 months after the date of payment of the first contribution.

$143,636.00 Due June 08

8. BANK GUARANTEE

(a) LLD shall provide an unconditional and irrevocable bank guarantee to Council for the amount outstanding from time to time of the cash component in respect of each Development Precinct at the later of:

(i) 30 days after the date of this Agreement; and

(ii) the issue of the first construction certificate following Development Consent being granted by the Council in respect of that Development Precinct.

(b) Council agrees to release each bank guarantee to an amount equal to the outstanding cash component at any time upon request by LLD. Council can only draw down against a bank guarantee if the cash component has not been paid in full as at the date of the issue of the occupation certificate of the last dwelling in St Patricks Estate and then only to the amount then outstanding by way of cash contribution.

(c) Council will apply the cash component of the Development Contributions in accordance with the Contributions Plan.

(d) LLD shall provide an unconditional and irrevocable bank guarantee to Council for the amount outstanding of the Material Public Benefit component from time to time. The parties acknowledge that the pedestrian access to the College Street Oval component of Material Public Benefit has been fully provided. The initial bank guarantee will be for that part of the Material Public Benefit certified by the Quantity Surveyor to be then outstanding. This bank guarantee will be provided within 30 days from the date of this Agreement.

(e) Council agrees to release the bank guarantee by the amount certified by the Quantity Surveyor as having been subsequently completed for each of the

components of Material Public Benefit at any time upon request by LLD. Council can only draw down against a bank guarantee if the Material Public Benefit has not been provided in full

(i) as at the date of the issue of the occupation certificate of the last dwelling in St Patricks Estate in respect of the public pathways and walkways component; and

(ii) as at 31 December 2010 in respect of the bush regeneration and endangered species components

and then only to the amount outstanding at that time by way of Material Public Benefit.

(f) LLD may provide separate bank guarantees or one bank guarantee to satisfy its obligations under this clause.

9. APPLICATION OF SECTION 94 AND SECTION 94A OF THE ACT

(a) The parties agree that the Development Contributions represent the total amount payable by LLD to Council under the Contributions Plan in respect of the Development.

(b) This Agreement excludes wholly the application of section 94 and section 94A of the Act to the Development.

(c) Development Contributions under this agreement shall satisfy the conditions of Development Consent that have already been granted by Council in respect of parts of the Development.

10. DISPUTE RESOLUTION

(a) This Agreement is entered into voluntarily between the parties and there is no right of appeal by LLD in respect of the Development Contributions agreed to in this Agreement or the Contributions Plan.

(b) If any other dispute arises between the parties arising out of or relating to this Agreement (**the Dispute**), any party seeking to resolve the Dispute must do so strictly in accordance with the provisions of this clause. Compliance with the provisions of this clause is a condition precedent to seeking relief in any court or tribunal in respect of the Dispute.

(c) A party seeking to resolve a dispute must notify the existence and nature of the dispute to the other party (**Notification**). Upon receipt of a Notification, the parties must refer resolution of the Dispute to their respective directors or their nominees.

(d) If the Dispute has not been resolved within thirty (30) days of receipt of the Notification, then either party may refer the dispute to mediation and must do so before initiating proceedings in a court to resolve the dispute. Any Dispute which is referred to mediation must be referred to the Australian Commercial

Dispute Centre Limited (**ACDC**) and be conducted in accordance with the conciliation rules of ACDC in force at the time of the Notification. If the dispute has not been resolved within sixty (60) days of referral to ACDC, either party is free to initiate proceedings in a court.

(e) Nothing in this clause shall prevent a party from seeking interlocutory relief through the courts of appropriate jurisdiction.

(f) This clause shall survive termination or expiration of the Agreement.

11. COSTS

Each party shall attend to payment of its own costs of negotiating, preparing, executing and stamping (if necessary) this Agreement.

12. NO FETTER

Nothing in this Agreement shall be construed as requiring Council to do anything that would cause it to be in breach of any of its obligations at law and, without limitation, nothing shall be construed as limiting or fettering in any way the exercise of any statutory discretion or duty.

13. NOTICES

13.1 Service of Notices

A notice or other communication required or permitted to be given by one party to another must be in writing and:

(a) delivered personally;

(b) left or sent by pre-paid mail to:

(i) the address of the addressee specified in this document; or

(ii) the registered office of any party to be served which is a company; or

(c) sent by facsimile transmission to the facsimile number of the addressee.

13.2 Addresses for Service

The address and facsimile number of each party for the purpose of service of notices is:

Council

Address: 1 Belgrave Street, Manly NSW 2095

Facsimile: 9976 1400

LLD

Address: David Rolls, Lend Lease Development Pty Limited, Level 4, 30 The Bond, 30 Hickson Road, Millers Point NSW 2000

Facsimile: 9236 6096

13.3 Timing

A notice or other communication is taken to have been given (unless otherwise proved):

(a) if mailed, on the third Business Day after posting; or

(b) if sent by facsimile before 4.00 pm on a Business Day at the place of receipt when the transmission is completed on the day it is sent and otherwise at 9.00 am on the next Business Day at the place of receipt, upon production of a transmission report by the sender which confirms that the facsimile was sent in its entirety to the facsimile number of the addressee.

13.4 Change of Address for Service

A party may change its address for service by giving notice of that change in writing to the other parties.

14. GENERAL PROVISIONS

14.1 Severability

(a) If any clause or part of a clause of this document is invalid, illegal, unlawful or otherwise being incapable of enforcement, that clause or part of a clause will be deemed to be severed from this document and of no force and effect but all other clauses and parts of clauses of this document will nevertheless prevail and remain in full force and effect and be valid and fully enforceable.

(b) No clause or part of a clause of this document will be construed to be dependent upon any other clause or part of a clause unless so expressed.

14.2 Governing Law and Jurisdiction

(a) This document is governed by the laws of New South Wales.

(b) Each party irrevocably submits to the non-exclusive jurisdiction of the courts of New South Wales.

14.3 Further Assurance

Each party will from time to time do all things (including executing all documents) necessary or desirable to give full effect to this document.

14.4 Counterparts

This document may be executed in any number of counterparts each of which will be an original but such counterparts together will constitute one and the same instrument and the date of the document will be the date on which it is executed by the last party.

14.5 Amendments

This document may not be varied except in writing signed by all of the parties.

14.6 Whole Agreement

(a) This document embodies the whole agreement between the parties relating to the subject matter of this document and supersedes any and all oral and written negotiations and communications by or on behalf of any of them.

(b) The parties have not, in entering into this document, relied upon any warranty representation or statement, whether oral or written, made or published by any other party or any person on behalf of any other party or otherwise in connection howsoever with the subject matter of this document, except such as are expressly provided herein and subject thereto have relied entirely upon their own enquiries relating to the subject matter of this document.

(c) The parties agree that to the extent that each of them may exclude any warranties or conditions which might otherwise be implied in connection with this document or the subject matter of this document by any competent legislation, then each party expressly excludes from application all such implied warranties and conditions.

14.7 Rights Not Affected by Failure to Enforce

The failure of either party at any time to enforce any of the provisions of this document or any rights in respect hereto or to exercise any election herein provided will not be a waiver of such provisions, rights or elections or affect the validity of this document.

EXECUTED as an agreement.

[Execution clause for Manly Council]

SIGNED for and on behalf of **LEND LEASE DEVELOPMENT PTY LIMITED** in accordance ~~with section 127~~ of the *Corporations Act* 2001:

~~Director~~/Secretary

Print Name

Director

Print Name

EXECUTED for and on behalf of **MANLY COUNCIL** by its duly authorised officers:

Signature

Print Name

Signature

Henry I. Wong
General Manager

Print Name

Appendix 1 Scope of Works

1.1 PROPOSED PUBLIC PATHWAY AND WALKWAY

1.1.1 General

The proposal involves various works in open space areas across the northern portions of St Patrick's Estate with a view to establishing appropriate defined public access routes through the estate. The works involve the installation of a public interpretative route and associated upgrades to various existing landscape elements. The proposed route will link to other recognised or planned walks in the Eastern Hill area including:
The Manly Scenic Walkway
The Manly Wharf to North Head Walk
Proposed walking tracks in Sydney Harbour National Park

1.1.2 Public Access Points

Public access points will occur at the following locations
via the existing ceremonial gate on Darley Road
via the recently created entry from Reddall/College Streets
via a new entry from the National Park through the stone wall to the south east of the convent.

1.1.3 Surface Treatments

A range of walking surfaces are proposed along the route to reflect the changing character of the landscape. Treatments proposed include
boardwalks at environmentally sensitive locations
continuous sealed paths
sealed path segments across open grass areas
stairs to negotiate changes in level
retention and upgrading of existing gravel and grass pathways when appropriate.

1.1.4 Signage and markers

A range of signage types and members are proposed along the route. Directional, prohibitive and interpretive signage will guide, inform and direct visitors. Interpretive signage will address a range of issues including:
historic landscapes and buildings
habitat and environment
scenic outlooks

Directional and prohibitive signage will provide guidance to visitors while protecting the privacy of occupants of the estate and its neighbours.

1.1.5 Nodes

At a number of key locations information nodes will be established. These include:

a new lookout point on the edge of the grass plateau to the north east of the college buildings.
an interpretive area in close proximity to Moran House and the historic terraces
a lookout and interpretive node above the gully leading to Bower Street in the eastern portion of the site.
In the historic Grotto.

Other interpretation opportunities will be provided intermittently along the route.

1.1.6 Upgrading of Landscape Features

Various landscape features will be rejuvenated including:
The Grotto plantings, pavements, walls and water features
Repairs to the Fairy Bower Road and the Ceremonial Entry Gates
Repairs to walls and pavements below the northern terraces
Improvements to the ditch/swale formation adjacent the Precinct 2 'oval' area to better control overland flows.

Refer to Knox & Partners Landscape Architects drawing L-SK-01 Revision A for a description of the proposed public access route and associated works.

1.2 Endangered species management and amelioration – Long Nosed Bandicoot

The Joint Venture has co-operated with its neighbour the National Parks and Wild Life Service (NPWS); (specifically the Endangered Species Unit), on a series of programmes to enhance the quality of bandicoot habitat on the Estate in attempt to improve numbers. There is ample evidence that Bandicoots move freely between the National Park and the Estate, so there is a need for the parties to work together, exchange data, information and coordinate monitoring.

The current programme of scientific study which commenced in 2002 will not complete until at 2010. Monitoring is undertaken on a quarterly basis and the associated compilation, analysis and reporting of these results all contributes to the general body of knowledge on this endangered population in the Manly area and provides a significant public benefit.

The programme is divided into two components as follows:

1.2.1 Monitoring & Reporting

This work is currently being undertaken by EcoSense Consulting and comprises four quarterly studies and reports of the findings and an annual "Trends" report which compares the results with previous years. The monitoring involves walking a series of transects around the Estate and recording numbers of fresh diggings and spotlighting to

count Bandicoots sighted. The data is exchanged with the NPWS who also trap and tag Bandicoots to monitor their movement.

1.2.2 Financial Contribution to the National Parks & Wildlife Service

In order to assist NPWS with funding of their own research programme, the Joint venture has agreed to contribute $50,000.00 in five equal annual payments of $10,000.00. One of these payments has been made and the remainder will be paid annually.

1.3 PROPOSED LANDSCAPE REHABILITATION AND BUSH REGENERATION WORKS

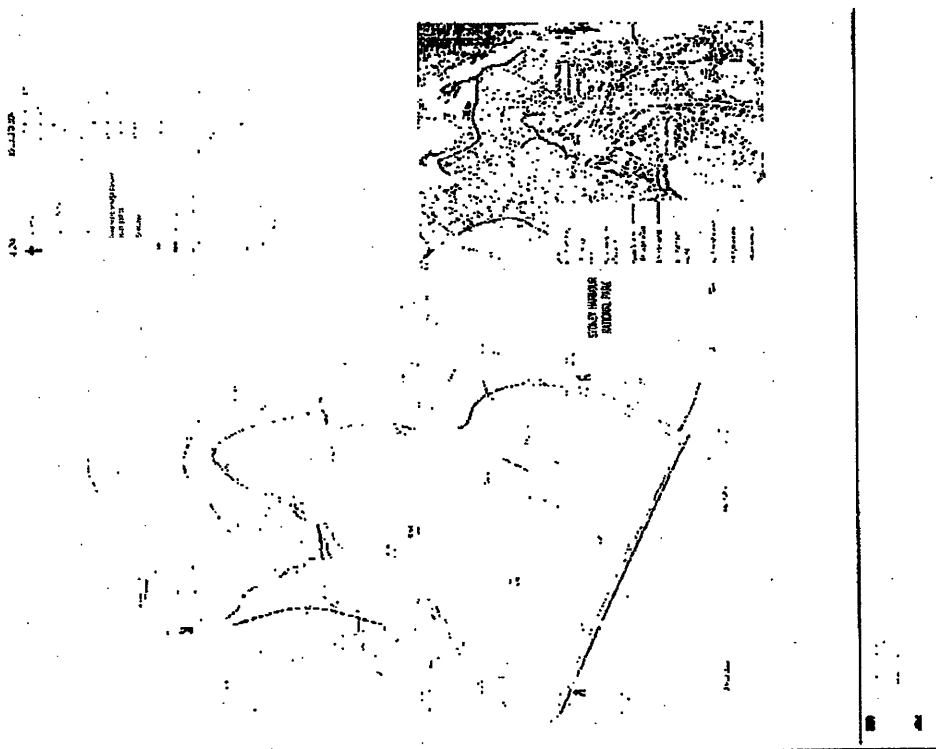
1.3.1 General

Bush regeneration and landscape rejuvenation works are proposed to the following areas of existing vegetation on or in the vicinity of the estate:

A one hectare portion of Sydney Harbour National Park adjacent Spring Cove – bush regeneration works
The existing Council owned reserve between St Patrick's Estate and Spring Cove – landscape rejuvenation works
The gully area leading to Bower Street in the eastern portion of the Darley North part of the estate – bush regeneration works
The existing bush land between the Bower Street gully and the adjacent wall on the National Park boundary – bush regeneration works

Typically the works include:
Primary and secondary weeding activities
Infill planting and mulching
Ongoing maintenance

All works to be undertaken by a specialist bush regeneration contractor. Refer to Knox & Partners Landscape Architects drawing L-SK-01 Revision A for the location and extent of each area.


STOCKTON BIGHT
NATIONAL PARK

PRECINCT 2

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Integrated Practical Solutions

REPORT ON GEOTECHNICAL INVESTIGATION

PRECINCTS 1 AND 2 ST PATRICK'S ESTATE MANLY

Prepared for
HUGHES TRUEMAN REINHOLD

Project 28058A
November 1999

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Douglas Partners
Geotechnics · Environment · Groundwater

REPORT
ON
GEOTECHNICAL INVESTIGATION

PRECINCTS 1 AND 2
ST PATRICK'S ESTATE
MANLY

Prepared for
HUGHES TRUEMAN REINHOLD

Project 28058A
November 1999

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APPENDIX A - Site Drawings
APPENDIX B - Field Test Results and Notes Relating to This Report

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MJT:lp
Project 28058A
18 November 1999

GEOTECHNICAL INVESTIGATION
PRECINCTS 1 AND 2
ST PATRICK'S ESTATE
MANLY

1. INTRODUCTION

This report details the results of a geotechnical investigation carried out for a proposed housing development at St Patrick's Estate in Darley Road, Manly. The work was undertaken on behalf of Hughes Trueman Reinhold Pty Ltd, Consulting Engineers for Lend Lease Developments, Project Managers.

The construction of Precincts 1 and 2 for a large housing development is proposed on the north-western side of the St Patrick's Estate. Precinct 1 will comprise detached housing on individual allotments whereas Precinct 2 will comprise an apartment block on portion of the site and townhouses adjacent to the existing houses facing Fairybower Road. Geotechnical investigation was carried out to provide information on the subsurface conditions so that advice could be provided on the design of foundations, retaining structures and pavements and the potential of the soils to undergo movement caused by settlement and shrink/swell behaviour.

The investigation comprised dynamic cone penetrometers and mapping of rock outcrops for Precinct 1 and drilling of test bores in Precinct 2. Details are given in the report together with comments on design and construction practices.

2. SITE DESCRIPTION AND GEOLOGY

Precincts 1 and 2 are located within the grounds of the former St Patrick's Catholic Seminary and are situated on the north-western side of the estate adjacent to existing housing. Precinct 1 is behind existing houses on Fairybower Road whereas Precinct 2 is in College Street in an area which was partly used as a sports field for the former Catholic College.

At the time of the investigation Precinct 1 was covered by dense vegetation over most of the area proposed for development. Precinct 2 was mostly cleared and grass covered apart from along the College Street frontage where some remnants of the native vegetation still remain.

Reference to 1:100 000 Series Geological Map for Sydney indicates that the site is underlain by Hawkesbury Sandstone which typically comprises medium to coarse grained quartz sandstone. This was confirmed by inspection of sandstone outcrops in both Precinct 1 and Precinct 2 and is consistent with investigations undertaken in the area on previous occasions.

3. FIELD INVESTIGATION

3.1 Methods

The field investigation for Precinct 1 comprised mapping of the sandstone outcrops and dynamic cone penetrometer testing at 15 locations to determine the depth of sandstone bedrock.

In Precinct 2 the investigation comprised 10 test bores drilled with a truck-mounted auger/rotary drilling rig. The bores were drilled to depths of about 1 to 3 metres using spiral flight augers with standard penetration tests carried out where appropriate to determine the engineering properties of the near surface soils. In selected bores coring of the bedrock took place below the level of auger drilling.

The location of the test bores and dynamic penetrometer tests are given on Drawings 1 and 2 in Appendix A.

3.2 Results

Details of the conditions encountered on the site are given in Appendix B together with notes defining the terms used to classify the strata. A general description of the results of the insitu testing is given below.

a) Precinct 1

The mapping and dynamic cone penetrometer tests indicate the presence of shallow sandstone over the entire area of Precinct 1. In general refusal in the dynamic penetrometer tests occurred at depths ranging from 0.15 to 1.05 m. The exception occurred in DCP 9 where the testing was discontinued at a depth of 1.2 m without refusal even though the penetration resistance was in excess of 10 blows/150 mm indicating the possible presence of weathered rock.

The results indicate some variable conditions over the site with sandstone outcrops occurring within a short distance of where the penetrometer was able to penetrate to depths in excess of 0.5 m. For example, DCP 6, 7 and 8 were conducted towards the rear of the Precinct 1 in an area where sandstone occurred at surface level. DCP 8 penetrated to a depth of 0.6 m prior to refusal indicating some difference in the depth of weathering. Similar results were obtained with DCP 14 and 15 within a short distance of a rock outcrop with DCP 14 refusing at a depth in excess of 1 m.

b) Precinct 2

The conditions encountered in the bores drilled in Precinct 2 are summarised in terms of rock levels in Table 1 below.

Table 1 - Summary of Rock Levels

	Bores	Surface Level (m)	Depth to Rock (m)	Rock Level (m)
Precinct 2 Apartment Building	201	27.99	2.1	25.89
	202	25.18	0.95	24.23
	203	26.33	0.75	25.58
	204	27.66	1.70	25.96
	205	26.44	0.80	25.64
Precinct 2 Attached Houses	206	33.96	0.7	33.26
	207	31.49	0.4	31.94
	208	32.56	0.3	32.26
	209	32.42	0.3	32.12
	210	34.04	0.6	33.44

These results indicate that rock in the area to be developed for the apartment buildings was first encountered at about RL 24 to 26. In some bores the rock was extremely low to low strength from the surface and continued as such to the full depth of drilling (e.g. Bore 203) whereas in other bores the rock strength improved with depth. The variability in the depth to the surface of the rock and the significant variability in the strength will have to be taken into consideration in the design as indicated below.

In the area of the attached houses the level at which rock was first encountered again was variable ranging from RL 31 to about RL 33.5. Similarly to the area of the apartment block the strength of the sandstone bedrock varied considerably with substantial core loss occurring due to the friable nature of the bedrock resulting from weathering.

No free groundwater was observed while augering in Bores 206 to 210 for the attached housing and water was observed in Bore 201 only in the area of the apartment. Site observations, however, indicate that the near surface soils were saturated when the investigation was undertaken and this, combined with the shallow depth of bedrock, would tend to indicate a potential seepage problem during construction. Further comments on groundwater seepage and its effect on the building development in both Precincts are given below.

4. PROPOSED DEVELOPMENT

It is understood that the proposed development will comprise:-

- Precinct 1 - two storey detached houses. The exact details are not known at this stage but presumably they would be two storey brick and tile structures built at the existing surface level with only minimal cutting and filling;
- Precinct 2 comprises an apartment block in the northern corner and attached houses on the southern side of the existing playing field. The apartment block will be a three storey structure with one level of basement parking. The attached dwellings will comprise two levels of residential accommodation and one basement parking level.

5. COMMENTS

5.1 Excavation Conditions

The investigation indicates that both Precincts 1 and 2 are underlain by shallow sandstone for which moderate to heavy ripping may be required in carrying out excavations. Drilling in Precinct 2 encountered mostly extremely low sandstone, however, in several bores low or medium strength rock was present. Excavation conditions will therefore be variable but observations indicate that some heavy ripping may be required.

In Precinct 1 outcrops of low and medium strength rock were observed throughout the site and this could necessitate the use of hydraulic rock breakers to facilitate excavation at acceptable productivity rates.

5.2 Excavation Support

Temporary and permanent support for excavations within soil and highly weathered sandstone can be provided by retaining walls, designed for a pressure distribution calculated using an active earth pressure coefficient of 0.3 together with a soil unit weight of 18 kN/m^3. A triangular pressure distribution can be assumed provided there are no superimposed loads and effective drainage results in negligible hydrostatic pressure behind the retaining walls.

Where space allows it may be advantageous to batter the temporary slopes at maximum angles of 1V:1½H. Otherwise some form of shoring such as soldier piles and shotcrete infilling or contiguous bored pile walls will be needed.

If cut batters are to be permanent it may be prudent to flatten the slope to 1V:4H to prevent erosion of the sandy material and to assist in long term maintenance by planting of grass. Some form of temporary erosion protection will be necessary until a grassed bank is properly established.

5.3 Foundations

The type of foundations which will be suitable for Precincts 1 and 2 will depend largely upon the levels chosen for the individual houses or apartment blocks. The investigation indicates that very low strength rock or better will probably be present at excavation levels over both precincts and accordingly it is suggested that a design bearing pressure of 1500 kPa could be utilised. As indicated above there are some indications of low and medium strength rock over the site for which an allowable bearing pressure of up to 3500 MPa would be applicable. However, if this higher pressure was to be adopted it would be necessary to carry out regular verification of the founding material because of the variability encountered in the bores.

For the conditions encountered in both Precincts 1 and 2 it is envisaged that strip or pad footings or raft slabs would be suitable. Regardless of which foundation type is eventually selected it is recommended that an inspection take place on each structure prior to pouring the footings to verify that the design bearing pressures are feasible for the conditions encountered on the site. In some instances it may be necessary to proof roll in the base of excavations to densify any material loosened by the excavation process or to identify materials which have been softened by groundwater flow and therefore may need to be replaced.

5.4 Pavements

Based on the conditions encountered on the site it is suggested that a CBR of 6% be adopted for the design of pavements supported by the sandy soils over most of Precincts 1 and 2. This CBR is relatively conservative but it takes into consideration the variability which is anticipated based on the results of the field investigation.

Some increase in subgrade CBR may be possible if conditions are found to uniformly comprise granular materials such as sand. To confirm this it would be advisable to carry out

an inspection during bulk earthworks. The inspection would also be advisable to decide on the location and depth of any subsoil drains which may be necessary to prevent seepage beneath the pavement.

5.5 Shrink/Swell Potential

The investigation indicates the presence of sandy soils and weathered sandstone over the entire site. The shrink/swell potential of these soils is low and hence it is suggested that a site classification of Class A or S would be applicable in accordance with Australian Standard AS2870 "Residential Slabs and Footings".

5.6 Groundwater

The investigation indicated that there was no significant groundwater flow in most of the bores and consequently it is expected that dewatering of the excavations would not be required during construction. However, the investigation indicates that sandstone bedrock is at shallow depth over both precincts and consequently it is anticipated that seepage could occur along the surface of the bedrock after periods of heavy rainfall. This possibility should be allowed for during excavations for basement construction and for service trenches. Furthermore it should be recognised that seepage may continue for a long period after rainfall because of the natural groundwater storage capacity of the sandy soils. It may therefore be prudent to construct a cut-off drain on the high side of each precinct to intercept any seepage flow and to channel it into the stormwater drainage system. This would help prevent any problems during construction.

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5.7 Earthquake Loading

The site is underlain by sandstone bedrock at shallow depth and hence a site factor of 1.0 is applicable in accordance with the Australian Standard AS1170.4 (Earthquake Loading). This site factor should be used in conjunction with a ground acceleration of 0.08g for Sydney.

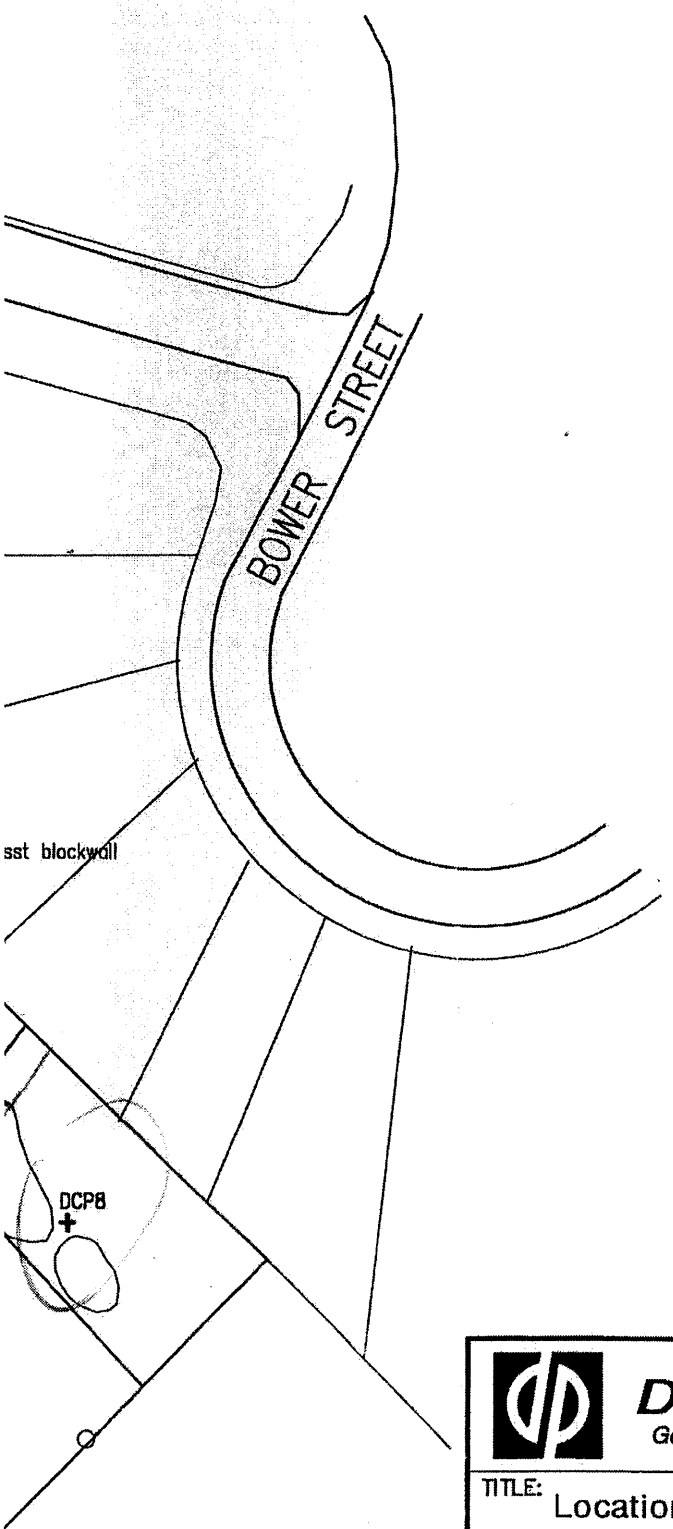
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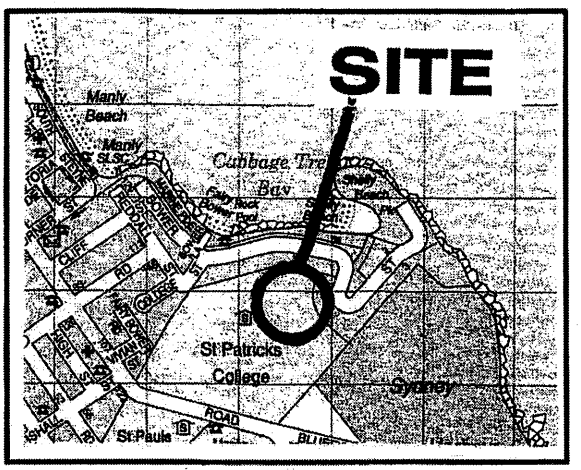
for **Michael J Thom**
Principal

Reviewed by:

Fiona MacGregor
Senior Associate

APPENDIX A
Site Drawings





LOCALITY PLAN

LOCATION	LEVEL(m)
1	37.59
2	37.28
3	39.84
4	43.40
5	43.23
6	41.29
7	43.60
8	45.18
9	46.62
10	46.39
11	45.65
12	46.29
13	43.08
14	42.74
15	39.90

LEGEND

+ DYNAMIC CONE PENETROMETER TEST

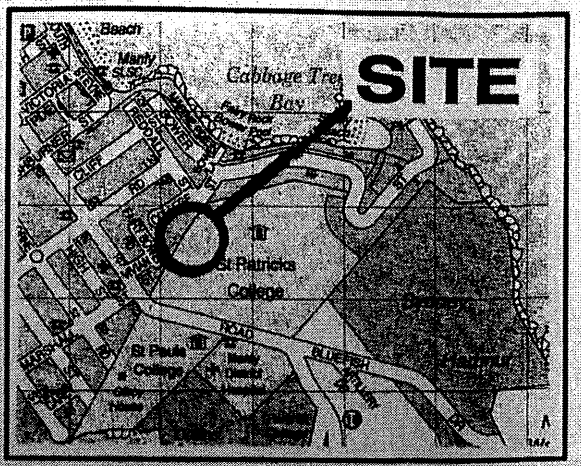
SANDSTONE OUTCROPS

Douglas Partners
Geotechnics, Environmental, Groundwater

Sydney, Newcastle, Brisbane, Melbourne, Perth, Darwin, Wyong, Singleton, Campbelltown, Townsville, Cairns, Wollongong

TITLE: Location of Field Tests
Precinct 1
St Patricks Estate
MANLY

CLIENT: Lend Lease			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 28058A	OFFICE: SYDNEY
APPROVED BY		DATE: 8.11.1999	DRAWING No: 1



LOCALITY PLAN

BORE No.	LEVEL(m)
201	27.99
202	25.18
203	26.33
204	27.66
205	26.44
206	33.96
207	31.49
208	32.56
209	32.42
210	34.04

LEGEND

TEST BORE

SANDSTONE OUTCROPS

Douglas Partners
Geotechnics, Environmental, Groundwater

Sydney, Newcastle, Brisbane, Melbourne, Perth, Darwin, Wyong, Singleton, Campbelltown, Townsville, Cairns, Wollongong

TITLE: Location of Test Bores
Precinct 2
St Patricks Estate
MANLY

CLIENT: Lend Lease			
DRAWN BY: PSCH	SCALE: As shown	PROJECT No: 28058A	OFFICE: SYDNEY
APPROVED BY:		DATE: 8.11.1999	DRAWING No: 2

APPENDIX B
Field Test Results and Notes Relating to This Report

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NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the Discussion and Comments section. Not all, of course, are necessarily relevant to all reports.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Undrained Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q_c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.

Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in

clays and in sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling — the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling — similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling — a continuous core sample is obtained using a diamond-tipped core barrel, usually 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

Standard Penetration Tests

Standard penetration tests (abbreviated as SPT) are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" — Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of say 4, 6 and 7

  as 4, 6, 7
  N = 13

- In the case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm

  as 15, 30/40 mm.

The results of the tests can be related empirically to the engineering properties of the soil.

Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borelogs in brackets.

Cone Penetrometer Testing and Interpretation

Cone penetrometer testing (sometimes referred to as Dutch cone — abbreviated as CPT) described in this report has been carried out using an electrical friction cone penetrometer. The test is described in Australian Standard 1289, Test 6.4.1.

In the tests, a 35 mm diameter rod with a cone-tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20 mm per second) the information is plotted on a computer screen and at the end of the test is stored on the computer for later plotting of the results.

The information provided on the plotted results comprises: —

- Cone resistance — the actual end bearing force divided by the cross sectional area of the cone — expressed in MPa.
- Sleeve friction — the frictional force on the sleeve divided by the surface area — expressed in kPa.
- Friction ratio — the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower scale (0—5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main scale (0—50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve friction to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1%—2% are commonly encountered in sands and very soft clays rising to 4%—10% in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:—

q_c (MPa) = (0.4 to 0.6) N (blows per 300 mm)

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:—

q_c = (12 to 18) c_u

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes, etc. This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.

Hand Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150 mm increments of penetration. Normally, there is a depth limitation of 1.2 m but this may be extended in certain conditions by the use of extension rods.

Two relatively similar tests are used.

- Perth sand penetrometer — a 16 mm diameter flat-ended rod is driven with a 9 kg hammer, dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.
- Cone penetrometer (sometimes known as the Scala Penetrometer) — a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). The test was developed initially for pavement subgrade investigations, and published correlations of the test results with California bearing ratio have been published by various Road Authorities.

Laboratory Testing

Laboratory testing is carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms.

Bore Logs

The bore logs presented herein are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable, or possible to justify on economic grounds. In any case, the boreholes represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes, the frequency of sampling and the possibility of other than 'straight line' variations between the boreholes.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems;

- In low permeability soils, ground water although present, may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report.
- The use of water or mud as a drilling fluid will mask any ground water inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Engineering Reports

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (eg. to a twenty storey building). If this happens, the Company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface condition, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- unexpected variations in ground conditions — the potential for this will depend partly on bore spacing and sampling frequency
- changes in policy or interpretation of policy by statutory authorities
- the actions of contractors responding to commercial pressures.

If these occur, the Company will be pleased to assist with investigation or advice to resolve the matter.

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the Company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed than at some later stage, well after the event.

Reproduction of Information for Contractual Purposes

Attention is drawn to the document "Guidelines for the Provision of Geotechnical Information in Tender Documents", published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section

is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

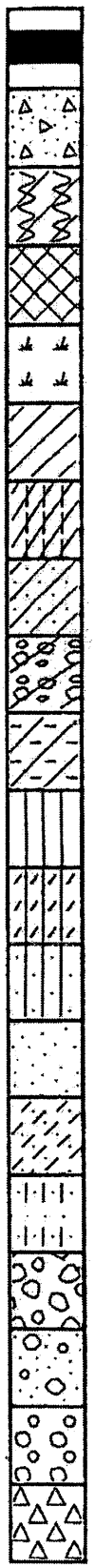
Site Inspection

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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GRAPHIC SYMBOLS FOR SOIL & ROCK

SOIL



BITUMINOUS CONCRETE

CONCRETE

TOPSOIL

FILLING

PEAT

CLAY

SILTY CLAY

SANDY CLAY

GRAVELLY CLAY

SHALY CLAY

SILT

CLAYEY SILT

SANDY SILT

SAND

CLAYEY SAND

SILTY SAND

GRAVEL

SANDY GRAVEL

COBBLES/BOULDERS

TALUS

SEDIMENTARY ROCK



BOULDER CONGLOMERATE

CONGLOMERATE

CONGLOMERATIC SANDSTONE

SANDSTONE FINE GRAINED

SANDSTONE COARSE GRAINED

SILTSTONE

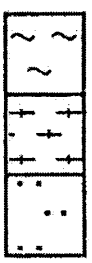
LAMINITE

MUDSTONE, CLAYSTONE, SHALE

COAL

LIMESTONE

METAMORPHIC ROCK

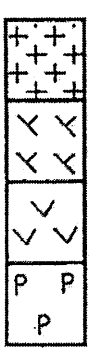


SLATE, PHYLLITE, SCHIST

GNEISS

QUARTZITE

IGNEOUS ROCK



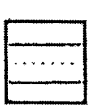
GRANITE

DOLERITE, BASALT

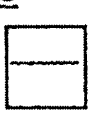
TUFF

PORPHYRY

SEAMS



SEAM
> 10 mm



SEAM
< 10 mm

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AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS IN THE SYDNEY AREA

This classification system provides a standardised terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable.

Under this system rocks are classified by Rock Type, Degree of Weathering, Strength, Stratification Spacing, and Degree of Fracturing. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc.) where these are relevant.

ROCK TYPE DEFINITIONS

Rock Type	Definition
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2 mm) fragments.
Sandstone:	More than 50% of the rock consists of sand sized (.06 to 2 mm) grains.
Siltstone:	More than 50% of the rock consists of silt sized (less than .06 mm) granular particles and the rock is not laminated.
Claystone:	More than 50% of the rock consists of clay or sericitic material and the rock is not laminated.
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated.

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

DEGREE OF WEATHERING

Term	Symbol	Definition
Extremely Weathered	EW	Rock substance affected by weathering to the extent that the rock exhibits soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered	MW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly Weathered	SW	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable.
Fresh	Fr	Rock substance unaffected by weathering.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly laminated	<6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	>2 m

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics (Reference).

Strength Term	Is(50) MPa	Field Guide	Approx. qu MPa*
Extremely Low:	0.03	Easily remoulded by hand to a material with soil properties.	0.7
Very Low:	0.1	May be crumbled in the hand, Sandstone is "sugary" and friable.	2.4
Low:	0.3	A piece of core 150 mm long x 50 mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium:	1	A piece of core 150 mm long x 50 mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
High:	3	A piece of core 150 mm long x 50 mm dia. core cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very High:	10	A piece of core 150 mm long x 50 mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely High:		A piece of core 150 mm long x 50 mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	

* The approximate unconfined compressive strength (qu) shown in the table is based on an assumed ratio to the point load index of 24:1. This ratio may vary widely.

DEGREE OF FRACTURING

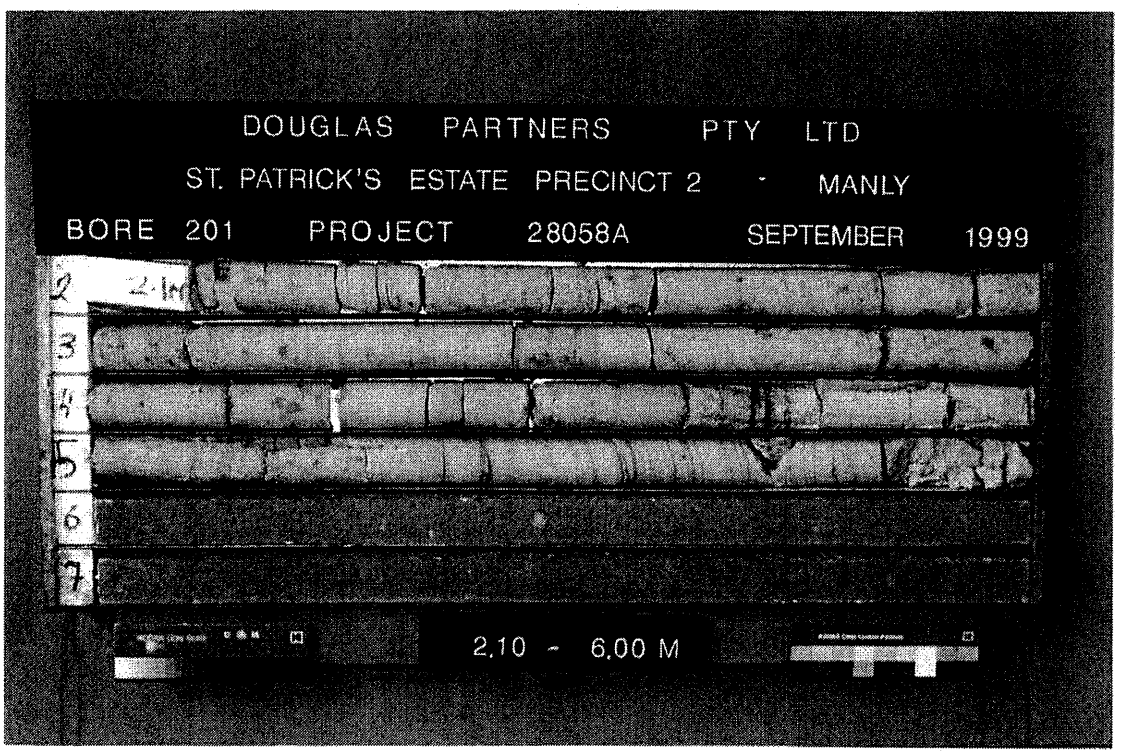
This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks.

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than the core diameter.
Highly Fractured:	Core lengths are generally less than 20 mm - 40 mm with occasional fragments.
Fractured:	Core lengths are mainly 30 mm - 100 mm with occasional shorter and longer sections.
Slightly Fractured:	Core lengths are generally 300 mm - 1000 mm with occasional longer sections and occasional sections of 100 mm - 300 mm
Unbroken:	The core does not contain any fracture.

REFERENCE

International Society of Rock Mechanics, Commission on Standardisation of Laboratory and Field Tests, Suggested Methods for Determining the Uniaxial Compressive Strength of Rock Materials and the Point Load Strength Index, Committee on Laboratory Tests Document No. 1. Final Draft October 1972.

Prepared by the Sydney Group of the Australian Geomechanics Society, January, 1975.


DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 201 PROJECT 28058A SEPTEMBER 1999
2.10 - 6.00 M

TEST BORE REPORT

BORE No: 201
DATE: 30/9/99
SHEET 1 **OF** 1

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 27.99
DIP OF HOLE: 90°

AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard) / Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND - light brown sand							
0.8	CLAYEY SAND - very stiff, brown grey clayey sand		Very Stiff		S			3,5,13 N=18
	- 1.3m - light brown							
2.1	SANDSTONE - low and extremely low strength, slightly weathered, fractured to slightly fractured, off white, coarse grained gravelly sandstone with extremely low and very low and medium strength bands			Ex. Low to Medium	C	100	88	PL (A)=0.2MPa PL (A)=0.5MPa
	- 4.76m:J 80° -85° smooth planar				C	100	74	PL (A)=0.5MPa
	- 5.19m:J 80° -85° smooth planar							
	- 5.68m:J 40° -45° rough planar							PL (A)=0.3MPa
6.0	TEST BORE DISCONTINUED AT 6.0 METRES							

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 2.1m

TYPE OF BORING: SFA TO 2.1m, NMLC CORING TO 6.0m

WATER OBSERVATIONS: FREE GROUNDWATER OBSERVED AT 1.7m WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 25.18
DIP OF HOLE: 90°

BORE No: 202
DATE: 30/9/99
SHEET 1 OF 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, F-type, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SANDY CLAY – dark grey sandy clay								
0.35	SAND – light grey sand								
0.55	SANDSTONE – extremely low strength, extremely weathered, light grey sandstone								
1.0	– 0.95m – very low strength					A			
	TEST BORE DISCONTINUED AT 1.0 METRES								

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** UNCASED

TYPE OF BORING: SFA TO 1.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 26.33
DIP OF HOLE: 90°

BORE No: 203
DATE: 30/9/99
SHEET 1 **OF** 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SANDY CLAY – dark grey sandy clay								
0.4	SAND – dark brown sand								
0.75	SANDSTONE – extremely to very low strength, extremely weathered, off white grey sandstone								
	–1.8m to 2.2m – extremely low strength								25/50mm ref
3.0	TEST BORE DISCONTINUED AT 3.0 METRES								~~10/20mm~~ ref

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** UNCASED

TYPE OF BORING: SFA TO 3.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

Douglas Partners
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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 204 PROJECT 28058A SEPTEMBER 1999
1.00 - 6.00 M

TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 27.66
DIP OF HOLE: 90°

BORE No: 204
DATE: 30/9/99
SHEET 1 OF 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND - grey sand								
0.45	SANDSTONE - extremely low strength sandstone								
1.0	- 1.0m - 700mm Core loss					C	22	0	
1.7	SANDSTONE - very low to low strength, slightly weathered, fractured to slightly fractured, light yellow to off white, coarse grained sandstone								PL (A)=0.1MPa
2									PL (A)=0.1MPa
2.9	- 2.9m - 150mm Core loss								
3.05						C	94	66	PL (A)=0.06MPa
3.65	SANDSTONE - low to medium and low strength, slightly and highly weathered, slightly fractured, off white, coarse grained gravelly sandstone								PL (A)=0.3MPa
4									
5									PL (A)=0.3MPa
5.45	- 5.45m - 550mm Core loss					C	66	41	PL (A)=0.2MPa
6.0	TEST BORE DISCONTINUED AT 6.0 METRES								
7									
8									
9									
10									

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 1.0m

TYPE OF BORING: SFA TO 1.0m, NMLC CORING TO 6.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_s (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

Douglas Partners
Geotechnics • Environment • Groundwater

TEST BORE REPORT

BORE No: 205
DATE: 30/9/99
SHEET 1 OF 1

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 26.44
DIP OF HOLE: 90°

AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND – dark grey sand								
	– 0.45m to 0.67m – light brown								
0.67	SANDSTONE – extremely low strength, extremely weathered, light grey yellow sandstone					A			
0.8	TEST BORE DISCONTINUED AT 0.8 METRES								
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** UNCASED

TYPE OF BORING: SFA TO 0.8m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

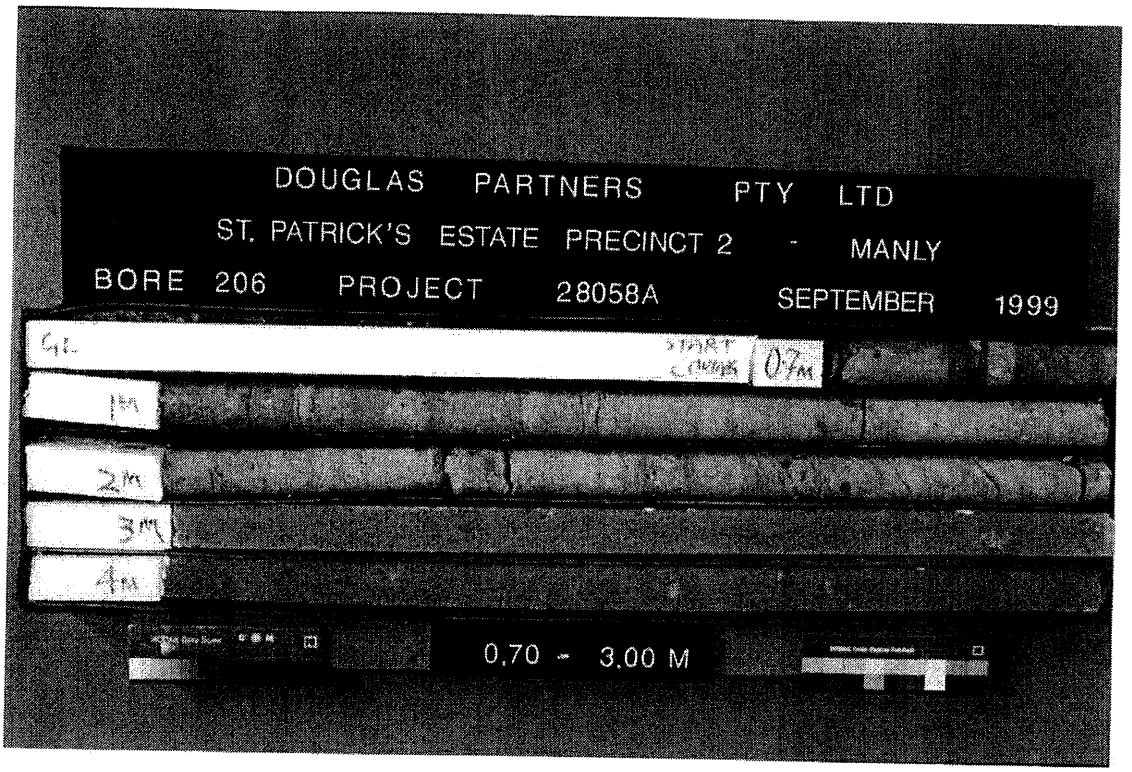
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

Douglas Partners
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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 206 PROJECT 28058A SEPTEMBER 1999
GL
START
0.7m
1m
2m
3m
4m
0.70 - 3.00 M

TEST BORE REPORT

BORE No: 206
DATE: 29/9/99
SHEET 1 **OF** 1

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 33.96
DIP OF HOLE: 90°
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	TOPSOIL								
0.4	SAND – brown sand								
0.7	SANDSTONE – low to medium and medium strength, moderately weathered, slightly fractured to unbroken, off white yellow, coarse grained gravelly sandstone					C	100	82	PL (A)=0.3MPa PL (A)=0.5MPa PL (A)=0.4MPa PL (A)=0.2MPa
3.0	TEST BORE DISCONTINUED AT 3.0 METRES								

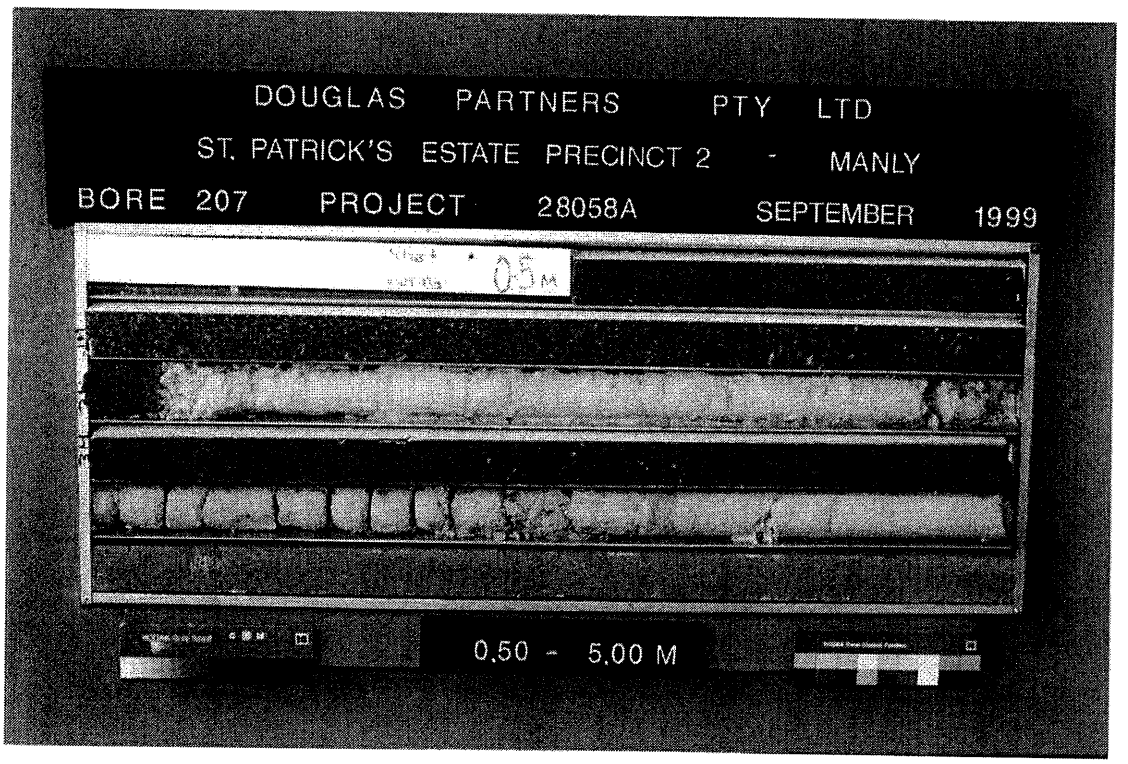
RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 0.7m
TYPE OF BORING: SFA TO 0.7m, NMLC CORING TO 3.0m
WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING
REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 207 PROJECT 28058A SEPTEMBER 1999
0.5M
0.50 - 5.00 M

TEST BORE REPORT

BORE No: 207
DATE: 29/9/99
SHEET 1 OF 1

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 31.49
DIP OF HOLE: 90°

AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard) / Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND - brown sand							
0.4								
0.5	SANDSTONE - extremely low strength sandstone							
	- 0.5m - 1500mm Core loss				C	40	33	
2.0								
2.13	SANDSTONE - very low to low strength, slightly weathered, slightly fractured to fractured, off white, coarse grained sugary sandstone with quartz gravel							PL (A)=0.1MPa
								PL (A)=0.1MPa
3.0	- 3.0m - 1000mm Core loss possible due to sugary and friable sandstone							
4.0					C	50	23	PL (A)=0.1MPa
5.0	TEST BORE DISCONTINUED AT 5.0 METRES							PL (A)=0.1MPa

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 0.5m

TYPE OF BORING: SFA TO 0.5m, NMLC CORING TO 6.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_s (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 208 PROJECT 28058A SEPTEMBER 1999
0.30 - 4.50 M

TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 32.56
DIP OF HOLE: 90°

BORE No: 208
DATE: 29/9/99
SHEET 1 OF 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND - brown sand								
0.3	CORE LOSS 2250mm - possibly due to extremely low strength, sugary and friable sandstone					C	17	9	
2.55									
2.75	SANDSTONE - very low strength, slightly weathered, fractured, off white, coarse grained, sugary sandstone								PL (A)=0.2MPa
	SANDSTONE - low then low to medium strength, slightly weathered, slightly fractured, off white, coarse grained gravelly sandstone					C	100	99	PL (A)=0.2MPa
4.5	TEST BORE DISCONTINUED AT 4.5 METRES								PL (A)=0.3MPa

RIG: SCOUT
DRILLER: COOPER
LOGGED: PARMAR
CASING: GL TO 0.3m

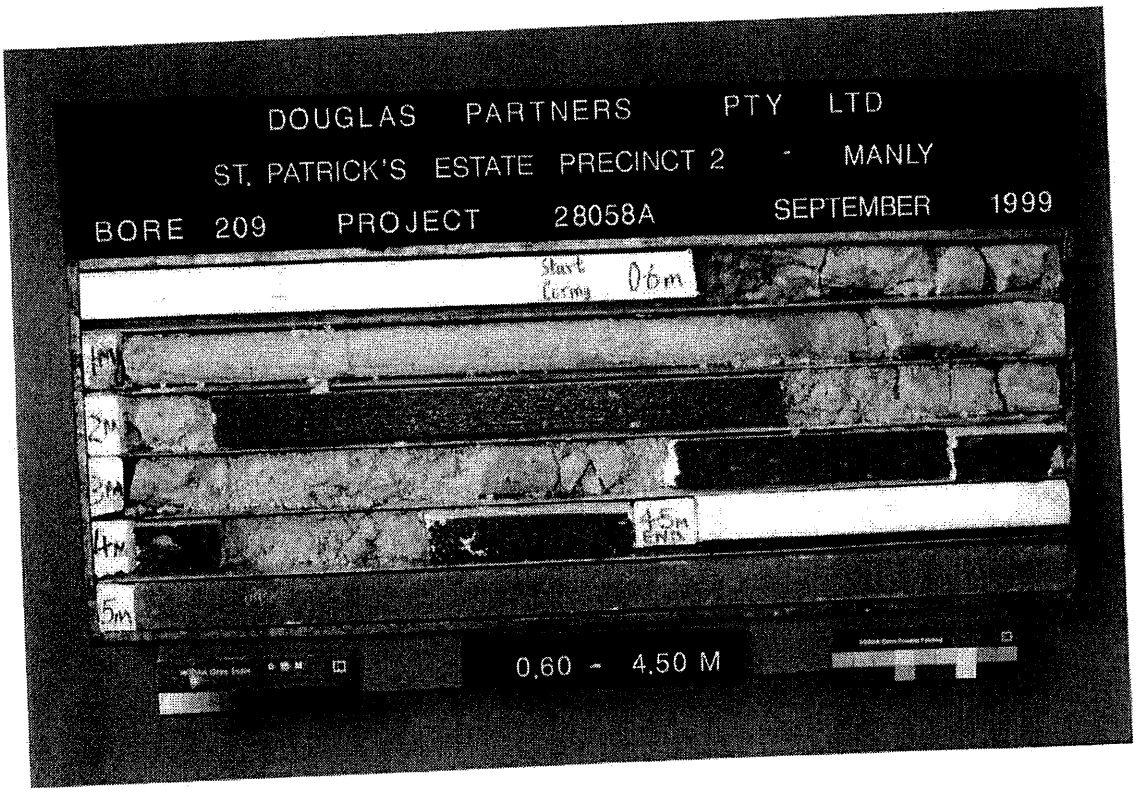
TYPE OF BORING: SFA TO 0.3m, NMLC CORING TO 4.6m
WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING
REMARKS: R = ROTARY

SAMPLING & IN SITU TESTING LEGEND

A auger sample
B bulk sample
C core drilling
pp pocket penetrometer (kPa)
PL point load strength I_S (50)MPa
S standard penetration test
Ux x mm dia. tube
V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 209 PROJECT 28058A SEPTEMBER 1999
Start Core 0.6m
1m
2m
3m
4m
4.5m End
5m
0.60 - 4.50 M

TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 32.42
DIP OF HOLE: 90°

BORE No: 209
DATE: 29/9/99
SHEET 1 OF 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND – dark brown sand								
0.3	SANDSTONE – extremely low strength, light yellow to off white, medium to coarse grained sandstone								
0.6	SANDSTONE – extremely low to very low strength, slightly weathered, slightly fractured, light yellow to off white grey, coarse grained sugary and friable sandstone with quartz gravel								PL (A)=0.04MPa
1									
2.0	– 2.0m – 700mm Core loss					C	67	0	PL (A)=0.04MPa
2.7									
3									
3.4	– 3.4m – 700mm Core loss					C	50	0	
4									
4.1									
4.3	– 4.3m – 200mm Core loss					C	50	0	
4.5	TEST BORE DISCONTINUED AT 4.5 METRES								
5									
6									
7									
8									
9									
10									

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 0.6m

TYPE OF BORING: SFA TO 0.6m, NMLC CORING TO 4.5m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

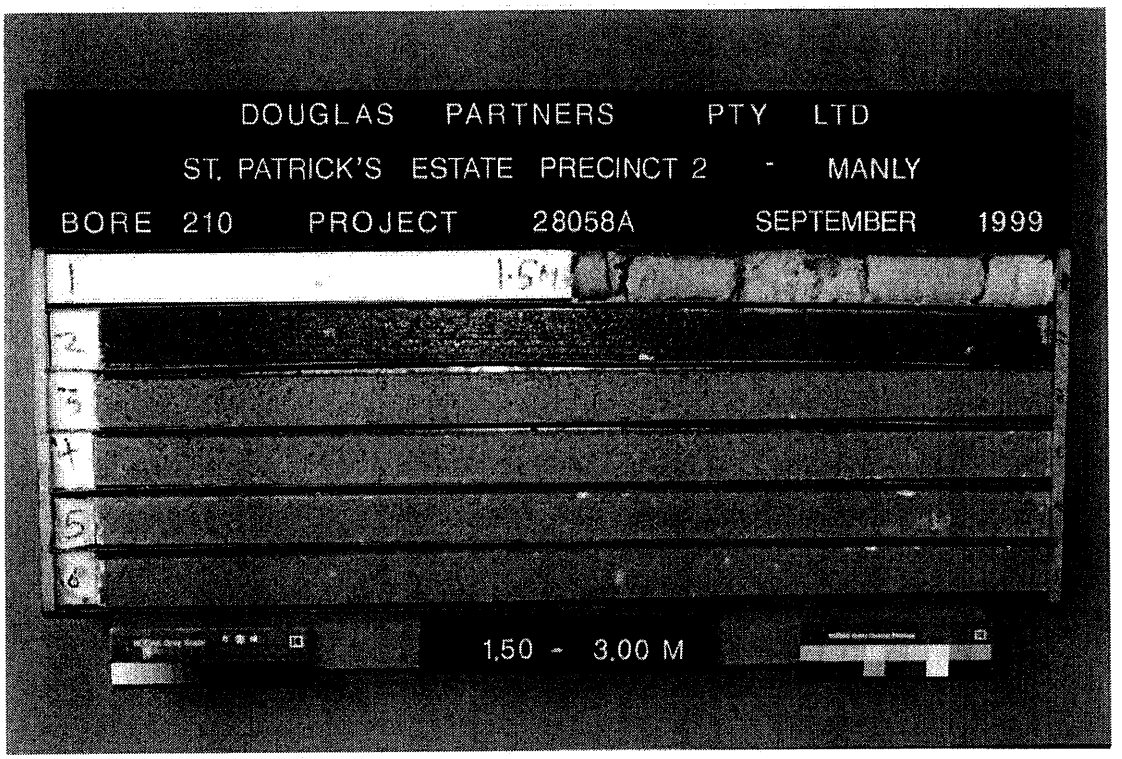
REMARKS: CORE LOSS POSSIBLE DUE TO FRIABLE SANDSTONE

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_s (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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DOUGLAS PARTNERS PTY LTD
ST. PATRICK'S ESTATE PRECINCT 2 - MANLY
BORE 210 PROJECT 28058A SEPTEMBER 1999
1
1.50
2
3
4
5
6
1.50 - 3.00 M

TEST BORE REPORT

CLIENT: HUGHES TRUEMAN REINHOLD
PROJECT: PRECINCT 2: ST PATRICK'S ESTATE
LOCATION: DARLEY ROAD, MANLY

PROJECT No: 28058A
SURFACE LEVEL: 34.04
DIP OF HOLE: 90°

BORE No: 210
DATE: 29/9/99
SHEET 1 OF 1
AZIMUTH:

Depth (m)	Description of Strata	Graphic Log	Soil: Cohesive (Very Soft, Soft, Firm, Stiff, Very Stiff, Hard)	Soil: Non-Cohesive (Very Loose, Loose, Med. Dense, Dense, Very Dense)	Rock Strength (Ex. Low, Very Low, Low, Medium, High, Very High, Ex. High)	Sampling & In Situ Testing: Sample Type	Core Rec. %	RQD %	Test Results & Comments
0	SAND – dark brown sand								
0.6	SANDSTONE – extremely low to very low strength, highly weathered, off white yellow, medium to coarse grained sugary and friable sandstone								
1.9									
2.0	CLAY – firm to stiff, light grey clay (possible extremely weathered siltstone?)					C	33	0	pp=50kPa
	– 2.0m – 1000mm Core loss possible due to sugary and friable sandstone								
3.0	TEST BORE DISCONTINUED AT 3.0 METRES								
4									
5									
6									
7									
8									
9									
10									

RIG: SCOUT **DRILLER:** COOPER **LOGGED:** PARMAR **CASING:** GL TO 1.5m

TYPE OF BORING: SFA TO 1.5m, NMLC CORING TO 3.0m

WATER OBSERVATIONS: NO FREE GROUNDWATER OBSERVED WHILST AUGERING

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A auger sample	PL point load strength I_S (50)MPa
B bulk sample	S standard penetration test
C core drilling	Ux x mm dia. tube
pp pocket penetrometer (kPa)	V Shear Vane (kPa)

CHECKED:
Initials:
Date: 18/11

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RESULTS OF DYNAMIC PENETROMETER TESTS

CLIENT	HTL REINHOLD PTY LTD	DATE	28-9-99
PROJECT	ST PATRICKS ESTATE MANLY, PRECINCT 1	PROJECT NO	28058A
LOCATION	ST PATRICKS COLLEGE, MANLY	PAGE NO	1 of 2

TEST LOCATIONS	1	2	3	4	5	6	7	8	9	10
RL OF TEST	38.4	42.0	40.4	42.5	42.0	40.6	38.8	38.0	43.3	44.5
DEPTH m	PENETRATION RESISTANCE BLOWS/150mm									
0.00 - 0.15	1	6/90mm	outcrop	3	2	1	1	2	0	0
0.15 - 0.30	5	ref		8	7/130mm	2/100mm	3/130mm	3	1	2
0.30 - 0.45	11	bounce		10	ref	ref	ref	5	4	2
0.45 - 0.60	ref			10	bounce	bounce	bounce	7	4	4
0.60 - 0.75	bounce			4/10mm				9/50mm	7	8/100mm
0.75 - 0.90				ref				ref	7	ref
0.90 - 1.05				bounce				bounce	11	bounce
1.05 - 1.20									11	
1.20 - 1.35										
1.35 - 1.50										
1.50 - 1.65										
1.65 - 1.80										
1.80 - 1.95										
1.95 - 2.10										
2.10 - 2.25										
2.25 - 2.40										
2.40 - 2.55										
2.55 - 2.70										
2.70 - 2.85										
2.85 - 3.00										

TEST METHOD AS 1289.6.3.2, CONE PENETROMETER ✓
AS 1289.6.3.3, FLAT END PENETROMETER O

TESTED BY: MS
CHECKED BY:

Douglas Partners
Geotechnics · Environment · Groundwater

RESULTS OF DYNAMIC PENETROMETER TESTS

CLIENT	HTL REINHOLD PTY LTD	DATE	28-9-99
PROJECT	ST PATRICKS ESTATE MANLY, PRECINCT 1	PROJECT NO	28058A
LOCATION	ST PATRICKS COLLEGE, MANLY	PAGE NO	2 of 2

TEST LOCATIONS	11	12	13	14	15					
RL OF TEST	44.9	44.7	44.3	42.4	41.0					
DEPTH m	PENETRATION RESISTANCE BLOWS/150mm									
0.00 - 0.15	0	1	1		1					
0.15 - 0.30	2	3/100mm	2	8	3					
0.30 - 0.45	5	ref	5	10	6/75mm					
0.45 - 0.60	15	bounce	2/90mm	5	ref					
0.60 - 0.75	20/90mm		ref	3	bounce					
0.75 - 0.90	ref		bounce	3						
0.90 - 1.05	bounce			3						
1.05 - 1.20				3/75mm						
1.20 - 1.35				ref						
1.35 - 1.50				bounce						
1.50 - 1.65										
1.65 - 1.80										
1.80 - 1.95										
1.95 - 2.10										
2.10 - 2.25										
2.25 - 2.40										
2.40 - 2.55										
2.55 - 2.70										
2.70 - 2.85										
2.85 - 3.00										

TEST METHOD AS 1289.6.3.2, CONE PENETROMETER ✓
AS 1289.6.3.3, FLAT END PENETROMETER O

TESTED BY: MS
CHECKED BY:

Douglas Partners
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total earth care

Lots 9 to 12
Precinct 13
St Patrick's Estate, Manly

Translocation Plan
Acacia terminalis* subsp. *terminalis

Total Earth Care Pty Ltd
November 2006

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Lots 9 to 12
Precinct 13
St Patrick's Estate, Manly

Translocation Plan
Acacia terminalis subsp. *terminalis*

Quality Control	© Total Earth Care Pty Ltd 2006		
Revision/Version No.	REV 0	Date of revision:	November 7, 2006
Prepared by:	R Blackall	Status:	Final
Prepared for:	Lend Lease Developments		
TEC Job No.	C584-LLD		

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Lots 9 to 12, Precinct 13
St Patrick's Estate, Manly

Acacia Translocation Plan

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APPENDICES

A	Translocation Plan Drawing
B	Botanic Gardens Trust Test Results

Lots 9 to 12, Precinct 13
St Patrick's Estate, Manly

Acacia Translocation Plan

1 INTRODUCTION

1.1 Background

Lend Lease Development Pty Ltd ('Lend Lease') have been granted approval for the subdivision into residential lots of a portion of St Patrick's Estate (the 'Estate') at North Head, known as Precinct 13 (the 'subject site'). There are currently eight detached dwellings on Lots 1-8 under construction that were approved by Council under previous Development Applications. Development Applications (DA Nos. 518-521/05) have been submitted by Lend Lease on behalf of the Catholic Church to Manly Council on 30 November 2005, seeking approval for the next stage of construction for four detached dwellings on Lots 9-12, Precinct 13.

The flora and fauna of Precinct 13 was previously described by Gunninah (2003) and more recently in Flora & Fauna Assessment prepared by Ecosense (2004) as part of the DAs for Lots 1 to 8. As part of the Ecosense study, Total Earth Care Pty Ltd was engaged to conduct a flora survey of Precinct 13, during which several individuals of the threatened species *Acacia terminalis* subsp. *terminalis* were recorded in the vicinity of Lot 8. A recent targeted survey of Lots 9 – 12 as part of the proposed translocation of Acacia plants associated with development on these Lots has located approximately 20 individuals of *Acacia terminalis* subsp. *terminalis.*

The subspecies is listed as "endangered" under Schedule 1 of the *NSW Threatened Species Conservation Act 1995* (TSC Act). Accordingly, Section 5A of the *NSW Environmental Planning & Assessment Act 1979* (the 8-part test as it was known then) was addressed, which determined that the development was not "likely" to impose "a significant effect" on this subspecies. However, it was considered prudent to salvage the plants to be affected and translocate them to another suitable site within the Estate (TEC in Ecosense 2004).

Manly Council granted consent for the development on lots 9 to 12, and included the following consent condition as part of the approval for DA 518/05 for Lot 9, namely:

ANS01
Where Acacia terminalis ssp. terminalis are located on the site, it is to be excavated and translocated to a recipient site located immediately south of precinct 13 prior to construction. The translocation is to include their above ground parts, root systems and surrounding soil. Details of the translocation are to be subject to a Translocation Management Plan (TMP) which must be prepared by a suitably qualified consultant in consultation with Council for endorsement prior to commencement of work. The TMP must contain guidelines for post-construction management and monitoring, and a map showing the location of plants to be salvaged and the recipient site. The TMP must be consistent with the Guidelines for the Translocation of Threatened Plants in Australia (Vallee et al. 2004)

As a consequence, this Translocation Plan has been prepared to facilitate the translocation of plant material, and soil material surrounding the roots, on the subject site in accordance with accepted best practice in the bush regeneration and horticulture industries. The Plan is based on field experience from previous translocation projects, as well as on published guidelines, with particular reference to the draft "Guidelines for the Translocation of Threatened Plants in Australia" (Vallee *et al.* 2004) and the guidelines for the translocation of the Duffys Forest ecological community (NPWS 2003).

1.2 Aims

The translocation is classified as a "salvage dig" by Vallee *et al.* (2004), which involves "transplantation of mature plants or soil to an area not affected by the development". The aims of the translocation are:

- To retain the existing genetic material of *A. terminalis* subsp. *terminalis* on or near the subject site (in preference to its complete removal or destruction);
- To provide an opportunity to establish a viable local population of the subspecies within the Estate, that is self-sustaining in the long-term; and
- To improve the diversity of locally indigenous native flora on the Estate.

2 PRE-TRANSLOCATION

2.1 Identification and mapping

A small stand of *A. terminalis* subsp. *terminalis* occurs within and adjacent to Lot 9 to Lot 12, within Precinct 13 of the Estate. At the time of writing this Plan, there are approximately twenty individuals[1] located in this area comprising a mixture of mature, semi-mature and seedlings. There is one mature plant and five seedlings located within the 10 metre protection zone at the southern end of the Lot12.

These locations are displayed on the accompanying 'translocation plan drawing' (Appendix A).

2.2 Approvals

Threatened species licencing under the *National Parks & Wildlife Act* (i.e. a s.132c licence for research, educational or conservation works) or the *Threatened Species Conservation Act* (i.e. a s.91 licence/s.95 certificate for other activities) are not required for works that are essential for the carrying out of development in accordance with a development consent.

This exemption includes translocation and bushland management activities provided that:

- the proposed works are only to be carried out in the area covered by the DA; and
- the proposed methodology was assessed and approved as part of the DA; or
- the proposed methodology is detailed in a document that was prepared to meet the conditions of the approval, and that document was subsequently approved by the consent authority.

Written evidence of a DA approval (from Council) or a s.91 licence or s.95 certificate (from DEC) must be supplied to the contractor responsible for the translocation works prior to commencement of works.

As the translocation proposal will be assessed and approved by Council as part of the Development process, no licence from the NSW Department of Environment and Conservation is required. Approval of this Translocation Management Plan (TMP) by Council is required for the *Acacia terminalis* subsp. *terminalis* translocation work to proceed within Lots 9-12 Precinct 13.

2.3 Site induction

All persons involved in the translocation project will receive a site induction prior to the commencement of work. The site induction will be delivered by the Site Supervisor and will include:

- details of the location and significance of *A. terminalis* subsp. *terminalis*;
- the location of the donor and recipient sites;

1 Note: the number of above-ground plants may change over time, with germination and mortality of plants likely to occur following publication of this Plan.

- details of the works that have been approved by Council consent; and
- the conditions of the approval.

2.4 Qualifications

The contractor assigned to complete the translocation works will possess suitable qualifications in bushland management as follows:

- All of the works associated with the translocation project will be directly supervised by a bushland supervisor with a minimum of 2000 hours field experience in bush regeneration or previous experience directly supervising the translocation of threatened plant or soil from an endangered ecological community;
- The bushland supervisor will have appropriate qualifications, being either TAFE certificate in bushland regeneration or University degree in environmental science (or both); and
- The contractor will have specific experience in native (indigenous) soil and/or vegetation translocation.

2.5 Notification

A representative of Manly Council will be informed of the upcoming translocation a minimum of 48 hours prior to the commencement of on-ground translocation works on the subject site.

2.6 Access Restrictions

Only people directly involved in the soil translocation process will be permitted to enter the translocation areas.

3 TRANSLOCATION ACTIVITIES

3.1 Choosing the Recipient Site

A suitable recipient site for the translocation has been chosen, as shown on the translocation plan drawing (Appendix A), according to the following criteria:

- It has the same or similar geological parent material as the donor site.
- It is as close as possible to the donor site.
- The land tenure allows for the recipient site to remain as protected bushland indefinitely.
- The Catholic Church has undertaken to manage the translocated material as part of its ongoing responsibility for maintenance of the established 'vegetated links'.

3.2 Preparation of the Recipient Site

3.2.1 Identification

The recipient site is identified on the accompanying plan drawing (Appendix A).

The recipient site will be defined on-ground with galvanised star pickets placed at a maximum interval of 10m.

3.2.2 Weeding

The recipient site should be weeded prior to translocation to ensure that no weed propagules will regrow in the translocated material.

3.2.3 Re-shaping

The recipient site should be shaped to achieve the following results:

- An 5 tonne excavator with tilting bucket is suggested as the best machine for excavating the soil and lifting plants.
- Ensure when re-shaping the existing sandstone capping material, the underlying soil material is not exposed.
- The ground (soil) surface must be smooth. A smooth soil surface allows translocated soil to be spread more evenly and over more ground than an uneven surface would.
- The soil must be moved once and cannot be stockpiled. Multiple handling will disrupt the of soil structure and hinder the regrading of the soil profiles.
- The contour of the prepared recipient site should mirror the shape of the finished soil profiles. The final contour of the recipient site (post-translocation) should be the same as existing levels in adjacent areas.
- The prepared recipient site should also have contours that will drain the sub-surface and surface water properly, to avoid pooling or ponding or water.
- All machinery, tools, material and equipment will be washed down to the satisfaction of the bushland supervisor at an appropriate location outside the bushland, prior to entering donor/recipient sites.

3.2.4 Fencing

The proposed recipient sites are located within the previously established vegetated link located to the south of Precinct 13. Locating the translocated plants within this area provides a degree of protection from on-going disturbance, however the recipient sites will be fenced off to prevent trampling and disturbance of the recipient sites.

3.3 Siltation and erosion control

Specific erosion control measures for the translocation process are:

- All topsoil that has been translocated will be surrounded with silt fencing.
- Silt fences should be erected according to the Landcom (2004) guidelines: "Managing Urban Stormwater: Soils and Construction" in a zigzag pattern across the contour to further compartmentalise silt movement and to avoid concentration of sediment behind the fence.
- Fill batters should be benched to compartmentalise water flow and to provide flat ground onto which silt fences can be erected.

3.4 Phytophthora control

As part of the management of Cinnamon Fungus *Phytophthora cinnamomi* ('Phytophthora'), a survey was conducted on the site on 10th October, 2006. A total of ten (10) soil samples (six donor sites and four recipient sites) were taken during the survey, with sample sites selected to represent different conditions on the site. Preference was given to areas on the lots where soil moisture was likely to be high, such under a dense vegetation canopy, in depressions that could collect water or areas where subsurface water flow may be directed to the surface by rock outcrops.

The survey returned no positive results for the soil fungal pathogen *Phytophthora cinnamomi;* however three soil samples from the donor site returned positive results for the presence of another species of Phytophthora. In addition, all samples contained a species of Pythium, but this is not a pathogen that is of concern to native plants in a natural environment.

Phytophthora cinnamomi is considered the most common and important species of *Phytophthora* causing root rot. While other species of *Phytophthora* such as the one isolated from three of the soil samples from within lots 9-12 may cause disease, it is generally less severe (Summerell *et al* 2005).

In light of the survey results the following recommendations are made:

- Because of the presence of a species of *Phytophthora*, a treatment regime should be put in place as part of the proposed Acacia translocation to control the growth of *Phytophthora sp.* to assist the survival rate of the translocated plants. This treatment regime should be based on the recommendations of the Plant Disease Diagnostic Unit (Botanic Gardens Trust), which are set out in their test results which is attached as Appendix B.
- All trucks, machinery, tools and footwear to be thoroughly cleaned and scrubbed down with a diluted bleach solution after entering the donor site for the translocation work. The cleaning should occur on a sealed surface such as cement or asphalt.
- A bushland management officer at Manly Council should be notified of the presence of a species of Phytophthora other than *Phytophthora cinnamomi* on the site.
- The areas of bushland surrounding the donor and recipient sites should be monitored for evidence of dieback and resurveyed if plant dieback becomes apparent.
- Washing boots with dilute chlorine/bleach should occur before entering a Phytophthora free area after being in an area that has not been tested and confirmed to be Phytophthora free.

3.5 Collection of seed, propagules and brush material

- Seed will be collected from any *A. terminalis* subsp. *terminalis* individuals that may be bearing seed at the time of the translocation[2].
- In the absence of seed, cuttings will be taken prior to translocation and supplied to a nursery for propagation. Monitoring of the recipient sites will dictate whether the plants grown from cuttings will be used on site.
- Some brush-matting will also be salvaged from the donor site. This brush-matting should be laid over the recipient site to stimulate the growth of seedlings of fire obligate plant species.

3.6 Plant and Soil Salvage

- All earth works are to be completed when soil moisture content is at 'field capacity' and no wet weather is forecast.
- All individuals of *A. terminalis* subsp. *terminalis* will be dug out by excavator and piled onto the bed of a waiting truck ready for relocation. The area to be excavated will be identified with spray paint on the ground surface prior to commencement. As much soil and root system of each plant will be excavated at one time, plus an additional surrounding soil, where possible.
- Larger plants will be lifted individually, whereas several smaller plants can be excavated together.
- An area of equivalent size to the stripped area on the donor site will then prepared at the recipient site.

[2] At the time of writing, none of the individuals of *A. terminalis* subsp. *terminalis* within Precinct 13 are bearing seed. It is therefore unlikely that any fresh seed can be harvested during the translocation process. Notwithstanding, seed will be collected from translocated plants during the next season or when plants next produce seed as a means of further propagating genetic material for later planting into vegetated links within the Estate.

3.7 Machinery

- An 5 tonne excavator with tilting bucket will be used for separating soil profiles, excavating and transferring plants and preparing the recipient site.
- A utility with a flat bed tray will be used for transferring the excavated plants from the donor site to the recipient site.

4 POST-TRANSLOCATION

After the completion of translocation works the recipient site is to be accessed only by persons performing maintenance actions, or assessing the topsoil and natural regeneration.

A 12-month maintenance programme for the recipient site is proposed and will involve:

- Staking and numbering each translocated plant, with a record kept of all plants for the duration of the maintenance period. Notes of the height, crown spread, stem diameter and general health of each plant will be collected at each maintenance event.
- Twice-weekly watering of the translocated plants and weeding of the recipient site for the first month from the date of translocation;
- Monthly watering and weeding of the recipient site for the following 11 months;
- Monitoring the number of plants at each monthly visit. Any losses or plant mortality will be reported to Council.

Weed control shall only be performed by persons that are formally qualified in bush regeneration and under the direct supervision of the bushland supervisor.

Seed will be collected from translocated plants during the next growth season or when plants next produce seed, as a means of further propagating genetic material for later planting into vegetated links within the Estate.

The recipient site will not be planted, seeded, hydro-mulched, covered or otherwise disturbed until the success of the translocation has been determined by the maintenance program. This will be a period of at least three years.

REFERENCES

NPWS (2003) *Soil Seedbank Translocation from Remnants* [sic] *Duffys Forest ecological community. June 2003.* NSW National Parks & Wildlife Service, Hurstville.

Total Earth Care (2005) *Precinct 13 St Patrick's Estate, Manly: Acacia Translocation Plan.* Total Earth Care Pty Ltd, North Narrabeen.

Vallee L, Hogbin T, Monks L, Makinson B, Matthes M and Rosetto M (2004) *Guidelines for the Translocation of Threatened Plants in Australia.* Second Edition. Australian Network for Plant Conservation, Canberra.

Appendix A

Translocation Plan Drawing

Proposed Residential Development
Lots 9-12
Precinct 13, St Patrick's Estate, Manly

Acacia Translocation Plan

Title: **Translocation Plan**

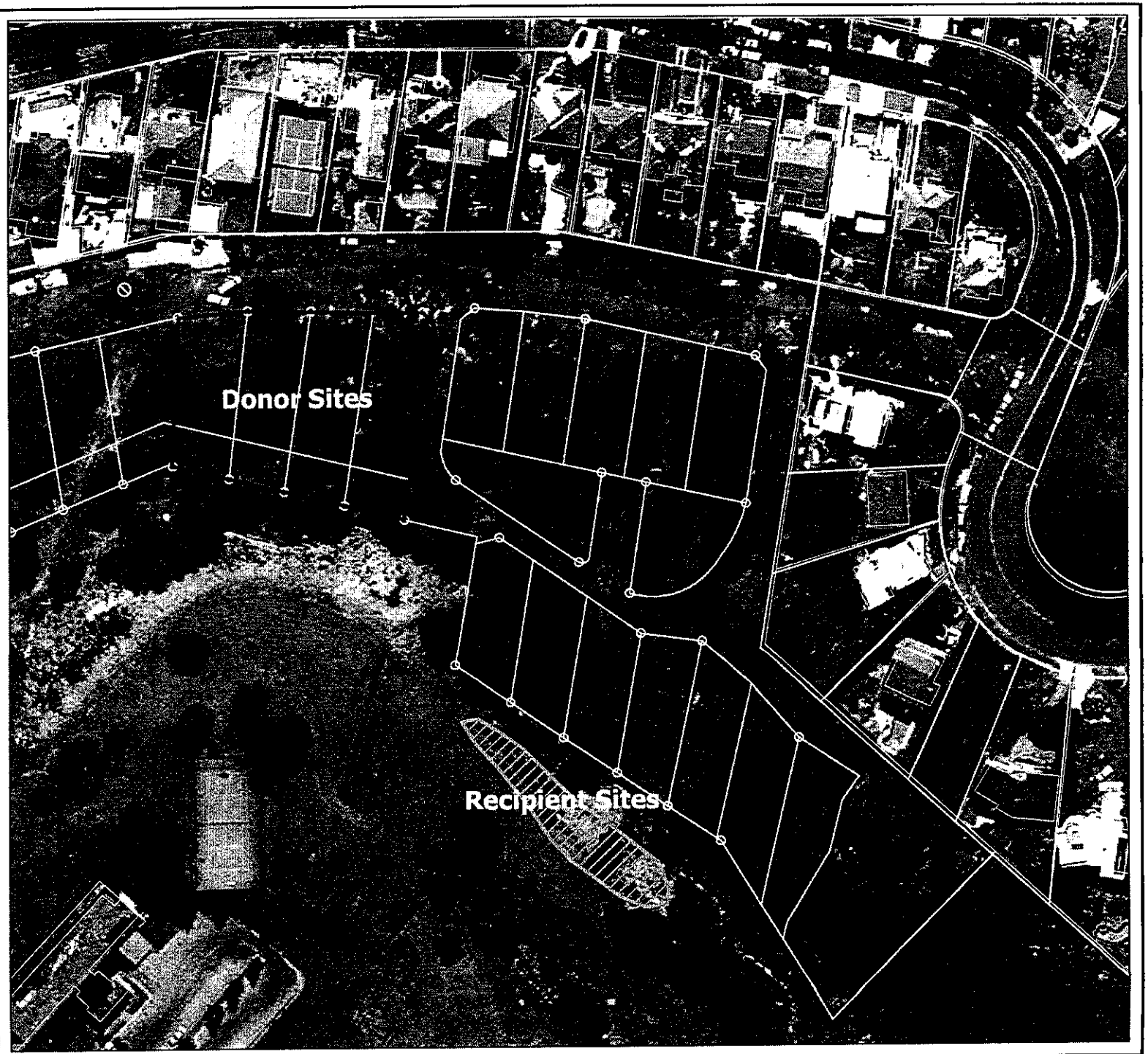
Site: Lot 9 - 12, Precinct 13
St Patrick's Estate

Client: Lend Lease Developments

Date: October 23, 2006

Project No: C584-LLD

Author: R Blackall



LEGEND

Site_Boundary

Lot Boundaries

Recipient_Sites

Metres
25 12.5 0 25

N

Data Source:
Data 1
Data 2

total earth care

Copyright Total Earth Care Pty Ltd, 2006
Tel: 02 9913 1432 Fax: 02 9913 1434

Appendix B

Botanic Gardens Trust Test Results

Proposed Residential Development
Lots 9-12
Precinct 13, St Patrick's Estate, Manly

Acacia Translocation Plan

Botanic Gardens Trust
SYDNEY

Science Education
CONSERVATION
Horticulture Recreation

Plant Disease Diagnostic Unit
Tel +61-2-9231 8189
Fax +61-2-9241 1135

Rob Blackall
Total Earth Care
37 Irrawong Road
North Narrabeen
NSW 2101

20/10/2006

Dear Rob

RE: Soils from St. Patrick's, Manly (our ref. E06/251)

We have tested the above soils for the presence of major soil-borne fungal pathogens. A species of *Pythium* was found in all samples, but this is not considered to be a serious pathogen to native plants in a natural environment.

However, we did isolate a *Phytophthora* species from three of the samples – D1, D3 and D4. It was not *Phytophthora cinnamomi*, but is in a group of *Phytophthora* species that are considered to be pathogenic and we therefore suggest you treat the soil accordingly.

As discussed on the phone, we recommend treating any transplanted plants and their associated soil with Ridomil at the concentrations given by the manufacturer. It would be advisable to treat an extended area around the transplanted soil to maximise control of the pathogen. A couple of weeks after treatment with Ridomil, we suggest drenching the soil with Anti-Rot. A second treatment, 4-5 week after the first is also suggested. This is not a fungicide, but actually increases the plant's resistance to the pathogen.

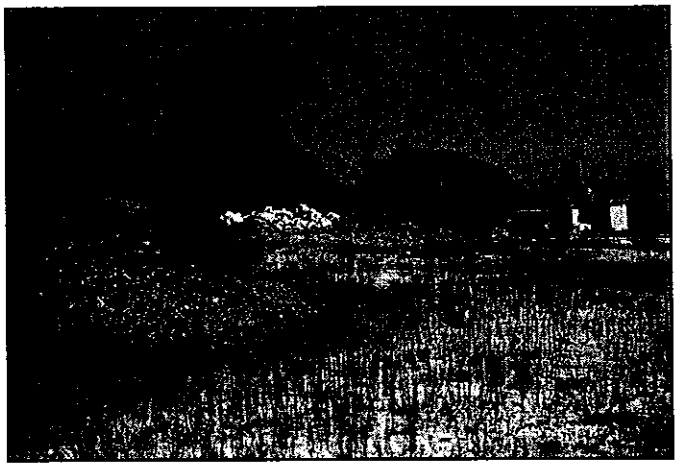
Any measures that will reduce the shock of transplantation, such as watering and covering the root zones of the plants with a good quality, organic mulch, are also advised.

If you have any questions please don't hesitate to phone.

Yours sincerely,

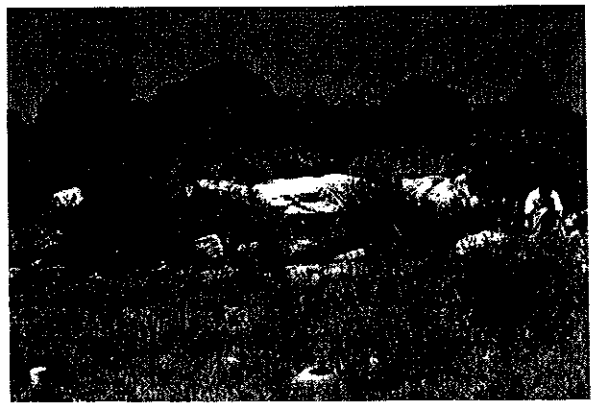
Dr Edward Liew
Plant Pathologist

Ecological assessment proposed residential development.



Lots 20 to 26
Montpellier Place,
North Head

March 2008



lesryk
ENVIRONMENTAL
CONSULTANTS

LesryK Environmental Consultants
in conjunction with
Ecosense Consulting Pty Ltd

Report prepared on behalf of:

Lend Lease Property Group

by

LesryK Environmental Consultants and Ecosense Consulting Pty Ltd
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Please note that, given the dynamic nature of the relevant pieces of environmental legislation considered in this report, the authors consider that this report only has a 'shelf life' of six months. If a development application, review of environmental factors or statement of environmental effect is not submitted to a determining authority for consideration within this time frame, it is recommended that this report be reviewed and revised where required in light of any relevant legislative listings or changes.

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1. Introduction.

This report presents the findings of a flora and fauna survey of the lands that occur within, and in close proximity to, Lots 20 to 26, Precinct 1, Montpelier Place (Figure 1 and 2). The survey has been undertaken at the request of Lend Lease Property Group to determine the ecological impacts associated with the development of these seven lots. For reference, the location of the St Patrick's Estate is provided on Figure 1.

The Proposal would encompass the development of seven detached two and three level houses, each supporting a double garage, gardens and opportunities for the establishment of a pool should the owners wish this in the future. Where required, more detailed information on the scope of the project is provided in the development's DA.

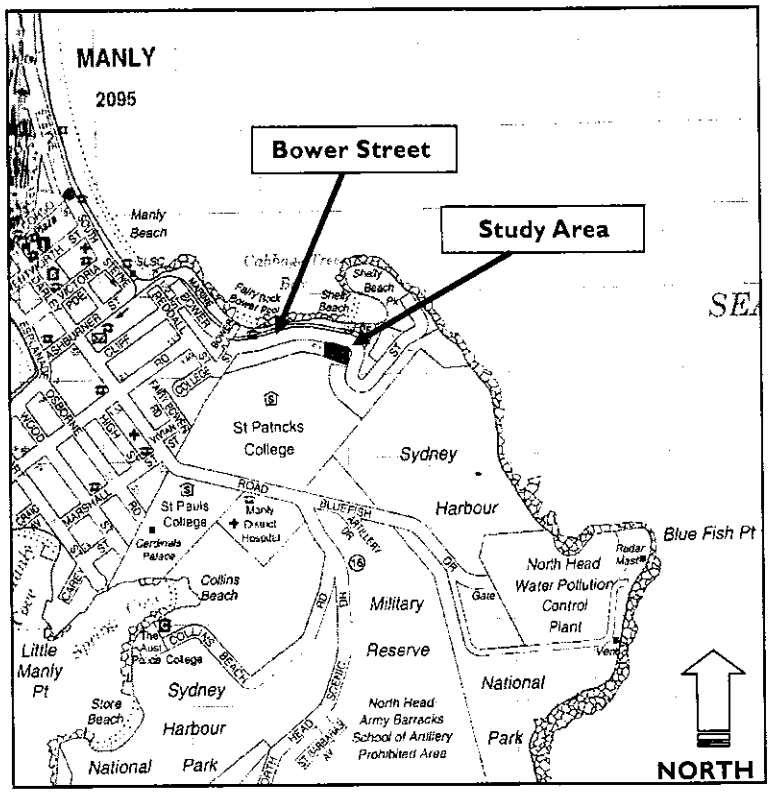


Figure 1: Study location and area.

Source: UBD (1993).
Not to scale.

With reference to the definitions provided by the Department of Environment and Climate Change [DECC] (DECC 2004) it is noted that the:

- Subject site is defined as: the area(s) directly affected by the Proposal (i.e. Lots 20-26 Montpelier Place);
- Study area is defined as: the subject site and any additional areas that are likely to be affected by the Proposal, either directly or indirectly; and
- A local population is defined as: the population that occurs within the study area, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated.

'Locality' is considered to encompass all lands that occur within 5 square kilometres (km^2) of the subject site.

When referring to the Proposal, this is considered to include all works associated with the development and occupation of Lots 20 to 26.

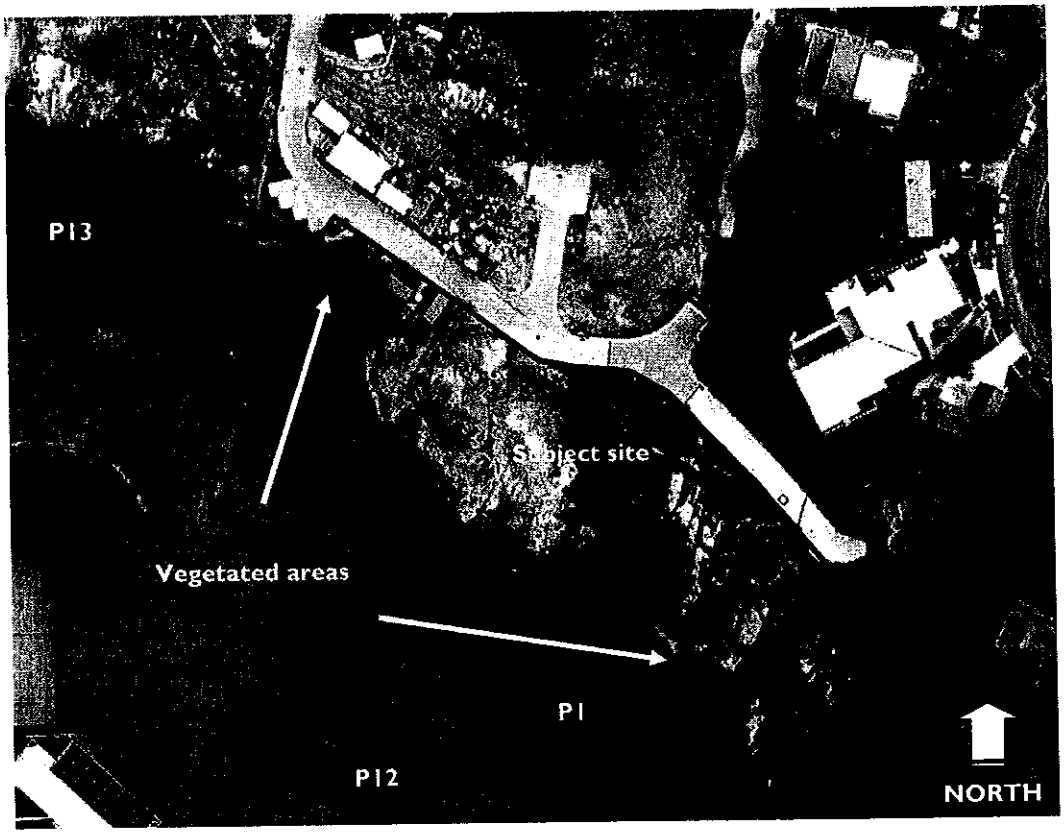


Figure 2: Subject site and areas of vegetation. (Study limits are approximate only).

Source: Google Maps (2008). Not to scale.

The assessment of possible impacts associated with the Proposal is based on a field survey of the subject site, a literature review of previous studies undertaken in both the locality and this portion of the Manly Local Government Area (LGA), the consultation of standard databases and the consideration of the objectives of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*), the New South Wales [NSW] *Environmental Planning and Assessment Act 1979*, NSW *National Parks and Wildlife Act 1974*, NSW *Threatened Species Conservation Act 1995* (*TSC Act*) and any relevant State Environmental Planning Policies (SEPPs).

2. Environmental setting.

Development of parts of the St Patrick's Estate, North Head, NSW have been the subject of various Development Applications (DAs) and Land and Environment Court decisions since 1996. North of Darley Road, Precinct 2 has already been developed through the establishment of residential flats and a townhouse complex. The construction of 44 apartments and 16 townhouses on Precincts 3 and 12 was completed in June-July 2007, with the construction of Lots 1to 8 finalised in February 2007. Lots 13 to 19 of Precinct 1 are currently under construction.

As noted, the subject site is located in the Sydney suburb of Manly, within the Manly LGA. Land uses that occur in the vicinity of the study area include residential developments to the north, east and west (Figure 1). To the south is St Patrick's College and further beyond the College is the North Head Army Barracks Military Reserve and Sydney Harbour National Park (Figure 1).

Due to the undertaking of previous decontamination works, the subject site is heavily disturbed and supports areas of fill and sites that have been cleared and are now vegetated by exotic grasses. The decontamination works resulted in the removal of all soil material down to bedrock, and the removal of bitumen and other underlying material. The exposed areas were backfilled with topsoil and planted with stabilising winter grasses. Due to the previous decontamination works the majority of the subject site is cleared apart from an isolated mature Melaleuca and Fig Tree, a single conifer, some semi-mature Acacias and a mixture of native and exotic groundcover plants. Two main pockets of vegetation exist within the subject site, these occurring within the western and eastern portions of the site (Figure 2). Apart from the mature trees, it is noted that all the remaining vegetation is the result of natural regeneration.

For reference, a photographic record of the subject site has been provided, this illustrating the current condition of Lots 20 to 26. In total, Lots 20 to 26 cover an area of approximately 3723 square metres (m^2).

Natural elevations within the subject site are around 25 metres (m) Australian Height Datum (AHD), the site being located within a landscape that is characterised by undulating to rolling low hills. The annual average rainfall in the locality is around 1220 millimetres (mm) with the greatest falls being experienced during the summer months (Bureau of Meteorology 2008). Average temperatures range from a winter low of approximately 8°C to a summer high of around 26°C (Bureau of Meteorology 2008).

The soils of the subject site have been mapped by Chapman and Murphy (1989) as being comprised of the Lambert Erosional Landscape. These soils are derived from the underlying Hawkesbury Sandstone geology, this being generally comprised of medium to coarse-grained quartz sandstone with minor shale and laminite lenses (Chapman and Murphy 1989). The Hawkesbury Sandstone soils are generally lithosols/siliceous sands that are associated with rock outcrops and Earthy Sands and Yellow Earths on crests and the insides of benches (Chapman and Murphy 1989). These soils are highly permeable, of low fertility and subject to high erosion hazard. Rock outcropping is common and generally occurs as wide benches (Chapman and Murphy 1989).

Conservation reserves and other protected areas that occur in the vicinity of the subject site include Sydney Harbour National Park (this covering an area of 393 hectares [ha]), and a number of smaller Council managed reserves, including Shelly Beach Park, Spring Cove and Little Manly Point, the exact size of which are unknown. Within the Manly LGA there is 268.1ha of National Park [it is noted that portions of Sydney Harbour National Park are present within the Mosman LGA] and 88.12ha of Crown land (Manly City Council 2004). Whilst this is the case approximately 90% of the bushland in Manly is degraded to some extent due to human activities (Manly City Council 1997 in Manly City Council 2004).

3. Literature review and field guides.

Prior to undertaking any fieldwork, previous studies conducted in the region and known databases were consulted to identify the diversity of flora and fauna species known for, or potentially occurring in, the locality. The identification of known, or potentially occurring, native species within this portion of the Manly LGA, particularly those listed under the Schedules of the *EPBC* and/or *TSC Acts*, thereby permits the tailoring of the field survey strategies to the detection of these animals and plants, their vegetation communities and necessary habitats. By identifying likely species, particularly any threatened animals or plants, the most appropriate species-specific survey techniques can be selected should their associated vegetation communities/fauna habitats be present. The undertaking of a literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are considered and drawn upon as required. This approach therefore increases the probability of considering the presence of, and possible impacts on, all known and likely native species, particularly any plants and animals that are of regional, state and/or national conservation concern. This approach also avoids issues inherent with a one off "snap shot" study.

Photographic record of the subject site.



Plate 1: Looking at the central portion of the proposed development area. Note the generally cleared nature of the site.



Plate 2: The eastern portion of the study site.



Plate 3: Looking south through the eastern half of the site.

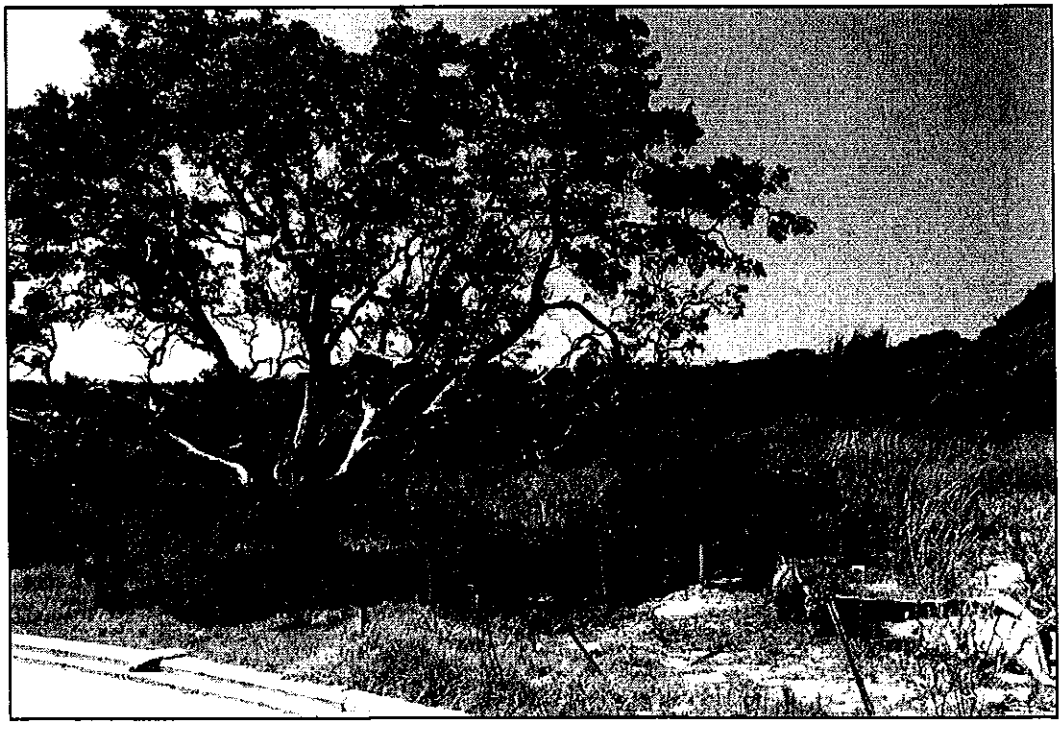


Plate 4: A lone Broad-leafed Paperbark (*Melaleuca quinquinervia*). Photo taken looking south-east through the northern portion of the study area.

The studies, reports and databases referred to include:

- A flora and fauna report of Manly Council's bushland reserves (Skelton *et al.* 2003);
- A flora and fauna assessment of the St Patrick's Estate Precincts 1 and 13 (Gunninah Environmental Consultants 2003);
- A report prepared on the potential impacts of remediation works in Precincts 1 and 13 on flora and fauna (Bali 2002);
- A Species Impact Statement prepared for the development of the St Patrick's site (Bali 2005a);
- An ecological assessment report prepared for Lots 9-12, Precinct 13 (LesryK Environmental Consultants 2005);
- An ecological assessment report prepared for Lots 13-19, Precinct 1 (LesryK Environmental Consultants 2007);
- Ecological assessment reports prepared for adjacent Lots (Pepper 2005, Bali 2002, Bali 2004);
- An ecological assessment report prepared for Precinct 3 and 12 (Total Earth Care and Ecosense Consulting 2004);
- The results of on-going Bandicoot monitoring investigations conducted within the St Patrick's and St Theresa's Convent sites (LesryK ongoing);
- The Department of Environment, Water, Heritage and the Arts (DEWHA) Online Database (DEWHA 2008);
- The DECC Atlas of NSW Wildlife (DECC 2008a);
- The BioNet Database (NSW Government 2008);
- The Australian Museum Database (Australian Museum 2008); and
- Manly Council's State of the Environment Reports (Manly City Council 2004, 2006 and 2007).

Other reports and documents referred to are provided within the bibliography section of this report.

When accessing the DEWHA and DECC databases, the search area specified was 5km^2 centred on the subject site, whilst the Manly LGA was used when investigating the Australian Museum and BioNet databases.

All these databases and reports were reviewed and drawn upon where relevant. While reviewing these documents, particular attention was paid to identifying records of species listed under the Schedules of the *EPBC* and/or *TSC Acts*, animals and plants that have been recorded in the locality and which may occur within, or in the vicinity of, the subject site.

Field guides and standard texts used include:

- Harden (1992, 1993, 2000 and 2002), Fairley and Moore (2000), Robinson (1994) and Auld and Medd (1992) (used for the identification of plants);
- Cogger (2000) (reptiles and frogs);
- Simpson and Day (1999) (birds);
- Strahan (1995) (mammals); and
- Triggs (1996) (scats, tracks and markings).

The naming of those species recorded or known for the locality follows the nomenclature presented in these texts.

The conservation significance of those plants and animals recorded is made with reference to:

- A publication on Australia's Rare or Threatened Plants (ROTAP's) (Briggs and Leigh 1996);
- The Schedules to the *EPBC* and *TSC Acts*; and
- Manly City Council's State of the Environment Report (Manly City Council 2007).

4. Field survey methods.

A survey of the study area was undertaken by Corrine de Mestre (Bsc. Hons) and Stephen Bloomfield (B. App. Sc.) on the 16th of January 2008. The investigation of the site involved foot traverses across the entire Proposal area, and those habitats that occur adjacent to it up for a distance of approximately 10m. During these investigations the diversity of plants and animals present was recorded.

The weather conditions experienced during the field investigation were clear skies, hot temperatures (28°C) and moderate north-easterly breezes.

The survey methods employed during the field investigations were:

- The direct observation of any fauna species present within, or adjacent to, the subject site;
- The identification of all plants within the areas of likely disturbance, including both direct and indirect impacts;
- The identification of the structure of those vegetation communities and fauna habitats present;
- Diurnal call identifications of fauna species with all calls being identified in the field;
- The identification of indirect evidence, such as tracks, scats, diggings and scratchings;
- Litter and ground debris searches for reptiles and amphibians; and
- Targeted searches for those species of state and national conservation concern, or their likely habitat areas, that were identified during the literature review stage of the project.

Based on the outcomes of those previous ecological investigations undertaken in this locality, and the cleared nature of the site, it was not considered necessary to undertake any nocturnal work. As such, no nocturnal work was undertaken.

The purpose of the field surveys was to locate within the areas surveyed any plants, animals or vegetation communities that are of state and/or national conservation significance. When conducting the field investigation, the 'Random Meander Method' (as per Cropper 1993), or an adaptation of this was employed. This method is suitable for covering large areas and for locating any rare species (and their associated vegetation communities/habitat types) that may occur within a survey site. The method involves walking randomly across a particular survey area whilst sampling all of the various habitat types and vegetation communities present until no new species have been recorded for at least thirty minutes.

Whilst conducting the fauna survey, efforts were made to document the diversity, structure and value of those habitats present within the areas surveyed for those protected, as defined under the *NSW National Parks and Wildlife Act 1974*, and threatened, species recorded or potentially occurring. This involved assessing the structure of the flora and fauna habitats present and determining their significance for native species, particularly any that are of national and/or state conservation concern. Whilst conducting the habitat assessments, efforts were made to identify features such as known feed trees, mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the life cycle needs of those threatened species known or likely to occur in the study region.

Stands of vegetation were described by their structural characteristics according to Specht (1981), and mapping and community names by Benson and Howell (1994). Where applicable, Endangered Ecological Communities were classified and named according to the NSW Scientific Committee's Final and Preliminary Determinations (various dates).

The diversity of the species recorded during the survey would be influenced by seasonal factors, with some species likely to be inconspicuous or absent from the local population during winter. This is particularly true of terrestrial orchids, which persist as dormant underground tubers during particular seasons. Other species (especially those growing in areas of long grass) are difficult to find unless they are experiencing a period of new growth or are flowering. For these reasons, survey results could have been improved by extending the investigation period to encompass all seasons. However, given

the small size and highly disturbed condition of the subject site, in addition to the numerous surveys undertaken on the site over the years, it is considered that the survey time allowed for this investigation is sufficient, and provides an adequate floristic description of the subject site.

By the completion of the field investigation, approximately three (3) person hours of active searches had been accumulated, active searches being defined as the time spent actively searching the study area. Given the physical condition and size of the subject site, combined with the results of the previous ecological investigations undertaken in this locality, this length of time is considered more than adequate when endeavouring to determine the diversity of native species present, their associated habitats and the conservation status of both of these.

During the course of the investigation, no limitations to the success of the study were encountered.

5. Results

5.1. Flora survey.

5.1.1. Plant species.

A list of plant species recorded within the subject site is provided in Appendix 1. This is not intended to be a comprehensive list of all species present within the subject site, and only represents those plants that were recorded whilst undertaking searches for those native species of national or state conservation concern that are known, or expected to occur, in the locality.

A number of mature and semi-mature individuals of *Acacia terminalis* ssp. *terminalis* (Sunshine Wattle) were found during the field investigation. This species is listed as endangered under the Schedules to both the *EPBC* and *TSC Acts*. The individuals occur predominately within the eastern half of the study site. It is noted that an individual is also present within the western portion of the site.

Consultation of the DECC (DECC 2008a) and DEWHA databases (DEWHA 2008) identified a further nine threatened plants that have been recorded previously in this locality (Table 1). Though targeted during the field investigation, none of these plants were recorded within, or in close proximity to, the subject site. As such they are not further considered in this report.

The following plants recorded within the subject site are listed as noxious weeds within the Manly LGA (as per the *Noxious Weeds Act 1993*): Morning Glory (*Ipomea indica*), Asparagus Fern (*Protasparagus aethiopicus*), Lantana (*Lantana camara*), Mickey Mouse Plant (*Ochna serrulata*), Castor Oil Plant (*Ricinus communis*), Cassia (*Senna pendula* var. *glabrata*) and Crofton Weed (*Ageratina adenophora*). Recommendations for the treatment of these species have been provided in Section 11.0 of this report.

5.1.2. Plant communities.

The subject site is heavily disturbed, the area surveyed supporting large areas of fill and sites that have been previously decontaminated and are now vegetated by exotic grasses. A small area of low native shrubland occurs within the eastern portion of the subject site. This native area occurs above some sandstone outcropping and consists mainly of Sydney Golden Wattle (*Acacia longifolia*), Sweet-scented Wattle (*Acacia suaveolens*) and Tick Bush (*Kunzea ambigua*). These are of a medium density and reach up to 3m in height. Other common native species are Running Postman (*Kennedia rubicunda*), Blue Flax Lily (*Dianella caerulea* var. *producta*), Kangaroo Grass (*Themeda australis*) and Water Couch (*Paspalum distichum*). These are all of a sparse to medium density and reach heights of 1m.

Table 1. Plant species of state or national conservation significance previously recorded within the locality.

Key
E = Endangered; V= Vulnerable.

Species	Status		Habitat*
	TSC	*EPBC*	
Allocasuarina portuensis	E	E	Restricted to a small area of coastal scrub at Nielsen Park.
Acacia bynoeana	E	V	Woodland and Heath on clayey ridge-tops over sandstone.
Acacia terminalis ssp. *terminalis*	E	E	Found during a previous survey undertaken on an adjacent lot (Lot 11) this being present to the west of the subject site.
Callistemon linearifolius	V	V	Ridgetops and upper slopes on sandstone.
Eucalyptus camfieldii	V	V	Woodland and Heath on clayey ridge-tops.
Syzygium paniculatum	V	V	Littoral rainforest.
Caladenia tessellata	E	E	Very rare orchid occurring in clay loam or sandy soils.
Thesium australe	V	V	Grassland or woodland often in damp sites.
Pimelea curviflora var. curviflora	V	V	Woodland and Heath on clayey ridge-tops over sandstone.
Tetratheca glandulosa	V	V	Woodland and Heath on clayey ridge-tops over sandstone.

* - based on Harden (1992-2002), Fairley and Moore (2001), LesryK Environmental Consultants (2005) and author's field notes.

The occasional Swamp She-Oak (*Casuarina glauca*) as well as one Broad-leafed Paperbark (*Melaleuca quinquinervia*) and one Port Jackson Fig (*Ficus rubiginosa*) also occur onsite, the maximum height of these trees being 10m. Within the western portion of the study site a number of landscaped native species have been planted, these including Mat Rush (*Lomandra longifolia*), Tuckeroo (*Cupaniopsis anarcardioides*) and Sydney Golden Wattle.

The remainder of the site is dominated by a 1.5m layer of exotic species. The density of this vegetation depends on which part of the site they are present in and varies from a sparse to high. The dominant species in this area include Kikuyu (*Pennisetum clandestinum*), Couch (*Cynodon dactylon*), Paspalum (*Paspalum dilatatum*) and Fleabane (*Conyza albida*).

An ephemeral water body approximately 8m long and 3m wide occurs within the southern portion of the site. A medium density layer of Cumbungi (*Typha orientalis*) dominates this area, these plants reaching a height of 2m. The water body is an artefact of the previous decontamination works and is not considered to be of any significant ecological value.

5.1.3. Conservation significance of the vegetation.

Benson and Howell (1994) mapped the vegetation of the Sydney 1:100,000 map sheet. They mapped the subject site and surrounds as Sydney Sandstone Ridgetop Woodland. Whilst this is the case, the vegetation on the site does not conform to any natural vegetation classification due to the impacts of past clearing and the lack of any significant remnant species. However, pre-clearing it is thought that the site would have conformed to a coastal variant of Sydney Sandstone Ridgetop Woodland (LesryK Environmental Consultants 2007).

At a state scale Keith (2002) has classified vegetation communities and estimated the amount of each removed since European settlement. The vegetation in the subject site corresponds to his classification of "Sydney sandstone coastal dry sclerophyll forest". He estimates that there is 3500-4600km^2 of this vegetation type remaining with less than 30% having been cleared since European settlement.

The vegetation community occurring at the site does not conform to any Endangered Ecological Community listed, or currently being considered for listing, on the Schedules to either the *EPBC* or *TSC Acts*.

5.2. Fauna survey.

5.2.1. Habitat types present within the subject site.

As mentioned previously the site has been previously cleared of all vegetation apart from a few mature native trees. The vegetation currently present is regrowth. Therefore, as a result of this past disturbance, only one habitat type was recorded within the subject site, this being a disturbed environment. This habitat type dominates the subject site and is the result of previous development works undertaken in this locality. Predominantly the site is cleared, levelled and devoid of any habitat features suitable for native fauna. Whilst this is the case, two small areas of regrowth vegetation were recorded, the largest of these being present within the eastern portion of the study site. Depending on the levels of regeneration and disturbance within these areas the density varies from sparse to high, whilst their heights reach 3m. In addition the site consists of a few mature trees, these reaching a maximum height of 10m, several semi-mature shrubs (that are to 3m in height) and a regenerative groundcover that supports a mixture of both exotic and native plants. In regards to those mature trees present, none support any hollows suitable for the roosting or sheltering needs of native animals. Within the disturbed environment, accumulations of ground debris are common, as is the presence of urban and construction refuse, soil mounds, timber, pipes, steel and so forth. Sandstone rock material is also present within the area surveyed, this being prominent within the eastern portion of the study site. Crevices, cracks, ledges and benches as well as eroded sandstone rock material are present in association with this.

A small ephemeral wetland (approximately 8m long by 3m wide) is present near to the southern limits of the study area. Dense emergent aquatic vegetation to 2m in height dominates this area. As noted, the "wetland" is an artefact of the previous decontamination works and is of limited ecological value.

The disturbed environment is characteristic of those modified and altered urban environments that surround the subject site, no habitat features observed within Lots 20 to 26 being unique to this locality. Giving consideration to the life cycle needs of those native species recorded, and their adaptation to urban areas, it is not considered that any further development of the subject site would cause the displacement and/or loss of any of these animals. The disturbed environment is not considered significant for the local occurrence of any viable populations of native fauna or their ecological communities, particularly any animals listed under the Schedules to either the *EPBC* or *TSC Acts*. As such, the disturbed environment could be further developed without significantly affecting the biodiversity of the locality, or threatening the presence of any of the native animals recorded, or expected to occur, within the study area.

5.2.2. Wildlife corridors and vegetation links.

Based on a review of topographic maps and aerial photography, combined with a visual assessment of the subject site undertaken at the time of the field investigation, it is noted that the vegetation that is present to the south of the study area (i.e. that which borders St Patrick's College and is known as Vegetated Links P1 and P13) forms a component of a local vegetation corridor. This corridor finishes to the west at Reddall Street, however connectivity eastwards through to both the Sydney Harbour National Park and North Head Army Barracks Military Reserve is possible. In regards to this corridor (which has been enhanced through the undertaking of habitat restoration works), whilst its width is

variable, opportunities do exist for the east – west dispersal of native animals such as the Long-nosed Bandicoot (*Perameles nasuta*). Whilst this locally significant corridor is present to the south of the proposed development area, it is not considered that the establishment of seven residential dwellings within the subject site would present a barrier to the dispersal needs of any native species that are currently utilising and traversing through this bushland.

Similarly, with the retention of the corridor to the south of Lots 20 to 26 movements for any ground dispersing species present would still be possible. The proposed residential dwellings are therefore not considered to present a barrier to the movement patterns of any native fauna, thereby isolating or further fragmenting their habitat areas. Similarly the Proposal would not isolate any interbreeding populations.

5.2.3. Fauna species recorded during the field investigations.

By the completion of the field surveys 8 native birds, 3 reptiles and 1 mammal had been recorded within, or adjacent to, the subject site (Table 2). Of those species detected, the Long-nosed Bandicoot is listed as an endangered population within the Manly LGA.

In addition to the native species recorded, a number of introduced animals were also detected, or indicated as occurring, within the subject site (Appendix 2).

Table 2. Fauna species recorded during the field investigation.

COMMON NAME	FAMILY and SCIENTIFIC NAME
MAMMALS	
	Peramelidae
Long-nosed Bandicoot	*Perameles nasuta*
BIRDS	
	Columbidae
Crested Pigeon	*Ocyphaps lophotes*
	Psittacidae
Rainbow Lorikeet	*Trichoglossus haematodus*
	Halcyonidae
Laughing Kookaburra	*Dacelo naxaeguineae*
	Meliphagidae
Little (Brush) Wattlebird	*Anthochaera chrysoptera*
Noisy Miner	*Manorina melanocephala*
	Artamidae
Australian Magpie	*Gymnorhina tibicen*
Pied Currawong	*Strepera graculina*
	Corvidae
Australian Raven	*Corvus coronoides*
REPTILES	
	Gekkonidae
Lesueur's Velvet Gecko	*Oedura lesueurii*
	Agamidae
Eastern Water Dragon	*Physignathus lesueurii*
	Scincidae
Garden Skink	*Lampropholis delicate*

In regards to the detection of those native species recorded:

- All of the birds were observed within, adjacent to, or flying over the subject site, or identified from their distinct calls;
- The Long-nosed Bandicoot (*Perameles nasuta*) was identified through its characteristic conical diggings within a mulched portion of the site;
- Several Garden Skinks (*Lampropholis delicata*) were observed at various locations throughout the subject site whilst conducting the ground debris searches;
- A juvenile Lesueur's Velvet Gecko (*Oedura lesueurii*) was observed in association with a sandstone outcrop that occurs within the eastern portion of the subject site; and
- The Eastern Water Dragon (*Physignathus lesueurii*) was observed in association with the landscaped vegetation within the western portion of the study site.

The species recorded are not considered to be reliant upon those habitats present within the subject site such that the removal or further disturbance of these would threaten the occurrence of these animals. The species recorded are all expected to be present within both the subject site and surrounding locality post-construction. Due to their ability to adapt to, and be tolerant of, urban environments, none of the native species recorded would be adversely affected by the Proposal such that the viability of a local population of that animal would be placed at risk of extinction.

The on-going occupation of the property could potentially influence the diversity of native species present. Whilst this is the case, the species recorded are known to be adaptable to and be tolerant of urban environments, the retention of the vegetated links (e.g. Vegetated Link P1 and P13 - upper) and Sydney Harbour National Park to the rear and south-east of the subject site expected to ensure the long-term presence of these animals.

5.2.4. Fauna species previously recorded within the locality.

Fauna surveys and compilation lists prepared for the locality have identified an additional sixteen (16) native mammals, one hundred and sixty four (164) native birds, twenty five (25) reptiles and ten (10) frogs (Appendix 2).

Of those native species previously recorded, 44 are listed, or currently being considered for listing, under the Schedules to the *EPBC* and/or *TSC Acts* (Table 3). Based on the consideration of the habitat needs of those native species recorded during the field survey, combined with the identification of those habitats present within the subject site, it is expected that, of those state and nationally listed threatened species previously recorded in the locality (as listed in Table 3), four (4) have the potential to be present within, or in the vicinity of, the subject site. For reference, the main habitat requirements of these species, and a consideration of the likely impacts of the Proposal on the local viability of these animals has been provided (Appendix 3). When assessing the extent of likely impact of the Proposal on the local and regional presence of those species presented in Appendix 3, including their movement patterns and interbreeding needs, the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* have been referred to and drawn upon. None of the threatened animals listed in Appendix 3 are considered to solely rely upon the subject site, such that the Proposal would have a significant impact on the local or regional viability of these species, their populations or habitats.

Table 3. Threatened fauna species previously recorded in the locality.

Legislation
EPBC Act M – Listed as migratory under the *EPBC Act.*
EPBC Act TM – Listed as threatened and migratory under the *EPBC Act.*
E – Endangered population at North Head as listed under the *TSC Act.*
Bold – species potentially present within the subject site.

Common Name	Scientific Name	Legislation
MAMMALS		
Spotted-tailed Quoll	*Dasyurus maculates*	*EPBC Act and TSC Act*
Long-nosed Bandicoot	***Perameles nasuta***	***TSC Act E***
Koala	*Phascolarctos cinereus*	*TSC Act*
Grey-headed Flying Fox	***Pteropus poliocephalus***	***EPBC Act and TSC Act***
Eastern Bentwing Bat	***Miniopterus schreibersii***	***TSC Act***
BIRDS		
Wandering Albatross	*Diomedea exulans*	*EPBC Act TM*
Black-browed Albatross	*Diomedea melanophris*	*EPBC Act M and TSC Act*
Yellow-nosed Albatross	*Diomedea chlorohynchos*	*EPBC Act M*
Shy Albatross	*Diomedea cauta*	*EPBC Act TM and TSC Act*
Sooty Albatross	*Phoebetria fusca*	*EPBC Act TM and TSC Act*
White-chinned Petrel	*Procellaria aequinoctialis*	*EPBC Act M*
Gould's Petrel	*Pterodroma leucoptera*	*EPBC Act TM and TSC Act*
Fairy Prion	*Pachyptila turtur*	*EPBC Act*
Wedge-tailed Shearwater	*Puffinus pacificus*	*EPBC Act M*
Short-tailed Shearwater	*Puffinus tenuiorstris*	*EPBC Act M*
Southern Giant Petrel	*Macronectes giganteus*	*EPBC Act TM and TSC Act*
White-tailed Tropicbird	*Phaeton lepturus*	*EPBC Act M*
Cattle Egret	*Ardea ibis*	*EPBC Act M*
Great Egret	*Ardea alba*	*EPBC Act M*
Eastern Reef Egret	*Egretta sacra*	*EPBC Act M*
Wandering Tattler	*Hetroscelis incana*	*EPBC Act M*
Sooty Oystercatcher	*Haematopus fuliginosus*	*TSC Act*
Arctic Jaeger	*Stercorarius parasiticus*	*EPBC Act M*
Long-tailed Jaeger	*Stercorarius Longicauda*	*EPBC Act M*
Caspian Tern	*Sterna caspia*	*EPBC Act M*
Common Tern	*Sterna hirundo*	*EPBC Act M*
Sooty Tern	*Sterna fuscata*	*TSC Act*
Osprey	*Pandion haliaetus*	*EPBC Act M and TSC Act*
White-bellied Sea-eagle	***Haliaeetus leucogaster***	***EPBC Act M***
Superb Fruit-dove	*Ptilinopus superbus*	*TSC Act*
Swift Parrot	*Lathamus discolor*	*EPBC Act and TSC Act*
Powerful Owl	*Ninox strenua*	*TSC Act*
Barking Owl	*Ninox connivens*	*TSC Act*
White-throated Needletail	*Hirundapus caudacutus*	*EPBC Act M*
Fork-tailed Swift	*Apus pacificus*	*EPBC Act M*
Regent Honeyeater	*Xanthomyza phrygia*	*EPBC Act TM and TSC Act*
Rufous Fantail	*Rhipidura rufifrons*	*EPBC Act M*
Satin Flycatcher	*Myiagra cyanoleuca*	*EPBC Act M*
Black-faced Monarch	*Monarcha melanopsis*	*EPBC Act M*
Spectacled Monarch	*Monacrha trivirgatus*	*EPBC Act M*
Diamond Firetail	*Stagonopleura guttata*	*TSC Act*
REPTILES		
Heath (Rosenberg's) Goanna	*Varanus rosenbergi*	*TSC Act*
AMPHIBIANS		
Giant Burrowing Frog	*Heleioporus australiacus*	*EPBC Act and TSC Act*
Red-crowned Toadlet	*Pseudophryne australis*	*TSC Act*

In relation to the species listed in Table 3, two, the Long-nosed Bandicoot and Grey-headed Flying-fox have the potential to be impacted on by the Proposal due to either the presence of resident individuals to the south of the subject site or previous recordings of these animals within the study area. Based on a precautionary approach, further ecological assessments have been undertaken on these species in Section 9 of this report. Given the structure and condition of the habitat to be modified as part of the Proposal, it is not considered that there would be any impact on the remaining species listed in Table 3 as a result of the future development of the subject site.

In relation to the additional threatened species listed in Table 3, though previously recorded within the locality, it is noted that these animals have specific habitat requirements (e.g. open expanses of water, rainforests, well developed woodlands and caves), no components of which are present within, or in close proximity to, the subject site. As such, no locally viable populations of these species would be present within or beyond the limits of the subject site. Therefore, as no locally viable populations of these animals would be present, it is not considered that the undertaking of the Proposal would have an adverse impact on any of these species, their populations or habitats.

The DECC has prepared, or is currently preparing, recovery plans for the Koala (*Phascolarctos cinereus*), Gould's Petrel (*Pterodroma leucoptera*), Barking Owl (*Ninox connivens*), Long-nosed Bandicoot (*Perameles nasuta*) and Large Forest Owls, these species having been previously recorded within the Manly LGA. As part of these recovery plans certain objectives have been established. Given the minimal extent, and type, of habitat to be modified as part of the Proposal, it is not considered that the development of the subject site would breach any of these objectives such that there would be a significant impact on these animals or their necessary habitats.

6. The Proposal Impacts

6.1. Flora.

Native and weed vegetation would be removed during the development of the subject site. All except one of the native species affected are considered to be common to abundant in the sandstone coastal areas of the Sydney region. A positive impact of development would be the removal of the seven species of noxious weeds from the subject site.

The only pre-construction impact on threatened flora would be the removal of a number of *Acacia terminalis* ssp. *terminalis* individuals and a percentage of its habitat (including the potential soil seed bank). Post-construction, the transplanted *Acacia terminalis* ssp. *terminalis* individuals could be affected by fire, grazing, trampling, altered drainage or other factors associated with human activity. These potential impacts would be minimised through the implementation of the Translocation Management Plan (Total Earth Care 2005) (see Section 6.4 below).

6.2. Fauna.

The potential effects of development of Lots 20 to 26 on fauna pre-, during and post-construction are summarised below. Mitigation measures aimed at minimising these impacts are discussed in Section 6.4.

Potential construction impacts for threatened fauna species and endangered populations would include:

- The temporary and permanent removal of some foraging habitat from the subject site;
- The creation of movement barriers associated with cleared areas/construction activities;
- Noise and human activity; and
- Potential injury/death of individuals.

Potential post-construction impacts for the endangered population of bandicoots include:

- Potential road mortality;
- Barrier effects of roads, driveways and retaining walls;
- Deterrent effects of lighting; and
- Noise and human disturbance.

Overall, approximately 2697m^2 of previously disturbed land that includes some vegetation would be permanently removed as a result of the development. It is noted that any vegetation that occurs within this area is all regrowth, the site having been previous cleared and decontaminated. The loss of this area would be offset through landscaping works, the Proposal including the establishment of 1026.3m^2 of shelter/shrubs and lawns (lawn areas totalling 384.1m^2).

6.3. Cumulative Impacts.

A number of DA's have been approved or submitted for development of Darley North since 2000. Cumulative impacts are summarised in Table 4 below:

Overall, more than 24.493m^2 of habitat would be permanently removed north of Darley Road. At least 12848.5m^2, would be retained/planted in the form of fuel-managed habitat corridors, additional vegetated links, lawns and garden beds. More than 86 trees would be removed.

Table 4. Summary of cumulative impacts north of Darley Road.

Precinct	Notional construction timing (Years)	Vegetation to be permanently removed (m^2)	Vegetation to be retained/planted (m^2)	Trees to be removed
P2	2000-2	1560	3440	-
P3 and P12	2005-7	12,627	3997[1]	-
Decontamination, P1 and P13	2003	1800	Sown with winter grasses	18
Lots 1-8, P13	2004-6	2800	2420	49
Lots 9-12	2006-7	1458	824.3	12
P1 (Lots 13-19)	2007	525	1140.9	7
P1 (Lots 20-26)	2008	3723	1026.3	0
TOTAL	**7**	**24,493**	**12,848.5**	**86**

6.3.1. *Acacia terminalis* ssp. *terminalis* individuals.

When considering and assessing the cumulative impacts of the Proposal on those *Acacia terminalis* ssp. *terminalis* individuals present, the following factors are of relevance:

1. A large population of this subspecies is present within the nearby Sydney Harbour National Park. Through reference to known databases and previous studies prepared for this locality, it is likely that this population is adequately represented within this conservation reserve;

2. The individuals of *Acacia terminalis* ssp. *terminalis* recorded do not comprise a significant area of known habitat for this subspecies. Similarly, the site would not be significant in the overall conservation of this subspecies in either the locality or surrounding region; and

3. It is proposed that the *Acacia terminalis* ssp. *terminalis* individuals (and an area of surrounding soil) would be translocated to those vegetation links that are present (within the nearby St Patrick's Estate). The success rate of relocated individuals has been varied – the overall success generally good but with last summer's (2006-07) extremely high temperatures and the incessant drought many of those individuals transplanted during this period did not survive (Total Earth Care, pers.comm.). Whilst it is acknowledged that the success of a

translocation programme is not guaranteed, the individual (and any seeds within the soil that is collected as part of the plants translocation) is likely to survive due to its ability to germinate well in response to disturbance events. Provided that the transplanting is undertaken during the cooler periods it is likely that the transplanted individuals will survive to maturity.

Whilst it is acknowledged that the Proposal would contribute to the cumulative removal of this species from private land holdings across its range, this impact is considered to be relatively minor based on a consideration of the above three factors.

6.3.2. Long-nosed Bandicoot.

With respect to assessing the impacts of habitat removal on the endangered population of bandicoots, it is important to take into account previous and proposed plantings on the Estate. Vegetation links have been progressively established on the site since 1997. The purpose of these was to provide bandicoots with additional habitat prior to development of Precincts 1 and 3. It has been demonstrated that bandicoots utilise these links for foraging and sheltering purposes (Lesryk ongoing). Another small habitat link was established opposite to the Precinct 2 apartments.

Other areas directly adjacent to Precinct 13 were planted during January to April 2006 as part of the early works for construction of Lots 1-8. Similarly, development of Precincts 3 and 12 is associated with the establishment of a number of major and minor habitat links planted between December 2005 and March 2006, both within the Estate and between the Estate and the nearby National Park. Some of these were previously agreed with DECC, whilst other supplementary plantings have been modified or added during the design process.

Development of Darley North is almost complete after a seven-year period. Lots 9-12 (Precinct 13) are currently underway, with Lots 13-19 (Precinct 1) approved for subdivision. During this time, habitat has been removed and replaced through a staging process aimed at minimising the scale of impact in any one location and the distribution of impacts over the whole of Darley North. By undertaking habitat creation/enhancement works well in advance of construction (i.e. vegetated links) and prior to clearing and construction (i.e. early works program), the availability of some habitat in the immediate area is ensured during development. Monitoring throughout the construction process is important to detect any changes in bandicoot activity as early as possible and to implement further mitigation measures if necessary.

It is noted that there is no early works program for Lots 20 - 26, however, the impacts of construction on these Lots would be minimised through the incorporation of appropriate mitigation measures (see Section 6.4). In the longer term, management protocols and strategies undertaken in consultation with DECC would be implemented to minimise Estate-wide cumulative impacts (see Section 7.0).

6.4. Mitigation Measures.

The Proposal incorporates a number of pre-construction and post-construction mitigation measures that are aimed at minimising the impacts of the development on flora and fauna species.

It is important to note that translocation of threatened plant species is not considered by the DECC to be a mitigation measure but rather an emergency procedure undertaken only where habitat destruction is imminent. Prior to construction, the *Acacia terminalis* ssp. *terminalis* individuals present (including an area of the soil that surrounds this plant) would be excavated and translocated to a recipient site in those vegetation links that are present (within the nearby St Patrick's Estate). A Translocation Management Plan has been previously prepared to guide this process for the translocation of other individuals from Lots 9 to 19. The Management Plan contains guidelines for post-translocation management and monitoring and a map showing the locations of plants to be

salvaged and the recipient site. The management plan is consistent with the *Guidelines for the Translocation of Threatened Plants in Australia* (Vallee *et al.* 2004).

6.4.1. Pre-construction.

Pre-construction mitigation measures for flora and fauna include:

- Conducting a site induction for contractors to alert them to the presence and location of threatened plants and retained bandicoot habitat;
- Translocating the *Acacia terminalis* ssp. *terminalis* individuals and a percentage of their surrounding soil;
- Weed management of the translocated soil;
- Erecting temporary barrier fencing to prevent machinery from damaging or removing surrounding vegetation;
- Incorporating a 20-30cm gap under the barrier fencing to facilitate bandicoot movements throughout the study area; and
- Integrating 'overlaps' in sediment fencing to permit bandicoot access.

6.4.2. Construction.

Construction mitigation measures for flora and fauna include:

- Applying the Bandicoot Construction Protocol (see Appendix 4);
- Continuing to monitor vegetated links quarterly throughout the construction process;
- Constructing, implementing and maintaining soil erosion and sediment control in accordance with requirements of the stormwater management manual *Managing Urban Stormwater – Soils and Construction* (Landcom 2004);
- Ensuring vehicles and machinery do not enter those portions of the site proposed for retention; and
- Removing temporary soil and water management structures only after the site has been stabilised/rehabilitated.

6.4.3. Post-construction.

Post-construction mitigation measures for flora and fauna include:

- Minimising the risk of road kills through enforcing a 'Shared Zone' limiting the speed limit to 15 – 20 kilometres per hour;
- Removing weeds and planting 1026.3m^2 of landscaping;
- Ensuring that the landscape plantings do not include aggressive exotic species that could invade the adjacent bushland;
- Including a covenant prohibiting future leaseholders from owning dogs and cats to minimise the risk of bandicoot predation;
- Incorporating additional mitigation measures as per letters received by Lend Lease Development from the NPWS (now DECC) dated 20 November 2000 and 3 November 2003 (see Section 7.2);
- Preparing a Bandicoot Amelioration Strategy for the entire Estate (see Section 7.1);
- Implementing monitoring and educational programs consistent with the Recovery Plan (see Section 7.1); and
- Continuing to monitor vegetated links during and post-construction (see Section 7.1.1).

7. Long-term management strategies.

A summary of long-term management measures and strategies relevant to the protection and maintenance of bandicoot habitat is presented below:

7.1. Bandicoot Amelioration Strategy.

Since 1996 the Trustees, together with their consultants and the DECC, have developed a range of amelioration measures to ensure that foraging and shelter habitat, and movement corridors, are maintained and/or enhanced during the development of various precincts on the Estate. These are described in the report Bandicoot Management Plan St Patrick's Estate (Bali 2005b). The plan is an evolving document that would eventually apply to the entire Estate (both developed and residual).

7.1.1. Vegetated Links Monitoring.

Development of Precincts 1 and 3 was approved by the Land and Environment Court in 1996. As part of the Conditions of Consent for development of Precinct 1, vegetated links were established within St Patrick's Estate in 1997 (P12), 2000 (P1) and 2002 (P13 upper). These were designed in order to increase the amount of lawn/shrub ecotone, the preferred habitat for Long-nosed Bandicoots. Their primary purpose is therefore to provide bandicoot movement corridors and shelter both within the Estate and between the Estate and Sydney Harbour National Park. As vegetated links were considered to be experimental, they required monitoring.

Quarterly monitoring of foraging activity and bandicoot numbers was undertaken for vegetated links P12, P1 and P13 (upper) from April 2002 to February 2003. In April 2004, a longer term monitoring program was initiated with the aim of collecting additional baseline data for the whole Estate prior to construction (Darley North) and decontamination/construction in the vicinity of existing shelter link P10 (Darley South) and to determine if bandicoots will continue to use established/future vegetated links for foraging and sheltering throughout the construction process. This monitoring program is ongoing.

Vegetated links P1 and P13 are located closest to the subject site. During April 2002 to February 2003, the quality of foraging habitat near P1 appeared to decline. As plantings took a long time to establish, habitat structure remained very open and therefore unsuitable as bandicoot refuge. Furthermore, a central portion of the link was washed away and then restored in 2002. However by February 2005, the link was impenetrable and was used by bandicoots for both foraging and sheltering. The highest frequency of diggings was recorded near P1 in September 2007. Seven bandicoots were observed near P1 in 2007/2008, with some of these taking refuge in the link when disturbed.

Since February 2003, the level of foraging activity north of Darley Road has increased to the highest recorded levels in June 2005. Digging frequency has remained consistently high near vegetated link P12 over this period, but has varied near links P1 and P13 (upper). Fluctuations in the number of diggings are not correlated with bandicoot captures (see Section 7.1.2) that have remained relatively stable over the same period. As the highest levels of foraging corresponded closely with the onset of construction activities on Precincts 3 and 12, it appears that the links are functioning as they were intended by providing additional habitat for bandicoots disturbed by construction activities. Over the past two years foraging activity near P1 has fluctuated greatly. A substantial increase in May and September of 2007 was observed followed by a dramatic decrease in November 2007 and January 2008. It is noted that this trend was also evident in links P7, P10, P13 and P12.

Since monitoring began in March 2004, bandicoot diggings south of Darley Road increased to September 2004 and then decreased to August 2005. Increases were associated with the post-decontamination activities on the site. However, the number of bandicoots observed and captured has remained relatively consistent during the past 2 years.

7.1.2. North Head Monitoring.

The DECC has been monitoring an endangered population of Long-nosed Bandicoots in North Head. Quarterly monitoring sessions involve trapping 20 transects (including four on St Patrick's Estate) over a 3-night period. In addition a more intensive survey is undertaken every two years; this involves trapping 43-46 transects over a 5-night period. Since August 2002, the Church has participated in the program by allowing the DECC to monitor four transects on St Patrick's Estate and by encouraging its consultants to assist with trapping activities. Transects within the Estate were included in the most recent intensive monitoring session held in May 2006.

The number of bandicoots captured along four transects located in St Patrick's Estate during quarterly monitoring is variable. Numbers appeared to decline progressively from August 2002 to February 2004, although this trend could not be correlated with any activities being undertaken on or near the Estate. However, the number of bandicoots captured between May 2004 and November 2006 has remained relatively high and stable (n=16-23) even though construction activities in Precincts 13 and 12 began in January 2005 and January 2006, respectively. This indicates that construction has not resulted in any noticeable decrease in the number of bandicoots using the area. Low numbers have been recorded in February 2006 and 2007, and even lower in February 2008. These however seem to be related to environmental factors.

During intensive trapping on North Head in May 2002, 64 individuals were trapped 117 times over 5 days. Using Population Viability Analysis (PVA), DECC estimated the North Head bandicoot population to be approximately 94 individuals. However, St Patrick's Estate was not included in that estimate. In May 2004, 116 individuals were captured 211 times and the population was estimated at 130-160 bandicoots using PVA. The DECC attributed the apparent population increase to the effectiveness of various mitigation measures implemented across North Head including traffic calming measures, fox control and burning (see Appendix 5). The number of bandicoots captured in May 2006 fell slightly to 102.

The Church will continue to cooperate with DECC in relation to population monitoring on North Head as part of its commitment to the implementation of the Recovery Plan.

7.1.3. Education and Awareness.

It is anticipated that a package of information on threatened plants and endangered populations would be distributed to leaseholders as part of the lease agreement.

Recommendations for education and awareness programs will be incorporated into the Environmental Management System for the Estate. In addition, interpretive material and signage will be incorporated into the Public Walkways Plan which has been developed by Lend Lease Development and is currently being reviewed by Manly Council.

7.2. Additional Mitigation Measures.

On 8th November 2002, the State Government gazetted Amendment No. 24 to the Manly Local Environment Plan (LEP) that considered development in St Patrick's Estate and included the rezoning of Precincts 12 and 13 for residential purposes. In order to mitigate the loss of bandicoot habitat associated with the development, the DECC and Church agreed to implement additional amelioration measures for bandicoots. These are described in letters from the DECC to Lend Lease Development dated 20th November 2000 and 3rd November 2003 and are shown on the attached Vegetated Links Summary Plan (Appendix 6). All but one of the mitigation measures would be incorporated as part of specific DAs that have already been submitted or will be submitted to Council in future. Progress for each of these additional measures is reported briefly below. All works would be undertaken to the satisfaction of the DECC:

- ***Enhancement of shelter habitat (i.e. weeding and planting additional understorey species) including 10m wide strip to the south of Precinct 13 Lots;***

The 10m setback has been incorporated into the design for Lots 1-8 (DA Nos. 277-84/0, Plans L02-L12) and for Lots 9-12 (Plans DA L02-DA L05).

As part of the early works program for Lots 1-8, additional plantings were established in the Conservation Area gardens and in the area immediately to the south of the Lots in January 2005.

- ***Enhancement of shelter habitat (i.e. weeding and planting additional understorey species) thereby linking Precincts 1, 12 and 13 and maintaining a 3m strip of vegetation along the Estate side of the wall;***

This has been incorporated into the Proposal for development of Precincts 3 and 12 and is discussed in the report, *Flora and Fauna Assessment Proposed Residential Development Precincts 3 and 12 St Patrick's Estate, Manly* (Total Earth Care and Ecosense Consulting 2004).

- ***Establishment of new shelter habitat and associated foraging opportunities (i.e. habitat mosaic) in eastern portion of Precinct 12;***

As above.

- ***Establishment of shelter habitat by planting a 2m wide strip along the inside of the perimeter wall from Precinct 3 to immediately east of the main Darley Road entrance;***

As above. Part of this strip has been widened to 4m.

- ***Bush regeneration works (i.e. removal of introduced species and enhancement of existing native vegetation) for bandicoot movement corridors located in Manly Council land (i.e. between Precinct 10 and Spring Cove) and in National Park and (i.e. behind Collins Beach); and***

The area under consideration is shown in the Vegetated Links Summary Plan (Appendix 6). Bush regeneration works would be undertaken in consultation with DECC and taking into consideration in the relevant bushfire hazard assessment (Building Code and Bushfire Hazard Solutions 2004). The timing is planned to coincide with the early works program for development of Precincts 5, 6 and 10.

- ***Enhancement of shelter belt between Precincts 5 and 10;***

This has been incorporated into the Proposal for the development of Precincts 5, 6 and 10 and is discussed further in the Species Impact Statement prepared for the area by Ecosense Consulting Pty Ltd (Bali 2005a). This link has also been extended so that it transects Darley South from east to west.

8. Flora.

8.1. Commonwealth legislative considerations.

The only threatened plant species detected on the subject site was *Acacia terminalis* ssp. *terminalis*. No listed endangered populations of plants or Endangered Ecological Communities occur within the subject site. *Acacia terminalis* ssp. *terminalis* is listed as an endangered species on the *EPBC Act* and is therefore a Matter of National Environmental Significance requiring assessment under this Act.

The following assessment guidelines are used to determine whether the action (i.e. the proposed development) has, will have, or is likely to have a significant impact on *Acacia terminalis* ssp. *terminalis*. If so, referral to the Federal Minister for the Environment, Water, Heritage and the Arts will be required for further consideration or approval.

For the purposes of this assessment it is assumed that all individuals of *Acacia terminalis* ssp. *terminalis* will be removed (i.e. destroyed), even though they would be translocated locally to those vegetation links that are present (within the nearby St Patrick's Estate) and managed according to the Translocation Management Plan.

8.1.1. (a) *Acacia terminalis* ssp. *terminalis*.

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population,*

The proposed development will result in the removal of a number of *Acacia terminalis* ssp. *terminalis* individuals and some associated habitat. It is recommended that the plants be translocated to those vegetation links that are present within the nearby St Patrick's Estate. The wider population consists of over 100 individuals many of which occur in the nearby National Park (based on NPWS Wildlife Atlas records). Whilst the removal of any individuals from the population would lead to a decrease in its size, given the proposal to translocate the individual and its soil seed bank, and to manage its survival, this population decrease is expected to be *short-term*. The implementation of the Translocation Management Plan is likely to result in the long-term increase of the size of the Manly/North population of *Acacia terminalis* ssp. *terminalis*. Given the highly disturbed condition of the subject site and the presence of invasive weeds, the individuals are expected to have low long-term viability, with poor survival of any seedlings that may germinate. Translocation and active management of the translocation site is expected to improve the seedling recruitment potential of these plants.

- *reduce the area of occupancy of the species,*

The proposed development would marginally reduce the area of occupancy of *Acacia terminalis* ssp. *terminalis*. Whilst this is the case, much more significant areas of better quality habitat occur elsewhere in both St Patrick's Estate and the nearby Sydney Harbour National Park.

- *fragment an existing population into two or more populations,*

The individuals detected occur within the eastern portion of the subject site amongst native vegetation. This area adjoins better vegetated areas and ultimately links up with Sydney Harbour National Park. North of the subject site only residential developments occur, no native habitat being present within this area that could support another population of *Acacia terminalis* ssp. *terminalis*. As such it is considered that the individuals are at the edge of their distribution range within the locality, the loss of these plants not affecting the connectivity or increasing the fragmentation between any existing populations.

- *adversely affect habitat critical to the survival of a species,*

It is unlikely that the habitat at the site is critical to the survival of this species, given its small size, degraded condition and the extent of suitable habitat in the conservation area of Sydney Harbour National Park.

- *disrupt the breeding cycle of a population,*

The removal of a number of individuals from the Manly/North Head population of *Acacia terminalis* ssp. *terminalis* would not significantly affect the breeding cycle of this population.

- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,*

The removal of the small amount of disturbed habitat is unlikely to cause the decline of the species in the Manly/North Head area.

- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat*[1],

The plants recorded currently occupy a site that is highly disturbed by earthworks and weed invasion. Invasive species are therefore already well established and are likely to be having a detrimental effect on seedling recruitment and the viability of the species at this location.

- *introduce disease that may cause the species to decline,*

The disturbance that has already occurred on site (particularly the sites decontamination, the importation of fill and the movement of plant and vehicles that track soil, seeds and spores from one location to the other), is expected to have the greatest potential to introduce plant diseases that may cause the decline of the species on the site.

- *interfere with the recovery of the species.*

The loss of a number of individuals and associated potential soil seed bank would not interfere with the recovery of the Manly/North Head population of this species. The recovery of this species in the locality would include the translocation of a number of plants from the proposed development site to the managed vegetated link area. This area is included under the recovery plan for the Long-nosed Bandicoot population in the area monitored by DECC.

The management of the vegetated link and the already translocated *Acacia terminalis* ssp. *terminalis* individuals includes a weed management program. Given the extent of the disturbances already occurring and the inclusion of the individual in the translocation programme of the development, it is considered that the proposed action would not detrimentally affect the recovery of the species.

8.1.1. (b) Expected impact on *Acacia terminalis* ssp. *terminalis*.

The proposed action is unlikely to have a significant adverse impact on *Acacia terminalis* ssp. *terminalis*. Therefore it is not considered that the matter would require referral to the Federal Minister for the Department of Environment, Water, Heritage and the Arts for further consideration or approval.

8.2. State legislative considerations.

8.2.1. *Environmental Planning and Assessment Act 1979.*

The only state listed threatened plant species detected in the subject site was *Acacia terminalis* ssp. *terminalis*. No endangered populations of plants or any Endangered Ecological Communities listed under the *TSC Act* occur within the subject site.

Section 5A of the *Environmental Planning and Assessment Act 1979* (as amended by the *TSC Act*) requires that the following factors (the "seven part test") be considered to determine whether a Proposal is likely to have a "significant effect on a threatened species, its populations, ecological communities or habitats".

For the purposes of this assessment it is assumed that the individuals of *Acacia terminalis* ssp. *terminalis* will be removed (i.e. destroyed), even though they would be translocated locally to those vegetation links that are present (within the nearby St Patrick's Estate) and managed according to the Translocation Management Plan.

[1] Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat, or predation.

8.2.1. (a) *Acacia terminalis* ssp. *terminalis*.

(a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction,*

Numerous individuals of *Acacia terminalis* ssp. *terminalis* were found throughout Lots 24, 25 and 26. The local (North Head) population of the species consists of at over 100 *Acacia terminalis* ssp. *terminalis* individuals (based on NPWS Wildlife Atlas records), including some 30 individuals that have been translocated from areas to be developed within St Patrick's Estate to a conservation area that is present to the south of the subject site.

The removal of numerous individuals of *Acacia terminalis* ssp. *terminalis* would not place the local Manly/North Head population at risk of extinction.

(b) *in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population, such that a viable local population of the species is likely to be placed at risk of extinction,*

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. The Manly/North Head population of *Acacia terminalis* ssp. *terminalis* is not listed as an endangered population.

(c) *in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

An 'endangered ecological community' is defined as a community specified in Part 3 of Schedule 1 of the *TSC Act* and 'critically endangered ecological community' is defined as a community specified in Part 2 of Schedule 1A of the *TSC Act*. The Manly/North Head population of *Acacia terminalis* ssp. *terminalis* is not listed as an endangered ecological community or a critically endangered ecological community.

(d) *in relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which the habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community,

The amount of habitat to be removed is small (seeds are dispersed and stored underground by ants as well as dropping below the plant, making estimates of the area of potential soil seed bank difficult). While other areas in the subject site may provide *potential* habitat, that habitat is poor and is highly degraded by mechanical disturbance, weed invasion, altered drainage conditions, and the importation of fill.

The study area is situated at the northern extent of the population's distribution (DECC 2007a). Previously suitable habitat has recently been removed to the east and west with that to the north having been developed some decades ago. Whilst the habitat would not be isolated it is noted that there would be a small amount of contraction in the population's distribution.

The habitat to be removed from the subject site is not considered to be important for the long-term survival of *Acacia terminalis* ssp. *terminalis*, given the larger areas of habitat in the Manly/North Head locality.

(e) *whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not yet been defined for *Acacia terminalis* ssp. *terminalis*. Nevertheless, any remnant of the size and condition of the subject one is unlikely to constitute critical habitat in any future declaration.

(f) *whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plan for *Acacia terminalis* ssp. *terminalis* has been or is being prepared by DECC. However, the translocation of individuals of the species that do not have long term viability in their current habitat, or that would otherwise be destroyed, would be consistent with broad recovery planning strategies.

(g) *whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process,*

Of the 29 Key Threatening Processes pertinent to mainland NSW that are listed under Schedule 3 of the *TSC Act*, "clearing of native vegetation" is applicable to the Proposal. However, as stated in 8.2.1 (a) above, the loss of the vegetation at the subject site is unlikely to adversely affect the local Manly/North Head population of *Acacia terminalis* ssp. *terminalis*. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

8.2.1. (b) Expected impact on *Acacia terminalis* ssp. *terminalis*.

While *Acacia terminalis* ssp. *terminalis* is inadequately represented in conservation reserves and the individuals on the subject site are at or near the northern limits of the distribution of this species, it is considered that the proposed development is unlikely to have a significant effect on this plant or its habitat. A Species Impact Statement is therefore not required.

9. Fauna

9.1. Commonwealth legislative considerations

By the completion of the field investigations, no animals listed under the Schedules to the *EPBC Act* had been recorded within, or in the vicinity of, the subject site. Although this is the case, based on the preceding literature review and studies carried out by the authors within the adjacent St Patricks Estate, one species of national conservation significance, the Grey-headed Flying-fox, was identified as potentially occurring in the vicinity of the subject site.

Based on the potential for this species to be present within or adjacent to the subject site, combined with the lack of suitable resources in the direct vicinity of the proposed works and the consultation of known literature sources, it is not considered that the Grey-headed Flying-fox would significantly rely upon the study area for any of its necessary life cycle requirements. Therefore, giving consideration to the Significance Impact Guidelines that are relevant to a vulnerable species, it is not considered that the Proposal would:

- lead to a long-term decrease in the size of an important Grey-headed Flying-fox population, or
- reduce the area of occupancy of an important Grey-headed Flying-fox population, or
- fragment an existing important population into two or more populations, or
- adversely affect habitat critical to the survival of the Grey-headed Flying-fox, or
- disrupt the breeding cycle of an important Grey-headed Flying-fox population, or
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, or
- Interfere substantially with the recovery of the Grey-headed Flying-fox.

Therefore, the Proposal can proceed as planned without requiring referral of the matter to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

The proposed construction of seven residential dwellings within Lots 20-26 Montpelier Place, St Patrick's Estate, North Head would not have a detrimental impact on any species of national conservation significance and therefore it is not considered that the matter would require referral to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

9.2. State legislative considerations.

9.2.1. *Environmental Planning and Assessment Act 1979.*

Characteristic diggings of the Long-nosed Bandicoot were recorded within the subject site. In addition, the Grey-headed Flying-fox has been previously recorded within this locality. To consider the impacts of the Proposal on the local and regional viability of these threatened species and populations, an assessment drawing on the criteria provided within Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken. This assessment is designed to determine "whether there is likely to be a significant effect on these threatened species, their populations, ecological communities, or habitats", and consequently whether a Species Impact Statement is required.

9.2.1. (a) Long-nosed Bandicoot.

(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."

A 'threatened species' is defined as "a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2" of the *TSC Act*. Therefore the Long-nosed Bandicoot is not a threatened species.

(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. Therefore the Long-nosed Bandicoot is classified as an endangered population.

Bandicoots prefer to forage in deeper moist soils for invertebrates, fungi, seeds, fruit and small vertebrates. During the day, individuals retreat into dense vegetation where they occupy nests made of dry grass, twigs and leaf litter constructed in depressions in the ground or at the base of trees. Movement corridors are also important, linking foraging and refuge habitats. During the present survey bandicoots were identified as utilising the site through the identification of their characteristic conical diggings. Although the site does not appear to contain suitable habitat, individuals may use the area (particularly the perimeter) as a movement corridor and/or foraging habitat. Bandicoots are known to forage and shelter within Precinct 1 and surrounds as shown through capture, radio-tracking and direct observations of individuals and diggings. Use of the site is likely to change seasonally and with soil moisture levels.

A detailed monitoring study undertaken on the Estate in January 1998 indicated that there may be 13 resident and up to 9 transient bandicoots occurring on Darley North. Most recent comprehensive monitoring data collected for the whole of North Head (May 2006) indicated that seven bandicoots were trapped near Precinct 1 (T52). Systematic quarterly monitoring undertaken by the DECC indicates that one to four individuals are regularly trapped near Precinct 13.

The development of the subject site would further disturb an area of approximately 3723m^2, this consisting of both regenerated and planted vegetation and cleared and disturbed areas. It should be noted that bandicoots will forage in newly disturbed/cleared areas as long as these are accessible and close to shelter. During construction, there is the possibility that any resident bandicoots would use these cleared areas for foraging/dispersal opportunities. Bandicoots would also continue to utilise the existing vegetated links (i.e. P1 and P13 [upper]). Post-construction, once the landscaping is complete, it is likely that bandicoots would again shift their home ranges to incorporate the new habitats (i.e. established lawns and garden beds).

Fencing design together with the incorporation of a continuous bandicoot corridor (in the form of backyards landscaping) has maintained permeability to the west and south between the Lots and the surrounding Estate (see Appendix 6). The perimeter road acts as a potential barrier to bandicoot movements and is likely to reduce bandicoot activity within Precinct 1 and hence may be beneficial in minimising the risk of road kills as the amount of habitat available is limited to front and backyards.

The residential development is not expected to increase the number or frequency of feral cats or foxes in the study area. Feral cats are already present in the park but there are presently no foxes on North Head. The latter are clearly a major threat to bandicoots with a single fox killing at least 15 bandicoots and 2 penguins in 2000. DECC has an emergency shooting strategy in place in the event that a fox is detected at North Head. Ownership of pets is not allowed under the lease agreement.

In the long-term, the use of vegetated links for foraging and shelter would continue to be monitored. Monitoring of the existing links was undertaken quarterly from April 2002 to February 2003. Another monitoring program was initiated in April 2004 and will continue throughout construction of Lots 20-26 until 2010. Furthermore, DECC regularly traps bandicoots along a fixed transect near Precinct 1 (T52) as part of its overall North Head monitoring program. By systematically monitoring use of the site by bandicoots, it should be possible to detect any decline in numbers or activity and to implement appropriate mitigation measures if necessary.

An updated report summarising the amelioration measures that have been implemented to date, and that are proposed for the Estate as part of a wider *Bandicoot Management Plan*, has been prepared (Bali 2005b).

The area that is to be developed is generally cleared and highly disturbed, there being no resources present that would be important to the local viability of a Long-nosed Bandicoot population. As such, the life cycle of the species that constitutes the endangered population is unlikely to be disrupted such that the viability of the population is likely to be significantly compromised.

(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."

The final determination of the NSW Scientific Committee defined the distribution of the North Head population of bandicoots as being approximately 360 ha, this encompassing Sydney Harbour National Park (160 ha), the Department of Defence lands and National Artillery Museum (72 ha), the North Head Sewerage Treatment Plant (20 ha), St Patrick's Estate (25 ha), Manly Hospital (15 ha), the Australian Institute of Police Management (3 ha), Manly Council Reserves including Spring Cove, Shelley Beach and Little Manly Point (25 ha) and part of residential Manly (40 ha). The subject site therefore covers approximately 0.4% of the population's distribution.

The Proposal would result in the permanent removal of 72% (2696.7m^2) of the subject site. Once construction is complete, approximately 1026.3m^2 of soft landscaping would be provided. During construction, excluding a number of individual trees, all vegetation on the Lots would be cleared. Although large open areas may form a barrier to bandicoot movement, individuals will still be able to access potential foraging habitat around the edges through gaps in the construction and sediment fences. However, it is important that contractors ensure that they check for any bandicoots that may be sheltering in heavy machinery each morning prior to beginning any works. These issues are taken into account in the Bandicoot Construction Protocol (Appendix 4) developed in consultation with DECC.

Some areas of bandicoot foraging habitat would be altered as a result of development, primarily for the purposes of the construction of terraced houses. However, landscaped habitat would comprise grassy foraging areas and dense shelter, thus maximizing the proportion of ecotone that is preferred by bandicoots. A package of information relating to the natural values of the subject site and to the Estate as a whole would be distributed to leaseholders with the lease agreement.

Lighting, noise and other disturbances may also indirectly affect the suitability of habitat for bandicoots. During construction, the use of heavy machinery would be confined to daylight hours and therefore would not affect bandicoots that are only active between dusk and dawn. Bandicoots are tolerant of some degree of noise and human activity.

The implementation of standard erosion and sedimentation controls would minimise the risk of indirect impacts associated with drainage affecting bandicoot habitat off-site.

Each Lot was assessed separately with regards to the removal/modification of habitat. This is summarised below in Table 5.

Table 5. Summary of bandicoot habitat features for each Lot[2].

Lot Number	Area Planted (m^2)	Area Lawn[3] (m^2)	Percentage Landscaped %	Permeability (Direction)
20	148.6	36.9	N/A	South and West
21	146.5	33.6	N/A	South
22	121.9	46.5	N/A	South
23	169.2	80.6	N/A	South
24	131.8	83.6	N/A	South
25	144.5	77.9	N/A	South
26	163.8	25	N/A	South and East
Total	**1026.3**	**384.1**	**28**	**NA**

[2] Each Lot means from curbside to rear of property.

[3] Subset of area planted (e.g. within the 148.6m^2 of area planted within Lot 20, 36.9m^2 of this is lawn. The remainder is composed of landscaped bed and shrubberies).

Although all existing habitat on Lots 20-26 would be removed or modified during construction, cumulatively these Lots would eventually provide 1026.3m^2 of suitable foraging and shelter habitat. Given the currently degraded and cleared condition of a large percentage of the subject site, this is considered an increase on what is presently available to the foraging needs of bandicoots.

The study area is not considered to constitute a significant regional area of known habitat for the Long-nosed Bandicoot. The vegetated areas within the subject site are highly disturbed, with non-contiguous, broken tree canopies and patchy groundcover being present. The value of the vegetation proposed to be removed is minimal compared to the remaining areas of similar foraging resources (both adjacent to, and beyond the limits of, the subject site). Therefore, the Proposal would not modify or remove a significant area of known regional habitat for the Long-nosed Bandicoot.

(d) "...in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and

72% of the subject site (totalling 2696.7m^2) would be cleared and developed. The development would include the provision of 1026.3m^2 of soft landscaping. The permanent removal of 2696.7m^2 of previously disturbed and cleared land (a large percentage of which offers limited habitat value for bandicoots due to the limited depth of soil present and the open character of the site) is not likely to result in a significant effect on the local or regional presence of the North Head Bandicoot population.

(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and

The Long-nosed Bandicoot is extremely adaptable and tolerant of major habitat disturbance and modifications and is one of the few Australian marsupials to be consistently recorded in urban environments (author's field notes, DECC 2007c). Precinct 1 is already considerably isolated as it is surrounded by an access road and residential development already occurs to the east, west and north. The subject site does however adjoin vegetation links to the south and east. In addition shelter or foraging habitat will be planted during the landscaping works post-construction. Vegetated areas present to the south east of the subject site may also provide suitable foraging and shelter habitats to support the movement of bandicoots into Lots 20-26.

Although a large cleared area would form a barrier to bandicoot movements during construction, permeability would be maintained within the vegetated links directly south of the perimeter road to the south of the subject site and the landscaped area directly east. As part of the works program for Lots 20-26, plantings will be established in the rear courtyards, which will provide potential foraging or shelter habitat for bandicoots that could potentially use the subject site as a stepping stone to more suitable habitat on the estate. The plantings in the front terraced gardens may be potentially suitable for the foraging and sheltering needs of bandicoots and aid in their east-west movement. The removal of a small percentage of currently disturbed vegetated foraging habitats, in addition to the planting of 1026.3m^2 of landscaping, would not further isolate any current interconnecting areas of habitat available to this species.

(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."

Currently, it is unlikely that Precinct 1 provides habitat important to the survival of this species due to its disturbed nature. The vegetation present is quite disturbed and is juvenile regrowth from previous clearing. The amount of vegetation proposed to be removed would not be important for the long-term survival of the Long-nosed Bandicoot at this locality. Adjacent to the Proposal, numerous stands of more suitable habitat is present, these providing foraging, breeding and sheltering opportunities for this species.

Post-construction, permeability within the site and between the subject site and the rest of the Estate will be maintained through fencing design (perimeter fencing would be raised a minimum of 150mm to allow unobstructed access along its length) and side boundary plantings. However, the perimeter road may reduce bandicoot activity within Precinct 1, the benefit of which would be a reduced possibility of road kill/injury at this location.

All seven lots were assessed as one unit with regards to their permeability to bandicoots. Although permeability within the subject site has been reduced due to the housing design, limiting movement from east to west (and vice versa), the use of raised fencing for front and rear gardens would ensure that limited permeability within the subject site and between Lots and the adjacent Estate is retained. Although there will be limited access between the subject site and the adjacent estate this may be beneficial in minimising the risk of road kills as fewer bandicoots are likely to the use the vegetated areas for foraging. The overall location of this precinct is likely to reduce the number of potential bandicoots infiltrating the subject site instead utilising the more suitable vegetated links to the south.

In the long-term, the use of vegetated links for foraging and shelter would continue to be monitored. Furthermore, DECC regularly traps bandicoots along a fixed transect near Precinct 1 (T52) as part of its overall North Head monitoring program. By systematically monitoring use of the site by bandicoots, it should be possible to detect any decline in numbers or activity and to implement appropriate mitigation measures if necessary.

As such, it is considered that the long-term presence of the local Long-nosed Bandicoot population would not be compromised.

(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."

No critical habitat would be adversely affected by the Proposal. The study area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*.

(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."

A Draft recovery plan is currently being prepared for the threatened Long-nosed Bandicoot population at North head. There are nine (9) Priority Actions identified for this species (DECC 2007b). Of these, the following may be relevant:

- Community and land-holder liaison/ awareness and/or education;
- Habitat management: Feral Control; Ongoing EIA - Advice to consent and planning authorities, Provide advice to consent authorities regarding impacts on population, Site Protection (e.g. Fencing/Signage), Erect signage/speed bumps to alert motorists and reduce road mortality;
- Weed Control: Continue weed control program in accordance with Sydney Harbour National Park PoM, Habitat Protection; and
- Monitoring: Monitor population in accordance with recovery program monitoring program.

However, given the amount of habitat likely to be disturbed by the Proposal, its undertaking is not considered to threaten the presence of any Long-nosed Bandicoot individuals, populations or their necessary habitat areas.

(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the *TSC Act*. Of these, in regards to the presence of the Long-nosed Bandicoot, the following are of relevance to the study area:

- Clearing of native vegetation;
- Competition and grazing by the feral European Rabbit;
- Predation by feral cats;
- Predation by the European Red Fox; and
- Removal of dead wood and dead trees.

Whilst this is the case, the percentage of habitat suitable for this species lost due to the undertaking of the Proposal would be minimal. Beyond the study area, the Long-nosed Bandicoot's necessary habitat requirements are well represented, thereby meeting the local and regional requirements of this species. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

9.2.1. (b) Expected impact on the Long-nosed Bandicoot.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Long-nosed Bandicoot population at North Head. The proposed development is therefore unlikely to significantly affect the endangered population of Long-nosed Bandicoots, because:

- The site is highly disturbed and cleared and would not be important to a resident population of this species; and
- The population is protected within the adjoining National Park, where more extensive habitat is present.

Consequently, a Species Impact Statement for the endangered population of Long-nosed Bandicoots is not required.

9.2.1. (c) Grey-headed Flying-fox.

(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."

During the field investigations, no historic or current Grey-headed Flying-fox camps were recorded within the subject site. Whilst this is the case, individuals have been previously recorded in the vicinity of the site, these having the opportunity to utilise those native plants present. In the locality, those native plants present within the subject site are not considered to constitute a significant foraging resource, other opportunities occurring both adjacent to and beyond the limits of the subject site. Giving consideration to the habitat requirements of this species, its adaptation to urban areas and utilisation of planted horticultural and native species, it is not considered that the development of the study site would disrupt the viability of a local population of this species, such that it would be placed at risk of extinction.

(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. Therefore the Grey-headed Flying-fox is not an endangered population.

(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."

The Grey-headed Flying-fox is not listed as an Endangered Ecological Community.

(d) "...in relation to the habitat of a threatened species, population or ecological community:

(i) "...the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and

The Proposal would result in the permanent removal of 2696.7m^2 of previously disturbed and cleared land. Given its cleared and previously disturbed character, the subject site is considered to be of limited habitat value for Grey-headed Flying-foxes. The site is considered to offer limited resources for the foraging or roosting needs of this species.

(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and

The Grey-headed Flying-fox is known to easily negotiate urban infrastructure, including urban areas, roads, open fields and paddocks (LesryK Environmental Consultants 2002, LesryK Environmental Consultants 2004). As such, the Proposal would not present a barrier to the movement patterns of this species such that its habitat areas are likely to become isolated.

(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."

The vegetation proposed to be removed would not be important for the long-term survival of the Grey-headed Flying-fox at this locality. Adjacent to the Proposal (particularly within the nearby Sydney Harbour National Park), numerous stands of native vegetation are present, these providing greater foraging opportunities for this species thereby guaranteeing its long-term presence.

(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."

The study area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*. Critical habitat for the Grey-headed Flying-fox is yet to be defined. Nevertheless, any remnant of the size and condition of the subject site is unlikely to constitute critical habitat in any future declaration.

(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."

Thirty-one priority actions have been identified for the Grey-headed Flying-fox (DECC 2007b). Of these the following may be relevant to the current Proposal: Habitat Protection: Protect and enhance priority foraging habitat for Grey-headed Flying-foxes, for example through management plans, local environmental plans and development assessments, and through volunteer conservation programs for privately owned land. However, given the limited amount of habitat available in the study area it is considered unlikely that it would be identified as a priority foraging habitat.

(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."

Of the 29 Key Threatening Processes pertinent to mainland NSW that are listed under Schedule 3 of the *TSC Act*, "clearing of native vegetation" is applicable to the Proposal. Whilst it is acknowledged that the current proposal would result in the clearance of some native vegetation potentially available for the foraging needs of the Grey-headed Flying-fox, it is not considered that the clearance that would take place would result in a significant loss of habitat for this species from the locality. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

9.2.1. (d) Expected impact on the Grey-headed Flying-fox.

The Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Grey-headed Flying-fox. No habitats were observed within the area of possible impact (including both direct and indirect impacts) that would be considered significant for the conservation and preservation of this species. Due to its ability to negotiate urban infrastructure, no Grey-headed Flying-fox corridors would be disturbed, and no significant areas of local or regional habitat would be removed or isolated. During the field survey, no resident individuals of this species were recorded within, or adjacent to, the subject site. As such, no locally viable populations of this animal are considered to occur. Therefore, the expected impacts associated with the Proposal on the Grey-headed Flying-fox are considered to be minimal, and therefore, the preparation of a Species Impact Statement is not considered necessary.

10. Conclusions.

The Proposal is not considered to affect, threaten or have a significant adverse impact on any of those plants or animals listed under the *EPBC Act*. Therefore, it is not considered that the matter would require referral to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

Whilst it is acknowledged that a number of individuals of *Acacia terminalis* ssp. *terminalis* and signs indicative of the Long-nosed Bandicoot were recorded in the subject site, and that the Grey-headed Flying-fox has been previously recorded in close proximity, based on a consideration of the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979*, it is not considered that the Proposal would have a significant impact on the local or regional presence of any of these species. As such, a Species Impact Statement that further considers the impacts of the Proposal on *Acacia terminalis* spp. *terminalis*, the Grey-headed Flying-fox or the North Head population of the Long-nosed Bandicoot is not required.

Based on the results of the flora and fauna surveys, combined with a review of known literature and database sources, it is not considered that there are any ecological constraints to the Proposal proceeding as planned. The proposed development of Lots 20-26 Montpelier Place, St Patrick's Estate, North Head would not significantly affect any populations of any native plants, animals, populations or ecological communities such that they are placed at risk of extinction. Similarly the construction of

seven residential dwellings would not remove or significantly affect any habitats of local, regional, state or national conservation concern providing that the recommendations contained within this report are followed.

11. Recommendations

In addition to the mitigation measures highlighted in Sections 6.4 – 7.2 the following recommendations to ensure the Proposal is undertaken in an ecologically sustainable manner are presented:

- Before translocation of the *Acacia terminalis* spp. *terminalis* individuals is undertaken, the weeds around the individual should be removed by the method determined by the Translocation Management Plan, so that weeds are not carried to the translocation site, and seeds of the Acacia have the best possibility of germination and growth. Growth of any weeds from the soil after translocation should also be removed as required to maintain optimum growth and recruitment conditions for *Acacia terminalis* spp. *terminalis*.

- The *Acacia terminalis* spp. *terminalis* individuals to be translocated should be removed using a front-end loader bucket, and include as much of the surrounding soil as possible so that any Acacia seed in the soil is also translocated.

- The post planting recommendations presented in the Translocation Management Plan for the Sunshine Wattle should be adhered to. These recommendations should include regular watering of any translocated individuals particularly during extended heat intervals for a minimum period of six months.

- Those infestations of noxious weeds present should be treated prior to the development of the site.

- Prior to the commencement of the project the proponent should liaise with the local (weed) control authority to determine the best methods for the treatment of the Morning Glory (*Ipomea indica*), Asparagus Fern (*Protasparagus aethiopicus*), Lantana (*Lantana camara*), Mickey Mouse Plant (*Ochna serrulata*), Castor Oil Plant (*Ricinus communis*), Cassia (*Senna pendula* var. *glabrata*) and Crofton Weed (*Ageratina adenophora*) infestations.

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Appendix 1: Flora species recorded within the subject site.

Key
* Introduced species
N – Species listed as noxious in the Manly LGA.

SCIENTIFIC NAME	COMMON NAME
CONIFEROPSIDA	CONIFERS
Juniperaceae	
* *Juniperus* sp.	Juniper
MAGNOLIOPSIDA	**FLOWERING PLANTS**
MAGNOLIIDAE	**DICOTYLEDONS**
Aizoaceae	
Carpobrotus glaucescens	Pig Face
Asclepiadaceae	
* *Gomphocarpus fruiticosus*	Narrow-leaf Cotton Bush
Asteraceae	
* **N** *Ageratina adenophora*	Crofton Weed
* *Bidens pilosa*	Cobbler's Pegs
* *Circium vulgare*	Thistle
* *Conyza albida*	Fleabane
Casuarinaceae	
Casuarina glauca	Swamp She-Oak
Commelinaceae	
Commelina cyanea	Creeping Christian
Convolvulaceae	
* **N** *Ipomoea indica*	Morning Glory
Dilleniaceae	
Hibbertia scandens	Golden Guinea Flower
Euphorbiaceae	
Breynia oblongifolia	Breynia
* *Euphorbia peplus*	Petty Spurge
* **N** *Ricinus communis*	Castor Oil Plant
Fabaceae: Caesalpinioideae	
* **N** *Senna pendula** var. *glabrata*	Cassia
Fabaceae: Faboideae	
* *Cytisus scoparius*	Scotch Broom
Glycine clandestine	Love Creeper
Kennedia rubicunda	Scarlet Runner
Fabaceae: Mimosoidea	
Acacia longifolia var. *longifolia*	Sydney Golden Wattle
Acacia suaveolens	Sweet-scented Wattle
Acacia terminalis ssp. *terminalis*	Sunshine Wattle
Malvaceae	
* *Sida rhombifolia*	Paddy's Lucerne
Moraceae	
Ficus rubiginosa	Port Jackson Fig
Myrtaceae	
Kunzea ambigua	Tick Bush
Melaleuca quinquenervia	Broad-leaved Paperbark
Ochnaceae	
N **Ochna serrulata*	Mickey Mouse Plant
Pittosporaceae	
Pittosporum undulatum	Sweet Pittosporum
Plantaginaceae	
* *Plantago lanceolata*	Plantain

SCIENTIFIC NAME	COMMON NAME
Polygonaceae	
* *Acetosa sagittata*	Turkey Rhubarb
Primulaceae	
* *Anagallis arvensis*	Scarlet Pimpernel
Sapindaceae	
Cupaniopsis anacardioides	Tuckeroo
Umbelliferae	
* *Foeniculum vulgare*	Fennel
Verbenaceae	
* **N** *Lantana camara*	Lantana
* *Verbena bonariensis*	Purple Top
LILIIDAE	**MONOCOTYLEDONS**
Asparagaceae	
* **N** Protoasparagus *aethiopicus*	Asparagus Fern
Cyperaceae	
**Cyperus eragrotis*	
Juncaceae	
Juncus sp.	Rush
Lomandraceae	
Lomandra longifolia	Mat-rush
Phormiaceae	
Dianella caerulea var producta	Flax-lily
Poaceae	
* *Briza minor*	Shivery Grass
* *Chloris gayana*	Rhodes Grass
Cymopogon refractus	Barbwire Grass
Cynodon dactylon	Couch
* *Paspalum dilatatum*	Paspalum
Paspalum distichum	Water Couch
* *Pennisetum clandestinum*	Kikuyu
* *Stenotaphrum secundatum*	Buffalo
Themeda australis	Kangaroo Grass
Typhaceae	
Typha orientalis	Cumbungi

Appendix 2: Fauna species recorded or known to occur in the vicinity of the subject site.

Source of Records

1 = Species recorded during the present study.
2 = DECC (2007a).
3 = Skelton *et al.* (Bower Gully section) (2003).
4 = Manly City Council (2006).

Key

A - Indicates species listed under the *EPBC Act.*
F - Migratory Family listed under the *EPBC Act.*
M - Species listed as migratory listed under the *EPBC Act.*
B - Indicates species listed under the *TSC Act.*
E - Species is Endangered.
V - Species is Vulnerable.
EN - Endangered population at North Head as listed under the *TSC Act.*
* - Indicates introduced species.

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		MAMMALS					
			Tachyglossidae				
		Short-beaked Echidna	*Tachyglossus aculeatus*		×		
			Dasyuridae				
V	V	Spotted-tailed Quoll	*Dasyurus maculatus*		×		
		Brown Antechinus	*Antechinus stuartii*		×		
			Peramelidae				
	EN	Long-nosed Bandicoot	*Perameles nasuta*	×	×	×	
			Phascolarctidae				
	V	Koala	*Phascolarctos cinereus*		×		
			Petauridae				
		Sugar Glider	*Petaurus breviceps*		×		
			Pseudocheiridae				
		Common Ringtail Possum	*Pseudocheirus peregrinus*		×	×	
			Phalangeridae				
		Common Brushtail Possum	*Trichosurus vulpecula*		×	×	
			Macropodidae				
		Swamp Wallaby	*Wallabia bicolor*		×		
			Pteropodidae				
V	V	Grey-headed Flying Fox	*Pteropus poliocephalus*		×	×	×
			Vespertilioidae				
		Gould's Wattled Bat	*Chalinolobus gouldii*		×		
	V	Eastern Bentwing Bat	*Miniopterus schreibersii*		×		
		Little Forest Bat	*Vespadelus vulturnus*		×		
			Molossidae				
		White-striped Freetail Bat	*Nyctinomus australis*		×		
			Muridae				
		Water Rat	*Hydromys chrysogaster*		×		
		* House Mouse	*Mus musculus*		×		
		Bush Rat	*Rattus fuscipes*		×		
		* Black Rat	*Rattus rattus*		×		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		* Unidentified rat	*Rattus sp.*	x			
			Canidae				
		Dingo	*Canis lupus dingo*		x		
		* Fox	*Vulpes vulpes*		x		
		* Dog	*Canis familiaris*		x	x	
			Felidae				
		* Feral Cat	*Felis catus*		x	x	
			Leporidae				
		* Rabbit	*Oryctolagus cuniculus*	x	x	x	
		BIRDS					
			Phasianidae				
		Brown Quail	*Coturnix ypsilophora*		x		
			Turnicidae				
		Painted Button-quail	*Turnix varia*		x		
			Diomedeidae				
MV		Wandering Albatross	*Diomedea exulans*		x		
M	V	Black-browed Albatross	*Diomedea melanophris*		x		
M		Yellow-nosed Albatross	*Diomedea chlorohynchos*		x		
MV	V	Shy Albatross	*Diomedea cauta*		x		
ME	V	Sooty Albatross	*Phoebetria fusca*		x		
			Procellariidae				
M		White-chinned Petrel	*Procellaria aequinoctialis*		x		
		Great-winged Petrel	*Pterodroma macroptera*		x		
ME	E	Gould's Petrel	*Pterodroma leucoptera*		x		
		Antarctic Prion	*Pachyptila desolata*		x		
V		Fairy Prion	*Pachyptila turtur*		x		
M		Wedge-tailed Shearwater	*Puffinus pacificus*		x		
		Buller's Shearwater	*Puffinus bulleri*		x		
M		Short-tailed Shearwater	*Puffinus tenuiorstris*		x		
		Fluttering Shearwater	*Puffinus gavia*		x		
ME	E	Southern Giant Petrel	*Macronectes giganteus*		x		x
		White-faced Storm Petrel	*Pelagodroma marina*		x		
		Common Diving-Petrel	*Pelecanoides urinatrix*		x		
			Pelecanidae				
		Australian Pelican	*Pelecanus conspicillatus*		x		
			Sulidae				
		Australasian Gannet	*Morus serrator*		x		
			Phaethontidae				
M		White-tailed Tropicbird	*Phaeton lepturus*		x		
			Phalacrocoracidae				
		Pied Cormorant	*Phalacrocorax varius*		x		
		Little Pied Cormorant	*Phalacrocorax melanoleucos*		x		
		Great Cormorant	*Phalacrocorax carbo*		x		
		Little Black Cormorant	*Phalacrocorax sulcirostris*		x		
			Podicipedidae				

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Hoary-headed Grebe	*Poliocephalus poliocephalus*		×		
			Spheniscidae				
	EN	Little Penguin	*Eudyptula minor*		×		
F			**Anatidae**				
		Pacific Black Duck	*Anas superciliosa*		×		
		Australian Wood Duck	*Chenonetta jubata*		×		
			Rallidae				
		Lewin's Rail	*Rallus pectoralis*		×		
			Ardeidae				
		White-necked Heron	*Ardea pacifica*		×		
		White-faced Heron	*Egretta novaehollandiae*		×		
M		Cattle Egret	*Ardea ibis*		×		
M		Great Egret	*Ardea alba*		×		
M		Eastern Reef Egret	*Egretta sacra*		×		
		Striated Heron	*Butorides striatus*		×		
		Nankeen (Rufous) Night Heron	*Nycticorax caledonicus*		×		
			Threskiornidae				
		Australian White Ibis	*Threskiornis molluca*		×		
F			**Scolopacidae**				
		Whimbrel	*Numenius phaeopus*		×		
M		Wandering Tattler	*Hetroscelis incana*		×		
			Haematopodidae				
	V	Sooty Oystercatcher	*Haematopus fuliginosus*		×		
F			**Charadriidae**				
		Masked Lapwing	*Vanellus miles*		×		
F			**Recurvirostridae**				
		Black-winged Stilt	*Himantopus himantopus*		×		
		Red-necked Avocet	*Recurvirostra novaehollandiae*		×		
			Laridae				
M		Arctic Jaeger	*Stercorarius parasiticus*		×		
M		Long-tailed Jaeger	*Stercorarius Longicauda*		×		
		Silver Gull	*Larus novaehollandiae*		×		
		Pacific Gull	*Larus pacificus*		×		
M		Caspian Tern	*Sterna caspia*		×		
M		Common Tern	*Sterna hirundo*		×		
		White-fronted Tern	*Sterna striata*		×		
	V	Sooty Tern	*Sterna fuscata*		×		
		Crested Tern	*Sterna bergii*		×		
		Common Noddy	*Anous stolidus*		×		
F			**Accipitridae**				
		Black-shouldered Kite	*Elanus axillaris*		×		
M	V	Osprey	*Pandion haliaetus*		×		×
		Whistling Kite	*Haliastur sphenurus*		×		
M		White-bellied Sea-eagle	*Haliaeetus leucogaster*		×		
		Little Eagle	*Hieraaetus morphnoides*		×		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Brown Goshawk	*Accipiter fasciatus*		x		
		Swamp Harrier	*Circus approximans*		x		
F			**Falconidae**				
		Peregrine Falcon	*Falco peregrinus*		x		
		Australian Hobby	*Falco longipennis*		x		
		Brown Falcon	*Falco berigora*		x		
		Nankeen Kestrel	*Falco cenchroides*		x		
			Columbidae				
	V	Superb Fruit-dove	*Ptilinopus superbus*		x		x
		Topknot Pigeon	*Lopholaimus antarcticus*		x		
		White-headed Pigeon	*Columba leucomela*		x		
		* Rock Dove	*Columba livia*		x	x	
		* Spotted Turtle-dove	*Streptopelia chinensis*		x	x	
		Brown Cuckoo-dove	*Macropygia amboinensis*		x		
		Bar-shouldered Dove	*Geopelia humeralis*		x		
		Brush Bronzewing	*Phaps elegans*		x		
		Crested Pigeon	*Ocyphaps lophotes*	x	x		
		Wonga Pigeon	*Leucosarcia melanoleuca*		x		
			Cacatuidae				
		Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*		x		
		Galah	*Eolophus roseicpilla*		x		
		Little Corella	*Cacatua sanguinea*		x		
		Sulphur-crested Cockatoo	*Cacatua galerita*		x		
			Psittacidae				
		Rainbow Lorikeet	*Trichoglossus haematodus*	x	x	x	
		Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*		x		
		Little Lorikeet	*Glossopsitta pusilla*		x		
		Australian King Parrot	*Alisterus scapularis*		x		
		Red-winged Parrot	*Aprosmictus erythropterus*		x		
E	E	Swift Parrot	*Lathamus discolor*		x		
		Crimson Rosella	*Platycercus elegans*		x		
		Eastern Rosella	*Platycercus eximius*		x		
		Australian Ringneck	*Barnardius zonarius*		x		
		Red-rumped Parrot	*Psephotus haematonotus*		x		
			Cuculidae				
		Pallid Cuckoo	*Cuculus pallidus*		x		
		Brush Cuckoo	*Cuculus variolosus*		x		
		Fan-tailed Cuckoo	*Cuculus flabelliformis*		x		
		Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*		x		
		Shining Bronze-Cuckoo	*Chrysococcyx lucidus*		x		
		Common Koel	*Eudynamys scolopacea*		x		
		Channel-billed Cuckoo	*Scthrops novaehollandiae*		x		
			Centropodidae				
		Pheasant Coucal	*Centropus phasianinus*		x		
			Strigidae				

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
	V	Powerful Owl	*Ninox strenua*		x		x
		Southern Boobook	*Ninox novaeseelandiae*		x		
	V	Barking Owl	*Ninox connivens*		x		
			Tytonidae				
		Barn Owl	*Tyto alba*		x		
			Podargidae				
		Tawny Frogmouth	*Podargus strigoides*		x		
			Apodidae				
M		White-throated Needletail	*Hirundapus caudacutus*		x		
M		Fork-tailed Swift	*Apus pacificus*		x		
			Alcedinidae				
		Azure Kingfisher	*Alcedo azurea*		x		
		Laughing Kookaburra	*Dacelo naxaeguineae*	x	x		
		Sacred Kingfisher	*Todiramphus sanctus*		x		
			Coraciidae				
		Dollarbird	*Eurystomus orientalis*		x		
			Menuridae				
		Superb Lyrebird	*Menura novaehollandiae*		x		
			Neosittidae				
		Varied Sittella	*Daphoenositta chrysoptera*		x		
			Maluridae				
		Superb Fairy-wren	*Malurus cyaneus*		x	x	
		Variegated Fairy-wren	*Malurus lamberti*		x		
			Pardalotidae				
		Spotted Pardalote	*Pardalotus punctatus*		x		
		Striated Pardalote	*Pardalotus striatus*		x		
		Rockwarbler	*Origma solitaria*		x		
		White-browed Scrubwren	*Sericornis frontalis*		x	x	
		White-throated Gerygone	*Gerygone olivacea*		x		
		Brown Gerygone	*Gerygone mouki*		x		
		Brown Thornbill	*Acanthiza pusilla*		x		
		Yellow Thornbill	*Acanthiza nana*		x		
		Striated Thornbill	*Acanthiza lineata*		x		
		Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		x		
			Meliphagidae				
		Red Wattlebird	*Anthochaera carunculata*		x		
		Little (Brush) Wattlebird	*Anthochaera chrysoptera*	x	x		
		Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*		x		
		Noisy Friarbird	*Philemon corniculatus*		x		
		Little Friarbird	*Philemon citreogularis*		x		
ME	E	Regent Honeyeater	*Xanthomyza phrygia*		x		x
		Noisy Miner	*Manorina melanocephala*	x	x	x	
		Lewin's Honeyeater	*Meliphaga lewinii*		x		
		Yellow-faced Honeyeater	*Lichenostomus chrysops*		x		
		White-eared Honeyeater	*Lichenostomus leucotis*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Yellow-tufted Honeyeater	*Lichenostomus melanops*		x		
		White-plumed Honeyeater	*Lichenostomus pencillatus*		x		
		White-naped Honeyeater	*Melithreptus lunatus*		x		
		White-cheeked Honeyeater	*Phylidonyris nigra*		x		
		New Holland Honeyeater	*Phylidonryis novaehollandiae*		x		
		Eastern Spinebill	*Acanthorhynchus tenuirostris*		x		
		Scarlet Honeyeater	*Myzomela sanguinolenta*		x		
			Orthonychidae				
		Eastern Whipbird	*Psophodes olivaceus*		x		
			Petroicidae				
		Rose Robin	*Petroica rosea*		x		
		Eastern Yellow Robin	*Eopsaltria australis*		x		
		Jacky Winter	*Microeca fascinans*		x		
			Pachycephalidae				
		Crested Shrike-tit	*Falcunculus frontatus*		x		
		Grey Shrike-thrush	*Colluricincla harmonica*		x		
		Golden Whistler	*Pachycephala pectoralis*		x		
		Rufous Whistler	*Pachycephala rufiventris*		x		
			Dicruridae				
		Grey Fantail	*Rhipidura fuliginosa*		x		
M		Rufous Fantail	*Rhipidura rufifrons*		x		
		Willie Wagtail	*Rhipidura leucophrys*		x		
		Leaden Flycatcher	*Myiagra rubecula*		x		
M		Satin Flycatcher	*Myiagra cyanoleuca*		x		
M		Black-faced Monarch	*Monarcha melanopsis*		x		
M		Spectacled Monarch	*Monacrha trivirgatus*		x		
		Magpie Lark	*Grallina cyanoleuca*		x		
		Spangled Drongo	*Dicrurus bracteatus*		x		
			Oriolidae				
		Olive-backed Oriole	*Oriolus sagittatus*		x		
		Figbird	*Sphecotheres viridis*		x		
			Campephagidae				
		Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		x		
			Artamidae				
		Grey Butcherbird	*Cracticus torquatus*		x		
		Pied Butcherbird	*Cracticus nigrogularis*		x		
		Australian Magpie	*Gymnorhina tibicen*	x	x	x	
		Pied Currawong	*Strepera graculina*	x	x		
			Corvidae				
		Australian Raven	*Corvus coronoides*	x	x		
			Hirundinidae				
		Welcome Swallow	*Hirundo neoxena*		x		
		Tree Martin	*Hirundo nigricans*		x		
			Motacillidae				
		Richard's Pipit	*Anthus naovaeseelandiae*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
F			**Sylviidae**				
		Golden-headed Cisticola	*Cisticola exilis*		x		
			Passeridae				
		* House Sparrow	*Passer domesticus*		x		
			Fringillidae				
		* European Goldfinch	*Carduelis carduelis*		x		
			Ploceidae				
		Red-browed Finch	*Neochmia temporalis*		x		
	V	Diamond Firetail	*Stagonopleura guttata*		x		
			Dicaeidae				
		Mistletoebird	*Dicaeum hirundinaceum*		x		
			Zosteropidae				
		Silvereye	*Zosterops lateralis*		x		
			Pycnonotidae				
		* Red-whiskered Bulbul	*Pycnonotus jocosus*		x		
F			**Muscicapidae**				
		Russet-tailed Thrush	*Zoothere heinei*		x		
		* Common Blackbird	*Turdus merula*		x		
			Sturnidae				
		* Common Starling	*Sturnus vulgaris*		x		
		* Common Myna	*Acridotheres tristis*		x		
		REPTILES					
			Chelidae				
		Eastern Snake-necked Turtle	*Chelodina longicollis*		x		
			Gekkonidae				
		Wood Gecko	*Diplodactylus vittatus*		x		
		Lesueur's Velvet Gecko	*Oedura lesueurii*	x	x		
		Southern Leaf-tailed Gecko	*Phyllurus platurus*		x		
		Thick-tailed Gecko	*Underwoodisaurus milii*		x		
			Pygopodidae				
		Burton's Snake-lizard	*Lialis burtonis*		x		
		Common Scaly-foot	*Pygopus lepidopodus*		x		
			Agamidae				
		Eastern Water Dragon	*Physignathus lesueurii*	x	x	x	
		Bearded Dragon	*Pogona barbata*		x		
			Varanidae				
	V	Heath (Rosenberg's) Goanna	*Varanus rosenbergi*		x		
			Scincidae				
		Red-throated Skink	*Bassiana platynota*		x		
		Wall Skink	*Cryptoblepharus virgatus*		x		
		Striped Skink	*Ctenotus robustus*		x		
		Copper-tailed Skink	*Ctenotus taeniolatus*		x		
		Eastern Water Skink	*Eulamprus quoyii*		x	x	
		Grass Skink	*Lampropholis delicata*	x	x	x	

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Garden Skink	*Lampropholis guichenoti*		x	x	
		Eastern Blue-tongued Lizard	*Tiliqua scincoides*		x	x	
		Rainbow Litter Skink	*Lygisaurus foliorum*		x		
			Boidae				
		Diamond Python	*Morelia spilota spilota*		x		
			Colubridae				
		Brown Tree Snake	*Boiga irregularis*		x		
		Common Tree Snake	*Dendrelaphis punctulata*		x	x	
			Elapidae				
		Golden Crowned Snake	*Cacophis squamulosus*		x		
		Yellow-faced Whip Snake	*Demansia psammophis*		x		
		Eastern Tiger Snake	*Notechis scutatus*		x		
		Red-bellied Black Snake	*Pseudechis porphyriacus*		x		
		Eastern Brown Snake	*Pseudonaja textilis*		x		
		Bandy Bandy	*Vermicella annulata*		x		
		AMPHIBIANS					
			Myobatrachidae				
		Common Eastern Froglet	*Crinia signifera*		x	x	
V	V	Giant Burrowing Frog	*Heleioporus australiacus*		x		
		Eastern Banjo Frog	*Limnodynastes dumerilii*		x		
		Ornate Burrowing Frog	*Limnodynastes ornatus*		x		
		Striped Marsh Frog	*Limnodynastes peronii*		x	x	
		Spotted Grass Frog	*Limnodynastes tasmaniensis*		x		
	V	Red-crowned Toadlet	*Pseudophryne australis*		x		x
			Hylidae				
		Green Tree Frog	*Litoria caerulea*		x		
		Peron's Tree Frog	*Litoria peronii*		x		
		Leaf Green Tree Frog	*Litoria phyllochroa*		x		

Appendix 3. Threatened fauna species known to have been previously recorded within this portion of the Manly Local Government Area.

Key
EPBC Act M – species listed as migratory under the *EPBC Act.*
EPBC Act TM – Species listed as threatened and migratory under the *EPBC Act.*
* - habitat requirements were generally extracted from Frith (1997), Cogger (2000), Strahan (1995), NPWS (1999), NPWS (2000) and the NSW Scientific Committee (2007), with other references used being identified in the bibliography.

Common and Scientific Name	Legislation	Habitat Requirements*	Presence Consideration and Potential Impacts
BIRDS			
White-bellied Sea-eagle *Haliaeetus leucogaster*	*EPBC Act* M	The White-bellied Sea-eagle is associated with coastal areas and bays all around Australia, and inland areas of large rivers, lakes and swamps. It spends most of its time soaring above these water bodies hunting for fish, tortoises, sea snakes, waterfowl and sometimes rabbits on land.	Unlikely to be present due to a lack of its necessary habitat requirements. Therefore, this species would not be disturbed as a result of the undertaking of the Proposal.
MAMMALS			
Long-nosed Bandicoot *Perameles nasuta*	*TSC Act* E	The Long-nosed Bandicoot has been recorded in woodlands, rainforests, wet and dry forests, open areas, heathlands and grasslands. Within these habitats they shelter during the day in a nest that is lined with grass and leaves, a number of which may be utilised in a given area. This species is known to be tolerant of major disturbances and is consistently recorded in urban environments. The Long-nosed Bandicoot feeds on a variety of invertebrates, as well as some plant material and fungi. Mating occurs throughout the year in the Sydney region. The home ranges of the Long-nosed Bandicoot are in the order of 4.4 ± 0.8ha for males and 1.7 ± 0.2ha for females.	During the present survey bandicoots were identified as utilising the site through the identification of their characteristic conical diggings. Although the site does not appear to contain suitable habitat, individuals may use the area (particularly the perimeter) as a movement corridor and/or foraging habitat. The degraded and essentially cleared nature of the site is expected to limit the occurrence of this species. Whilst this is the case, due to its nearby presence, based on a precautionary approach an assessment, using the seven part test as provided under Section 5A of the *Environmental Planning and Assessment Act 1979*, has been provided within Section 9.2 of this report.

Common and Scientific Name	Legislation	Habitat Requirements*	Presence Consideration and Potential Impacts
Grey-headed Flying-fox *Pteropus poliocephalus*	*EPBC Act* *TSC Act*	A canopy-feeding frugivore, blossom-eater and nectarivore which inhabits a variety of habitats. Roosts and breeds communally in 'camps', with these camps containing between 500 and 5,000 individuals. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring. Foraging occurs opportunistically on both native and exotic plants, often at distances between 30 and 70 km from camps.	During the field investigation, no active or historic flying-fox camps were identified. Individuals of this species known to forage within the vicinity of the subject site on occasion. Based on a precautionary approach an assessment, using the criteria provided under the *EPBC Act* and Section 5A of the *Environmental Planning and Assessment Act 1979*, has been provided within Section 9 of this report.
Eastern Bentwing-bat *Miniopterus schreibersii*	*TSC Act*	This species is the dominant cave-dwelling bat in south-eastern Australia. It occurs in a variety of habitats and roosts in caves, storm water channels, mines and houses. Feeds on insects caught on the wing from within eucalypt woodlands and forests.	The absence of caves and other suitable roosting site would negate the presence of this species. Therefore, this species would not be disturbed as a result of the undertaking of the Proposal.

Aim: To minimise bandicoot mortality and injury and to protect bandicoot habitat in areas not subject to construction activity.

- Ensure that all retained areas are clearly identified and marked to avoid any accidental damage/destruction
- Erect temporary chain wire fencing around the construction site. Gaps of at least 20-30 cm are to be provided at the bottom of the fencing, so as not to impede bandicoot movement around and through the construction site.
- All construction workers on the site, including sub contractors and visitors to the work site, are to be made aware of the presence of bandicoots through induction training by a suitably qualified and experienced person.
- A systematic clearing approach must be determined by a suitably qualified and experienced person prior to the commencement of clearing that is to include progression of clearing in one direction towards areas of retained habitat.
- Vegetation clearing to be undertaken using hand tools in the first instance and checking or likely shelter sites (at the base of vegetation and under deep litter) so as to cause bandicoots to be flushed from sheltering sites to other retained areas. Ideally all clearance to be completed within one day so that bandicoots do not re occupy partially cleared areas overnight.
- Earth moving or other large machinery is not to be used until the level of vegetation clearance achieved cannot support a bandicoot sheltering or nesting. Appropriate level of clearance to be determined by a suitably qualified person.
- If cleared vegetation is stockpiled on the site temporarily, then its removal from the site must be undertaken by hand, not large machinery.
- Operating hours are to be confined to 0700 to 1800 on weekdays and 0700 to 1300 on Saturdays to limit disturbance. No machinery is to be used within one half hour of dusk.
- All machinery and construction material stock piles are to be inspected daily prior to operations commencing to ensure that no bandicoots are sheltering.
- If an injured bandicoot is found, it must be reported to the NPWS Harbour North Office on 9977 6732, or if unavailable contact the Sydney Metropolitan Wildlife Service on 9413 4300.
- If a dead bandicoot is found, it must be reported to NPWS on the above number. A NPWS Ranger will need to check the body for a microchip, therefore, if possible put the body in a plastic bag and refrigerate or keep cool.
- Undertake monitoring of the vegetated links throughout construction as per Monitoring Protocol.

Department of Environment and Climate Change (NSW)

NEWS RELEASE NEWS RELEASE NEWS RELEASE

August 12, 2004

Bright future for North Head bandicoots

Measures taken by the Department of Conservation and Environment (DEC) to protect the endangered long-nosed bandicoot population of North Head are reaping rewards, with bandicoot numbers on the rise.

Results of the latest survey found the population had grown to between 130 and 160 individuals, up from an estimated 100 in the 2002 bandicoot census.

The five-day survey involved local DEC staff, threatened species officers, volunteers, and researchers from the University of NSW setting 276 live traps across the entire headland.

DEC Threatened Species Manager, Robert Humphries, said the results of the survey were extremely encouraging.

"Over the last few years we have put in place a range of measures to help in the recovery of these highly endangered native animals," Mr Humphries said.

"We have maintained an extensive fox baiting program, greatly reducing the major threat from this predator.

"The installation of speed bumps and restriction of night time access to North Head since 1998 are also helping by reducing road kills at night when the bandicoots are most active.

"In late 2003, local staff undertook a number of hazard reduction burns that have rejuvenated some of the long unburnt heath on North head. A number of bandicoots were found foraging in these areas.

"There had been concerns that the drought may be having detrimental effects on the colony but the increase points to a population who is faring well.

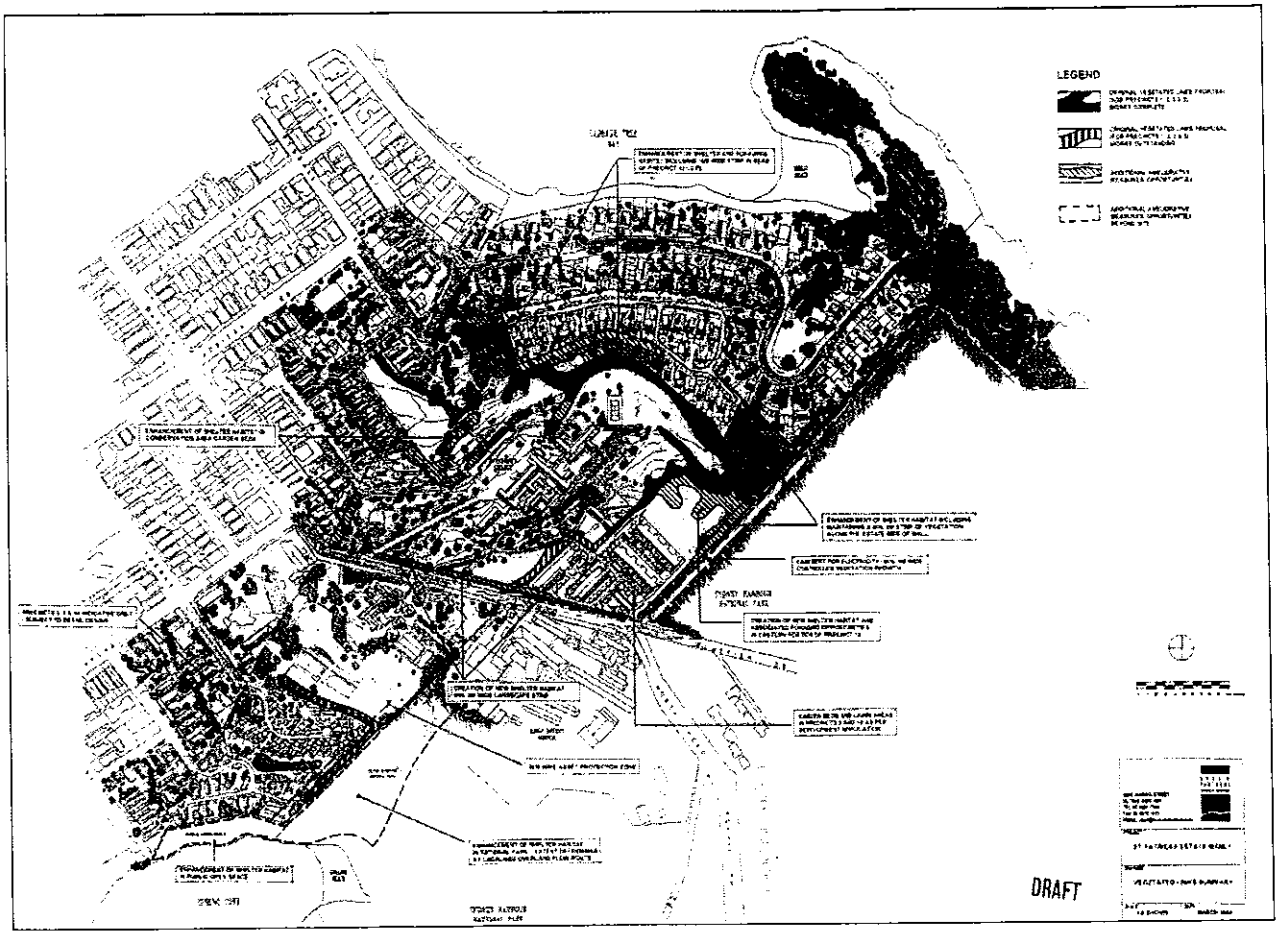
"Whilst wild populations naturally undergo seasonal and annual variations in abundance, the results have found a good sex ratio and distribution of age classes across the population – a sign of a healthy colony. "

The long nosed bandicoot is the most common bandicoot species in NSW, however like Manly's Little Penguin population, the North Head bandicoot population is surviving in isolation in the heart of Sydney.

It was declared an endangered population by the independent NSW Scientific Committee in 1997.

Department of Environment and Conservation news releases are on the web:
www.epa.nsw.gov.au/media/

Appendix 6. Vegetated links summary plan.



total earth care

Lots 9 to 12
Precinct 13
St Patrick's Estate, Manly

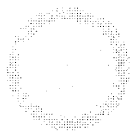
Translocation Plan
Acacia terminalis* subsp. *terminalis

Total Earth Care Pty Ltd
November 2006

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Lots 9 to 12
Precinct 13
St Patrick's Estate, Manly

Translocation Plan
Acacia terminalis subsp. *terminalis*

Quality Control	© Total Earth Care Pty Ltd 2006		
Revision/Version No.	REV 0	Date of revision:	November 7, 2006
Prepared by:	R Blackall	Status:	Final
Prepared for:	Lend Lease Developments		
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Lots 9 to 12, Precinct 13
St Patrick's Estate, Manly

Acacia Translocation Plan

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Lots 9 to 12, Precinct 13
St Patrick's Estate, Manly

Acacia Translocation Plan

1 INTRODUCTION

1.1 Background

Lend Lease Development Pty Ltd ('Lend Lease') have been granted approval for the subdivision into residential lots of a portion of St Patrick's Estate (the 'Estate') at North Head, known as Precinct 13 (the 'subject site'). There are currently eight detached dwellings on Lots 1-8 under construction that were approved by Council under previous Development Applications. Development Applications (DA Nos. 518-521/05) have been submitted by Lend Lease on behalf of the Catholic Church to Manly Council on 30 November 2005, seeking approval for the next stage of construction for four detached dwellings on Lots 9-12, Precinct 13.

The flora and fauna of Precinct 13 was previously described by Gunninah (2003) and more recently in Flora & Fauna Assessment prepared by Ecosense (2004) as part of the DAs for Lots 1 to 8. As part of the Ecosense study, Total Earth Care Pty Ltd was engaged to conduct a flora survey of Precinct 13, during which several individuals of the threatened species *Acacia terminalis* subsp. *terminalis* were recorded in the vicinity of Lot 8. A recent targeted survey of Lots 9 – 12 as part of the proposed translocation of Acacia plants associated with development on these Lots has located approximately 20 individuals of *Acacia terminalis* subsp. *terminalis.*

The subspecies is listed as "endangered" under Schedule 1 of the *NSW Threatened Species Conservation Act 1995* (TSC Act). Accordingly, Section 5A of the *NSW Environmental Planning & Assessment Act 1979* (the 8-part test as it was known then) was addressed, which determined that the development was not "likely" to impose "a significant effect" on this subspecies. However, it was considered prudent to salvage the plants to be affected and translocate them to another suitable site within the Estate (TEC in Ecosense 2004).

Manly Council granted consent for the development on lots 9 to 12, and included the following consent condition as part of the approval for DA 518/05 for Lot 9, namely:

ANS01
Where Acacia terminalis ssp. terminalis are located on the site, it is to be excavated and translocated to a recipient site located immediately south of precinct 13 prior to construction. The translocation is to include their above ground parts, root systems and surrounding soil. Details of the translocation are to be subject to a Translocation Management Plan (TMP) which must be prepared by a suitably qualified consultant in consultation with Council for endorsement prior to commencement of work. The TMP must contain guidelines for post-construction management and monitoring, and a map showing the location of plants to be salvaged and the recipient site. The TMP must be consistent with the Guidelines for the Translocation of Threatened Plants in Australia (Vallee et al. 2004)

As a consequence, this Translocation Plan has been prepared to facilitate the translocation of plant material, and soil material surrounding the roots, on the subject site in accordance with accepted best practice in the bush regeneration and horticulture industries. The Plan is based on field experience from previous translocation projects, as well as on published guidelines, with particular reference to the draft "Guidelines for the Translocation of Threatened Plants in Australia" (Vallee *et al.* 2004) and the guidelines for the translocation of the Duffys Forest ecological community (NPWS 2003).

1.2 Aims

The translocation is classified as a "salvage dig" by Vallee *et al.* (2004), which involves "transplantation of mature plants or soil to an area not affected by the development". The aims of the translocation are:

- To retain the existing genetic material of *A. terminalis* subsp. *terminalis* on or near the subject site (in preference to its complete removal or destruction);
- To provide an opportunity to establish a viable local population of the subspecies within the Estate, that is self-sustaining in the long-term; and
- To improve the diversity of locally indigenous native flora on the Estate.

2 PRE-TRANSLOCATION

2.1 Identification and mapping

A small stand of *A. terminalis* subsp. *terminalis* occurs within and adjacent to Lot 9 to Lot 12, within Precinct 13 of the Estate. At the time of writing this Plan, there are approximately twenty individuals[1] located in this area comprising a mixture of mature, semi-mature and seedlings. There is one mature plant and five seedlings located within the 10 metre protection zone at the southern end of the Lot12.

These locations are displayed on the accompanying 'translocation plan drawing' (Appendix A).

2.2 Approvals

Threatened species licencing under the *National Parks & Wildlife Act* (i.e. a s.132c licence for research, educational or conservation works) or the *Threatened Species Conservation Act* (i.e. a s.91 licence/s.95 certificate for other activities) are not required for works that are essential for the carrying out of development in accordance with a development consent.

This exemption includes translocation and bushland management activities provided that:

- the proposed works are only to be carried out in the area covered by the DA; and
- the proposed methodology was assessed and approved as part of the DA; or
- the proposed methodology is detailed in a document that was prepared to meet the conditions of the approval, and that document was subsequently approved by the consent authority.

Written evidence of a DA approval (from Council) or a s.91 licence or s.95 certificate (from DEC) must be supplied to the contractor responsible for the translocation works prior to commencement of works.

As the translocation proposal will be assessed and approved by Council as part of the Development process, no licence from the NSW Department of Environment and Conservation is required. Approval of this Translocation Management Plan (TMP) by Council is required for the *Acacia terminalis* subsp. *terminalis* translocation work to proceed within Lots 9-12 Precinct 13.

2.3 Site induction

All persons involved in the translocation project will receive a site induction prior to the commencement of work. The site induction will be delivered by the Site Supervisor and will include:

- details of the location and significance of *A. terminalis* subsp. *terminalis*;
- the location of the donor and recipient sites;

1 Note: the number of above-ground plants may change over time, with germination and mortality of plants likely to occur following publication of this Plan.

- details of the works that have been approved by Council consent; and
- the conditions of the approval.

2.4 Qualifications

The contractor assigned to complete the translocation works will possess suitable qualifications in bushland management as follows:

- All of the works associated with the translocation project will be directly supervised by a bushland supervisor with a minimum of 2000 hours field experience in bush regeneration or previous experience directly supervising the translocation of threatened plant or soil from an endangered ecological community;
- The bushland supervisor will have appropriate qualifications, being either TAFE certificate in bushland regeneration or University degree in environmental science (or both); and
- The contractor will have specific experience in native (indigenous) soil and/or vegetation translocation.

2.5 Notification

A representative of Manly Council will be informed of the upcoming translocation a minimum of 48 hours prior to the commencement of on-ground translocation works on the subject site.

2.6 Access Restrictions

Only people directly involved in the soil translocation process will be permitted to enter the translocation areas.

3 TRANSLOCATION ACTIVITIES

3.1 Choosing the Recipient Site

A suitable recipient site for the translocation has been chosen, as shown on the translocation plan drawing (Appendix A), according to the following criteria:

- It has the same or similar geological parent material as the donor site.
- It is as close as possible to the donor site.
- The land tenure allows for the recipient site to remain as protected bushland indefinitely.
- The Catholic Church has undertaken to manage the translocated material as part of its ongoing responsibility for maintenance of the established 'vegetated links'.

3.2 Preparation of the Recipient Site

3.2.1 Identification

The recipient site is identified on the accompanying plan drawing (Appendix A).

The recipient site will be defined on-ground with galvanised star pickets placed at a maximum interval of 10m.

3.2.2 Weeding

The recipient site should be weeded prior to translocation to ensure that no weed propagules will regrow in the translocated material.

3.2.3 Re-shaping

The recipient site should be shaped to achieve the following results:

- An 5 tonne excavator with tilting bucket is suggested as the best machine for excavating the soil and lifting plants.
- Ensure when re-shaping the existing sandstone capping material, the underlying soil material is not exposed.
- The ground (soil) surface must be smooth. A smooth soil surface allows translocated soil to be spread more evenly and over more ground than an uneven surface would.
- The soil must be moved once and cannot be stockpiled. Multiple handling will disrupt the of soil structure and hinder the regrading of the soil profiles.
- The contour of the prepared recipient site should mirror the shape of the finished soil profiles. The final contour of the recipient site (post-translocation) should be the same as existing levels in adjacent areas.
- The prepared recipient site should also have contours that will drain the sub-surface and surface water properly, to avoid pooling or ponding or water.
- All machinery, tools, material and equipment will be washed down to the satisfaction of the bushland supervisor at an appropriate location outside the bushland, prior to entering donor/recipient sites.

3.2.4 Fencing

The proposed recipient sites are located within the previously established vegetated link located to the south of Precinct 13. Locating the translocated plants within this area provides a degree of protection from on-going disturbance, however the recipient sites will be fenced off to prevent trampling and disturbance of the recipient sites.

3.3 Siltation and erosion control

Specific erosion control measures for the translocation process are:

- All topsoil that has been translocated will be surrounded with silt fencing.
- Silt fences should be erected according to the Landcom (2004) guidelines: "Managing Urban Stormwater: Soils and Construction" in a zigzag pattern across the contour to further compartmentalise silt movement and to avoid concentration of sediment behind the fence.
- Fill batters should be benched to compartmentalise water flow and to provide flat ground onto which silt fences can be erected.

3.4 Phytophthora control

As part of the management of Cinnamon Fungus *Phytophthora cinnamomi* ('Phytophthora'), a survey was conducted on the site on 10th October, 2006. A total of ten (10) soil samples (six donor sites and four recipient sites) were taken during the survey, with sample sites selected to represent different conditions on the site. Preference was given to areas on the lots where soil moisture was likely to be high, such under a dense vegetation canopy, in depressions that could collect water or areas where subsurface water flow may be directed to the surface by rock outcrops.

The survey returned no positive results for the soil fungal pathogen *Phytophthora cinnamomi;* however three soil samples from the donor site returned positive results for the presence of another species of Phytophthora. In addition, all samples contained a species of Pythium, but this is not a pathogen that is of concern to native plants in a natural environment.

Phytophthora cinnamomi is considered the most common and important species of *Phytophthora* causing root rot. While other species of *Phytophthora* such as the one isolated from three of the soil samples from within lots 9-12 may cause disease, it is generally less severe (Summerell *et al* 2005).

In light of the survey results the following recommendations are made:

- Because of the presence of a species of *Phytophthora*, a treatment regime should be put in place as part of the proposed Acacia translocation to control the growth of *Phytophthora sp.* to assist the survival rate of the translocated plants. This treatment regime should be based on the recommendations of the Plant Disease Diagnostic Unit (Botanic Gardens Trust), which are set out in their test results which is attached as Appendix B.
- All trucks, machinery, tools and footwear to be thoroughly cleaned and scrubbed down with a diluted bleach solution after entering the donor site for the translocation work. The cleaning should occur on a sealed surface such as cement or asphalt.
- A bushland management officer at Manly Council should be notified of the presence of a species of Phytophthora other than *Phytophthora cinnamomi* on the site.
- The areas of bushland surrounding the donor and recipient sites should be monitored for evidence of dieback and resurveyed if plant dieback becomes apparent.
- Washing boots with dilute chlorine/bleach should occur before entering a Phytophthora free area after being in an area that has not been tested and confirmed to be Phytophthora free.

3.5 Collection of seed, propagules and brush material

- Seed will be collected from any *A. terminalis* subsp. *terminalis* individuals that may be bearing seed at the time of the translocation[2].
- In the absence of seed, cuttings will be taken prior to translocation and supplied to a nursery for propagation. Monitoring of the recipient sites will dictate whether the plants grown from cuttings will be used on site.
- Some brush-matting will also be salvaged from the donor site. This brush-matting should be laid over the recipient site to stimulate the growth of seedlings of fire obligate plant species.

3.6 Plant and Soil Salvage

- All earth works are to be completed when soil moisture content is at 'field capacity' and no wet weather is forecast.
- All individuals of *A. terminalis* subsp. *terminalis* will be dug out by excavator and piled onto the bed of a waiting truck ready for relocation. The area to be excavated will be identified with spray paint on the ground surface prior to commencement. As much soil and root system of each plant will be excavated at one time, plus an additional surrounding soil, where possible.
- Larger plants will be lifted individually, whereas several smaller plants can be excavated together.
- An area of equivalent size to the stripped area on the donor site will then prepared at the recipient site.

---

2 At the time of writing, none of the individuals of *A. terminalis* subsp. *terminalis* within Precinct 13 are bearing seed. It is therefore unlikely that any fresh seed can be harvested during the translocation process. Notwithstanding, seed will be collected from translocated plants during the next season or when plants next produce seed as a means of further propagating genetic material for later planting into vegetated links within the Estate.

3.7 Machinery

- An 5 tonne excavator with tilting bucket will be used for separating soil profiles, excavating and transferring plants and preparing the recipient site.
- A utility with a flat bed tray will be used for transferring the excavated plants from the donor site to the recipient site.

4 POST-TRANSLOCATION

After the completion of translocation works the recipient site is to be accessed only by persons performing maintenance actions, or assessing the topsoil and natural regeneration.

A 12-month maintenance programme for the recipient site is proposed and will involve:

- Staking and numbering each translocated plant, with a record kept of all plants for the duration of the maintenance period. Notes of the height, crown spread, stem diameter and general health of each plant will be collected at each maintenance event.
- Twice-weekly watering of the translocated plants and weeding of the recipient site for the first month from the date of translocation;
- Monthly watering and weeding of the recipient site for the following 11 months;
- Monitoring the number of plants at each monthly visit. Any losses or plant mortality will be reported to Council.

Weed control shall only be performed by persons that are formally qualified in bush regeneration and under the direct supervision of the bushland supervisor.

Seed will be collected from translocated plants during the next growth season or when plants next produce seed, as a means of further propagating genetic material for later planting into vegetated links within the Estate.

The recipient site will not be planted, seeded, hydro-mulched, covered or otherwise disturbed until the success of the translocation has been determined by the maintenance program. This will be a period of at least three years.

REFERENCES

NPWS (2003) *Soil Seedbank Translocation from Remnants* [sic] *Duffys Forest ecological community. June 2003.* NSW National Parks & Wildlife Service, Hurstville.

Total Earth Care (2005) *Precinct 13 St Patrick's Estate, Manly: Acacia Translocation Plan.* Total Earth Care Pty Ltd, North Narrabeen.

Vallee L, Hogbin T, Monks L, Makinson B, Matthes M and Rosetto M (2004) *Guidelines for the Translocation of Threatened Plants in Australia.* Second Edition. Australian Network for Plant Conservation, Canberra.

Appendix A

Translocation Plan Drawing

Proposed Residential Development
Lots 9-12
Precinct 13, St Patrick's Estate, Manly

Acacia Translocation Plan

Title: **Translocation Plan**

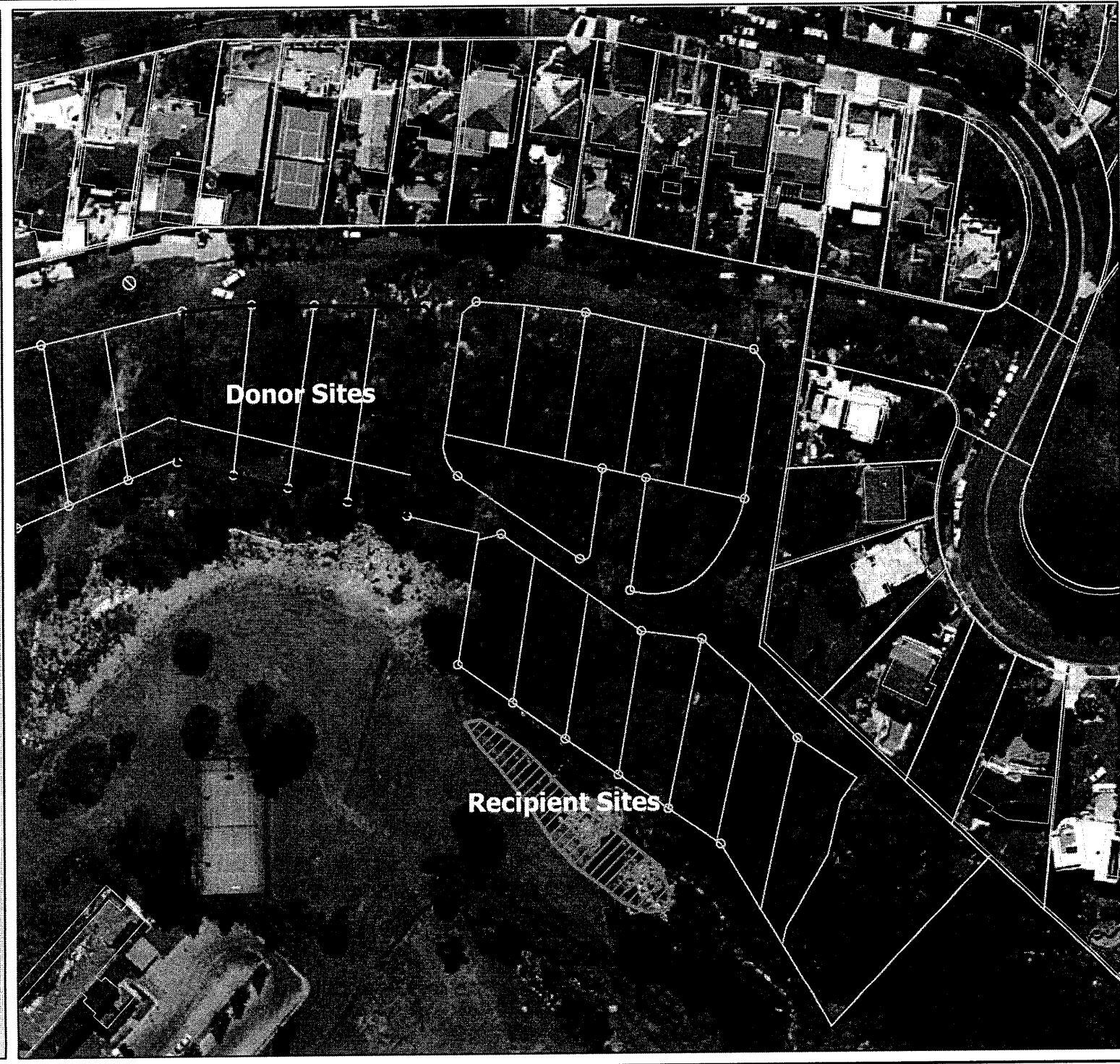
Site: Lot 9 - 12, Precinct 13
St Patrick's Estate

Client: Lend Lease Developments

Date: October 23, 2006

Project No: C584-LLD

Author: R Blackall



LEGEND

Site_Boundary

Lot Boundaries

Recipient_Sites

Metres
25 12.5 0 25

N

Data Source:
Data 1
Data 2

total earth care

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Tel: 02 9913 1432 Fax: 02 9913 1434

Appendix B

Botanic Gardens Trust Test Results

Proposed Residential Development
Lots 9-12
Precinct 13, St Patrick's Estate, Manly

Acacia Translocation Plan

Botanic Gardens Trust
SYDNEY

Science Education
CONSERVATION
Horticulture Recreation

Plant Disease Diagnostic Unit
Tel +61-2-9231 8189
Fax +61-2-9241 1135

Rob Blackall
Total Earth Care
37 Irrawong Road
North Narrabeen
NSW 2101

20/10/2006

Dear Rob

RE: Soils from St. Patrick's, Manly (our ref. E06/251)

We have tested the above soils for the presence of major soil-borne fungal pathogens. A species of *Pythium* was found in all samples, but this is not considered to be a serious pathogen to native plants in a natural environment.

However, we did isolate a *Phytophthora* species from three of the samples – D1, D3 and D4. It was not *Phytophthora cinnamomi*, but is in a group of *Phytophthora* species that are considered to be pathogenic and we therefore suggest you treat the soil accordingly.

As discussed on the phone, we recommend treating any transplanted plants and their associated soil with Ridomil at the concentrations given by the manufacturer. It would be advisable to treat an extended area around the transplanted soil to maximise control of the pathogen. A couple of weeks after treatment with Ridomil, we suggest drenching the soil with Anti-Rot. A second treatment, 4-5 week after the first is also suggested. This is not a fungicide, but actually increases the plant's resistance to the pathogen.

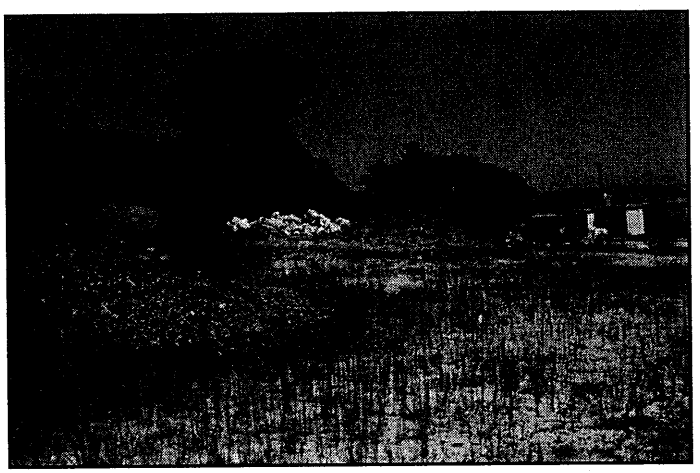
Any measures that will reduce the shock of transplantation, such as watering and covering the root zones of the plants with a good quality, organic mulch, are also advised.

If you have any questions please don't hesitate to phone.

Yours sincerely,

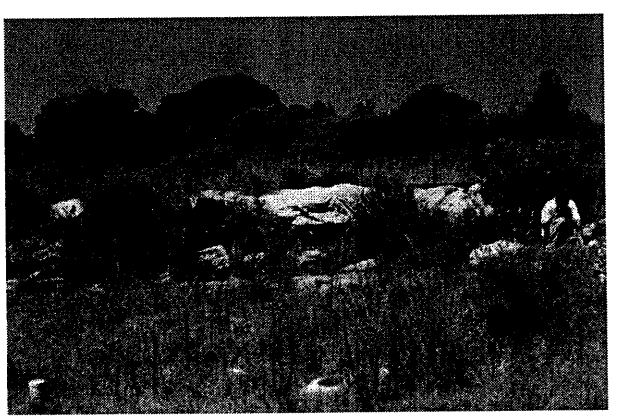
Dr Edward Liew
Plant Pathologist

Ecological assessment proposed residential development.



Lots 20 to 26
Montpellier Place,
North Head

March 2008



lesryk
ENVIRONMENTAL
CONSULTANTS

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in conjunction with
Ecosense Consulting Pty Ltd

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Please note that, given the dynamic nature of the relevant pieces of environmental legislation considered in this report, the authors consider that this report only has a 'shelf life' of six months. If a development application, review of environmental factors or statement of environmental effect is not submitted to a determining authority for consideration within this time frame, it is recommended that this report be reviewed and revised where required in light of any relevant legislative listings or changes.

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1. Introduction.

This report presents the findings of a flora and fauna survey of the lands that occur within, and in close proximity to, Lots 20 to 26, Precinct 1, Montpelier Place (Figure 1 and 2). The survey has been undertaken at the request of Lend Lease Property Group to determine the ecological impacts associated with the development of these seven lots. For reference, the location of the St Patrick's Estate is provided on Figure 1.

The Proposal would encompass the development of seven detached two and three level houses, each supporting a double garage, gardens and opportunities for the establishment of a pool should the owners wish this in the future. Where required, more detailed information on the scope of the project is provided in the development's DA.

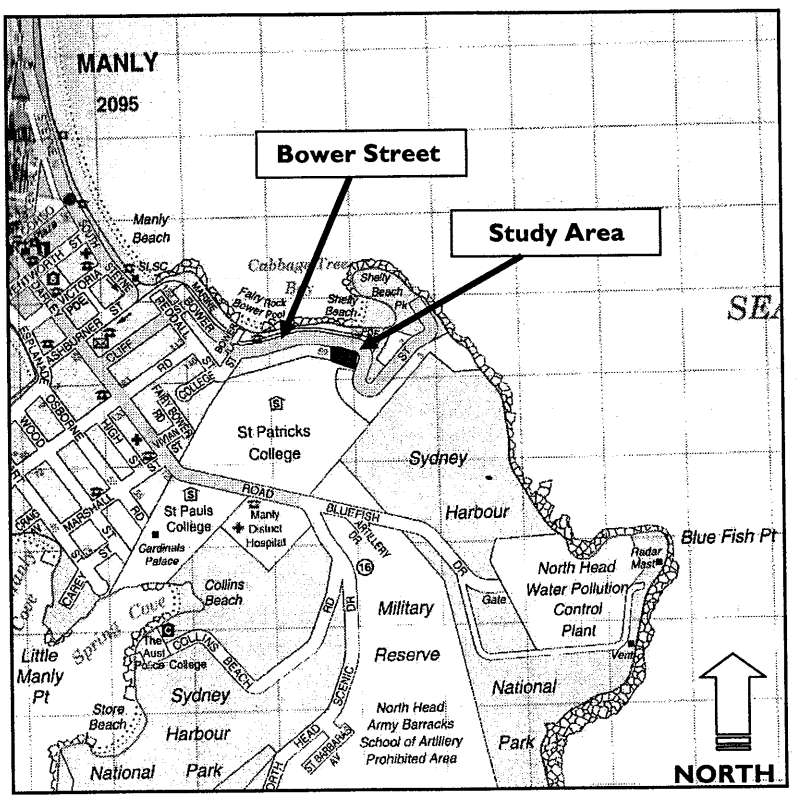


Figure 1: Study location and area.

Source: UBD (1993).
Not to scale.

With reference to the definitions provided by the Department of Environment and Climate Change [DECC] (DECC 2004) it is noted that the:

- Subject site is defined as: the area(s) directly affected by the Proposal (i.e. Lots 20-26 Montpelier Place);
- Study area is defined as: the subject site and any additional areas that are likely to be affected by the Proposal, either directly or indirectly; and
- A local population is defined as: the population that occurs within the study area, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated.

'Locality' is considered to encompass all lands that occur within 5 square kilometres (km^2) of the subject site.

When referring to the Proposal, this is considered to include all works associated with the development and occupation of Lots 20 to 26.

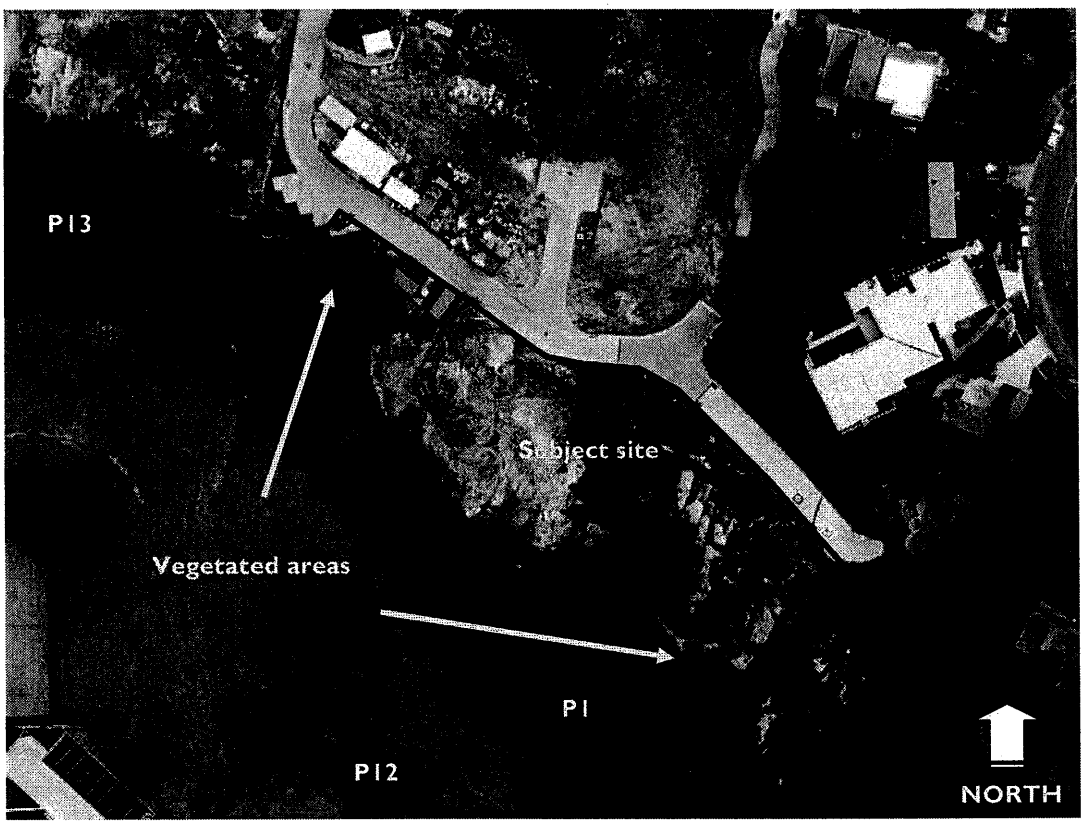


Figure 2: Subject site and areas of vegetation. (Study limits are approximate only).

Source: Google Maps (2008). Not to scale.

The assessment of possible impacts associated with the Proposal is based on a field survey of the subject site, a literature review of previous studies undertaken in both the locality and this portion of the Manly Local Government Area (LGA), the consultation of standard databases and the consideration of the objectives of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, the New South Wales [NSW] *Environmental Planning and Assessment Act 1979*, NSW *National Parks and Wildlife Act 1974*, NSW *Threatened Species Conservation Act 1995 (TSC Act)* and any relevant State Environmental Planning Policies (SEPPs).

2. Environmental setting.

Development of parts of the St Patrick's Estate, North Head, NSW have been the subject of various Development Applications (DAs) and Land and Environment Court decisions since 1996. North of Darley Road, Precinct 2 has already been developed through the establishment of residential flats and a townhouse complex. The construction of 44 apartments and 16 townhouses on Precincts 3 and 12 was completed in June-July 2007, with the construction of Lots 1to 8 finalised in February 2007. Lots 13 to 19 of Precinct 1 are currently under construction.

As noted, the subject site is located in the Sydney suburb of Manly, within the Manly LGA. Land uses that occur in the vicinity of the study area include residential developments to the north, east and west (Figure 1). To the south is St Patrick's College and further beyond the College is the North Head Army Barracks Military Reserve and Sydney Harbour National Park (Figure 1).

Due to the undertaking of previous decontamination works, the subject site is heavily disturbed and supports areas of fill and sites that have been cleared and are now vegetated by exotic grasses. The decontamination works resulted in the removal of all soil material down to bedrock, and the removal of bitumen and other underlying material. The exposed areas were backfilled with topsoil and planted with stabilising winter grasses. Due to the previous decontamination works the majority of the subject site is cleared apart from an isolated mature Melaleuca and Fig Tree, a single conifer, some semi-mature Acacias and a mixture of native and exotic groundcover plants. Two main pockets of vegetation exist within the subject site, these occurring within the western and eastern portions of the site (Figure 2). Apart from the mature trees, it is noted that all the remaining vegetation is the result of natural regeneration.

For reference, a photographic record of the subject site has been provided, this illustrating the current condition of Lots 20 to 26. In total, Lots 20 to 26 cover an area of approximately 3723 square metres (m^2).

Natural elevations within the subject site are around 25 metres (m) Australian Height Datum (AHD), the site being located within a landscape that is characterised by undulating to rolling low hills. The annual average rainfall in the locality is around 1220 millimetres (mm) with the greatest falls being experienced during the summer months (Bureau of Meteorology 2008). Average temperatures range from a winter low of approximately 8°C to a summer high of around 26°C (Bureau of Meteorology 2008).

The soils of the subject site have been mapped by Chapman and Murphy (1989) as being comprised of the Lambert Erosional Landscape. These soils are derived from the underlying Hawkesbury Sandstone geology, this being generally comprised of medium to coarse-grained quartz sandstone with minor shale and laminite lenses (Chapman and Murphy 1989). The Hawkesbury Sandstone soils are generally lithosols/siliceous sands that are associated with rock outcrops and Earthy Sands and Yellow Earths on crests and the insides of benches (Chapman and Murphy 1989). These soils are highly permeable, of low fertility and subject to high erosion hazard. Rock outcropping is common and generally occurs as wide benches (Chapman and Murphy 1989).

Conservation reserves and other protected areas that occur in the vicinity of the subject site include Sydney Harbour National Park (this covering an area of 393 hectares [ha]), and a number of smaller Council managed reserves, including Shelly Beach Park, Spring Cove and Little Manly Point, the exact size of which are unknown. Within the Manly LGA there is 268.1ha of National Park [it is noted that portions of Sydney Harbour National Park are present within the Mosman LGA] and 88.12ha of Crown land (Manly City Council 2004). Whilst this is the case approximately 90% of the bushland in Manly is degraded to some extent due to human activities (Manly City Council 1997 in Manly City Council 2004).

3. Literature review and field guides.

Prior to undertaking any fieldwork, previous studies conducted in the region and known databases were consulted to identify the diversity of flora and fauna species known for, or potentially occurring in, the locality. The identification of known, or potentially occurring, native species within this portion of the Manly LGA, particularly those listed under the Schedules of the *EPBC* and/or *TSC Acts*, thereby permits the tailoring of the field survey strategies to the detection of these animals and plants, their vegetation communities and necessary habitats. By identifying likely species, particularly any threatened animals or plants, the most appropriate species-specific survey techniques can be selected should their associated vegetation communities/fauna habitats be present. The undertaking of a literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are considered and drawn upon as required. This approach therefore increases the probability of considering the presence of, and possible impacts on, all known and likely native species, particularly any plants and animals that are of regional, state and/or national conservation concern. This approach also avoids issues inherent with a one off "snap shot" study.

Photographic record of the subject site.

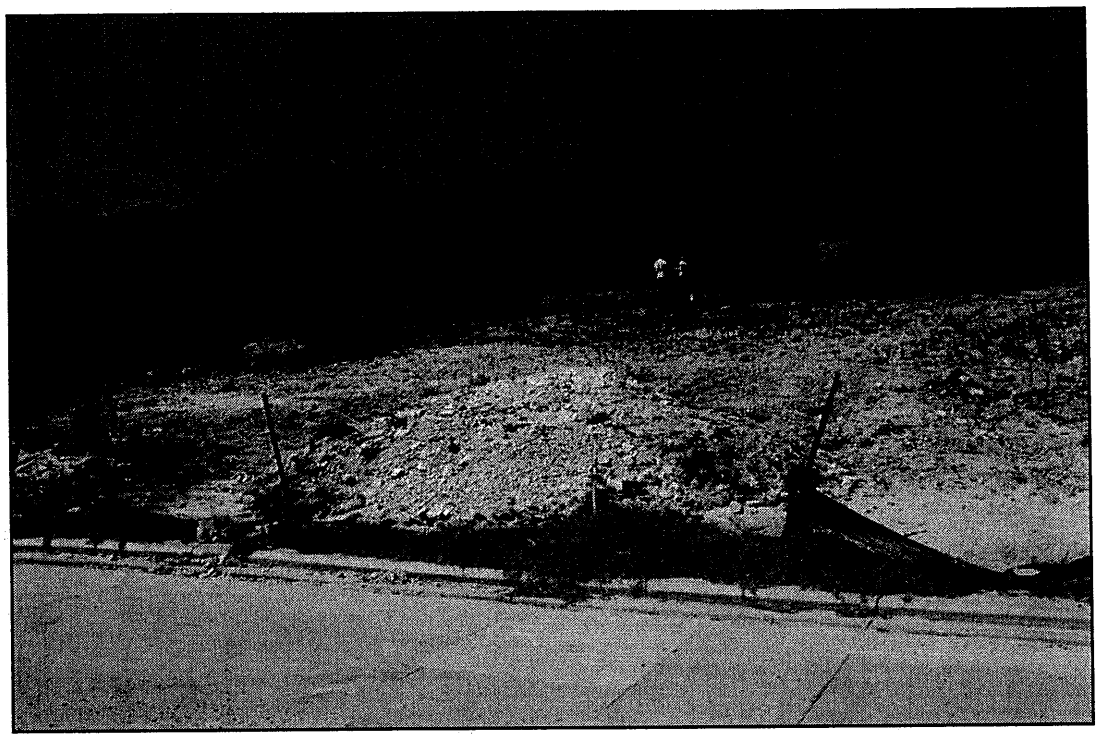


Plate 1: Looking at the central portion of the proposed development area. Note the generally cleared nature of the site.

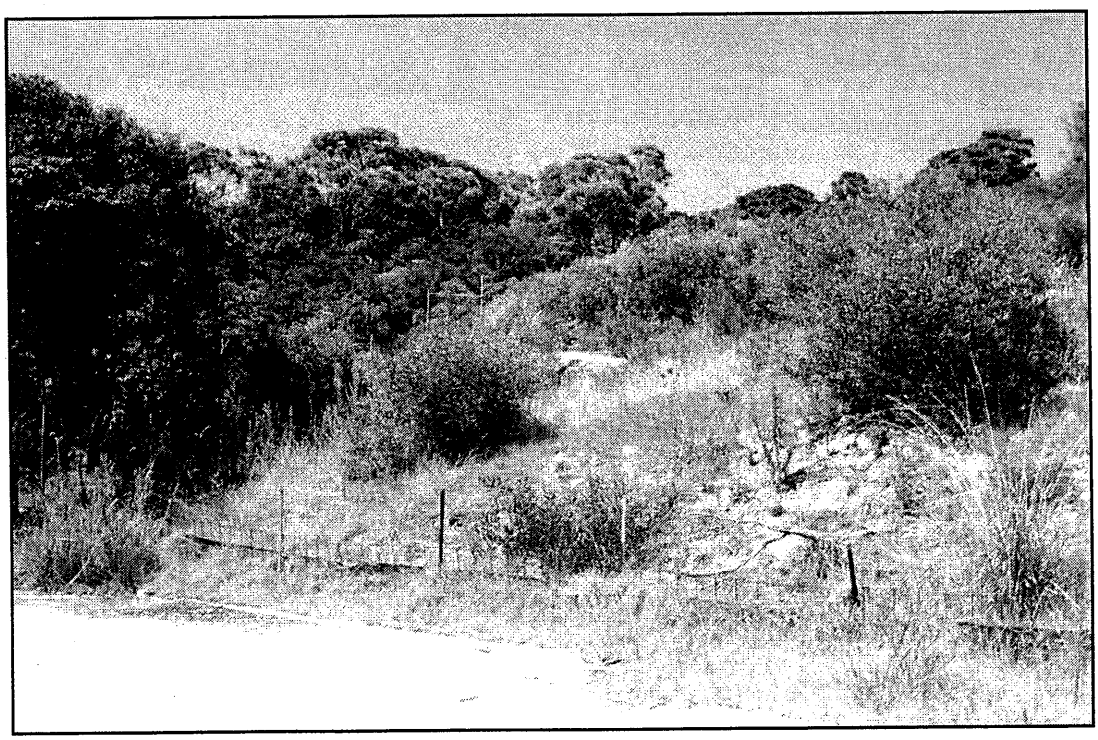


Plate 2: The eastern portion of the study site.

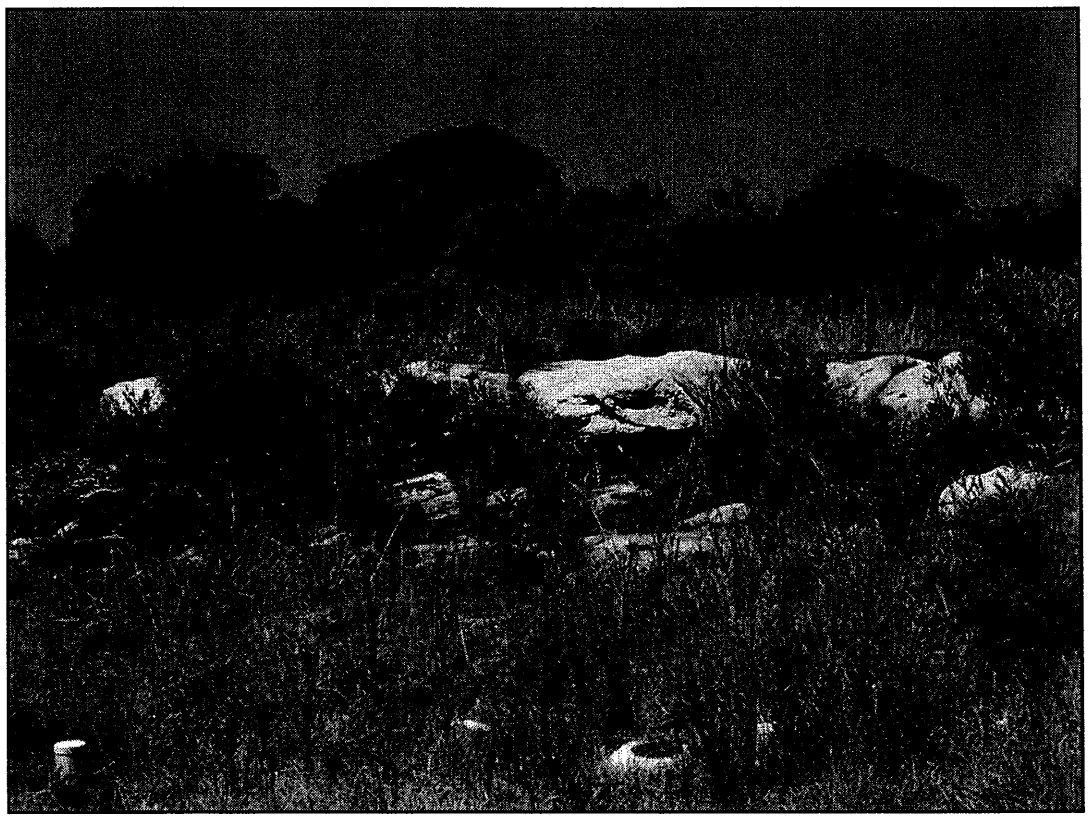


Plate 3: Looking south through the eastern half of the site.

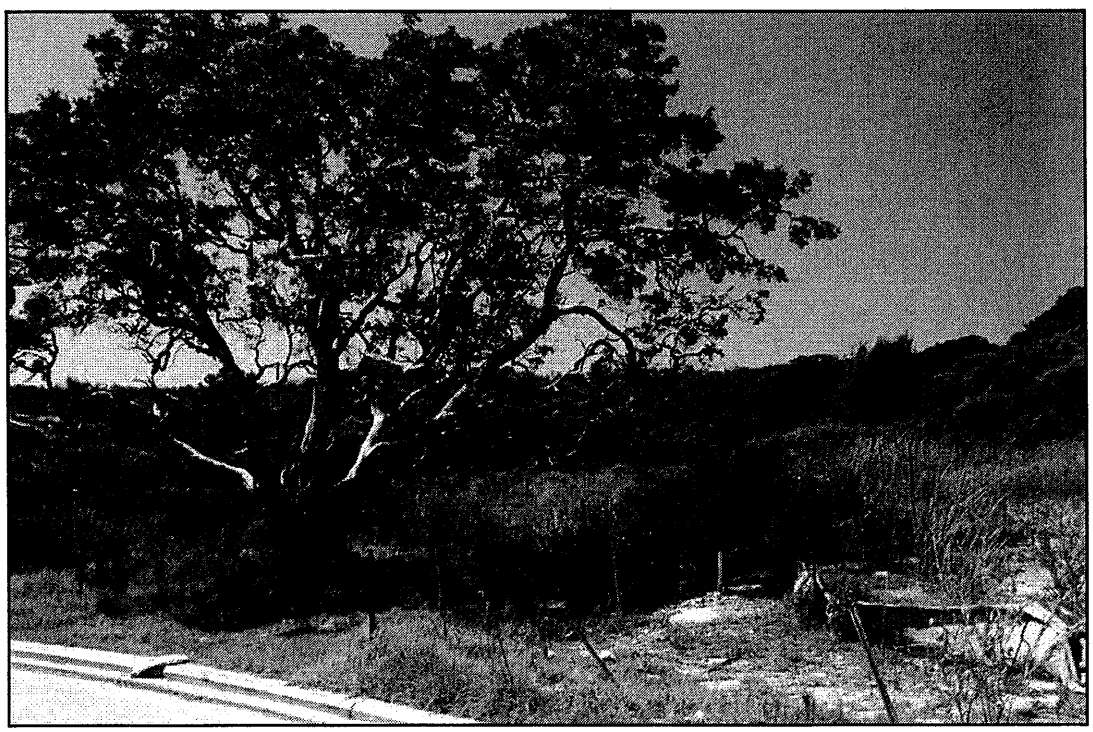


Plate 4: A lone Broad-leafed Paperbark (*Melaleuca quinquinervia*). Photo taken looking south-east through the northern portion of the study area.

The studies, reports and databases referred to include:

- A flora and fauna report of Manly Council's bushland reserves (Skelton *et al.* 2003);
- A flora and fauna assessment of the St Patrick's Estate Precincts 1 and 13 (Gunninah Environmental Consultants 2003);
- A report prepared on the potential impacts of remediation works in Precincts 1 and 13 on flora and fauna (Bali 2002);
- A Species Impact Statement prepared for the development of the St Patrick's site (Bali 2005a);
- An ecological assessment report prepared for Lots 9-12, Precinct 13 (LesryK Environmental Consultants 2005);
- An ecological assessment report prepared for Lots 13-19, Precinct 1 (LesryK Environmental Consultants 2007);
- Ecological assessment reports prepared for adjacent Lots (Pepper 2005, Bali 2002, Bali 2004);
- An ecological assessment report prepared for Precinct 3 and 12 (Total Earth Care and Ecosense Consulting 2004);
- The results of on-going Bandicoot monitoring investigations conducted within the St Patrick's and St Theresa's Convent sites (LesryK ongoing);
- The Department of Environment, Water, Heritage and the Arts (DEWHA) Online Database (DEWHA 2008);
- The DECC Atlas of NSW Wildlife (DECC 2008a);
- The BioNet Database (NSW Government 2008);
- The Australian Museum Database (Australian Museum 2008); and
- Manly Council's State of the Environment Reports (Manly City Council 2004, 2006 and 2007).

Other reports and documents referred to are provided within the bibliography section of this report.

When accessing the DEWHA and DECC databases, the search area specified was 5km^2 centred on the subject site, whilst the Manly LGA was used when investigating the Australian Museum and BioNet databases.

All these databases and reports were reviewed and drawn upon where relevant. While reviewing these documents, particular attention was paid to identifying records of species listed under the Schedules of the *EPBC* and/or *TSC Acts*, animals and plants that have been recorded in the locality and which may occur within, or in the vicinity of, the subject site.

Field guides and standard texts used include:

- Harden (1992, 1993, 2000 and 2002), Fairley and Moore (2000), Robinson (1994) and Auld and Medd (1992) (used for the identification of plants);
- Cogger (2000) (reptiles and frogs);
- Simpson and Day (1999) (birds);
- Strahan (1995) (mammals); and
- Triggs (1996) (scats, tracks and markings).

The naming of those species recorded or known for the locality follows the nomenclature presented in these texts.

The conservation significance of those plants and animals recorded is made with reference to:

- A publication on Australia's Rare or Threatened Plants (ROTAP's) (Briggs and Leigh 1996);
- The Schedules to the *EPBC* and *TSC Acts*; and
- Manly City Council's State of the Environment Report (Manly City Council 2007).

4. Field survey methods.

A survey of the study area was undertaken by Corrine de Mestre (Bsc. Hons) and Stephen Bloomfield (B. App. Sc.) on the 16th of January 2008. The investigation of the site involved foot traverses across the entire Proposal area, and those habitats that occur adjacent to it up for a distance of approximately 10m. During these investigations the diversity of plants and animals present was recorded.

The weather conditions experienced during the field investigation were clear skies, hot temperatures (28°C) and moderate north-easterly breezes.

The survey methods employed during the field investigations were:

- The direct observation of any fauna species present within, or adjacent to, the subject site;
- The identification of all plants within the areas of likely disturbance, including both direct and indirect impacts;
- The identification of the structure of those vegetation communities and fauna habitats present;
- Diurnal call identifications of fauna species with all calls being identified in the field;
- The identification of indirect evidence, such as tracks, scats, diggings and scratchings;
- Litter and ground debris searches for reptiles and amphibians; and
- Targeted searches for those species of state and national conservation concern, or their likely habitat areas, that were identified during the literature review stage of the project.

Based on the outcomes of those previous ecological investigations undertaken in this locality, and the cleared nature of the site, it was not considered necessary to undertake any nocturnal work. As such, no nocturnal work was undertaken.

The purpose of the field surveys was to locate within the areas surveyed any plants, animals or vegetation communities that are of state and/or national conservation significance. When conducting the field investigation, the 'Random Meander Method' (as per Cropper 1993), or an adaptation of this was employed. This method is suitable for covering large areas and for locating any rare species (and their associated vegetation communities/habitat types) that may occur within a survey site. The method involves walking randomly across a particular survey area whilst sampling all of the various habitat types and vegetation communities present until no new species have been recorded for at least thirty minutes.

Whilst conducting the fauna survey, efforts were made to document the diversity, structure and value of those habitats present within the areas surveyed for those protected, as defined under the *NSW National Parks and Wildlife Act 1974*, and threatened, species recorded or potentially occurring. This involved assessing the structure of the flora and fauna habitats present and determining their significance for native species, particularly any that are of national and/or state conservation concern. Whilst conducting the habitat assessments, efforts were made to identify features such as known feed trees, mature trees with hollows, connectivity of fauna corridors, aquatic environments and other habitat features important to the life cycle needs of those threatened species known or likely to occur in the study region.

Stands of vegetation were described by their structural characteristics according to Specht (1981), and mapping and community names by Benson and Howell (1994). Where applicable, Endangered Ecological Communities were classified and named according to the NSW Scientific Committee's Final and Preliminary Determinations (various dates).

The diversity of the species recorded during the survey would be influenced by seasonal factors, with some species likely to be inconspicuous or absent from the local population during winter. This is particularly true of terrestrial orchids, which persist as dormant underground tubers during particular seasons. Other species (especially those growing in areas of long grass) are difficult to find unless they are experiencing a period of new growth or are flowering. For these reasons, survey results could have been improved by extending the investigation period to encompass all seasons. However, given

the small size and highly disturbed condition of the subject site, in addition to the numerous surveys undertaken on the site over the years, it is considered that the survey time allowed for this investigation is sufficient, and provides an adequate floristic description of the subject site.

By the completion of the field investigation, approximately three (3) person hours of active searches had been accumulated, active searches being defined as the time spent actively searching the study area. Given the physical condition and size of the subject site, combined with the results of the previous ecological investigations undertaken in this locality, this length of time is considered more than adequate when endeavouring to determine the diversity of native species present, their associated habitats and the conservation status of both of these.

During the course of the investigation, no limitations to the success of the study were encountered.

5. Results

5.1. Flora survey.

5.1.1. Plant species.

A list of plant species recorded within the subject site is provided in Appendix 1. This is not intended to be a comprehensive list of all species present within the subject site, and only represents those plants that were recorded whilst undertaking searches for those native species of national or state conservation concern that are known, or expected to occur, in the locality.

A number of mature and semi-mature individuals of *Acacia terminalis* ssp. *terminalis* (Sunshine Wattle) were found during the field investigation. This species is listed as endangered under the Schedules to both the *EPBC* and *TSC Acts*. The individuals occur predominately within the eastern half of the study site. It is noted that an individual is also present within the western portion of the site.

Consultation of the DECC (DECC 2008a) and DEWHA databases (DEWHA 2008) identified a further nine threatened plants that have been recorded previously in this locality (Table 1). Though targeted during the field investigation, none of these plants were recorded within, or in close proximity to, the subject site. As such they are not further considered in this report.

The following plants recorded within the subject site are listed as noxious weeds within the Manly LGA (as per the *Noxious Weeds Act 1993*): Morning Glory (*Ipomea indica*), Asparagus Fern (*Protasparagus aethiopicus*), Lantana (*Lantana camara*), Mickey Mouse Plant (*Ochna serrulata*), Castor Oil Plant (*Ricinus communis*), Cassia (*Senna pendula* var. *glabrata*) and Crofton Weed (*Ageratina adenophora*). Recommendations for the treatment of these species have been provided in Section 11.0 of this report.

5.1.2. Plant communities.

The subject site is heavily disturbed, the area surveyed supporting large areas of fill and sites that have been previously decontaminated and are now vegetated by exotic grasses. A small area of low native shrubland occurs within the eastern portion of the subject site. This native area occurs above some sandstone outcropping and consists mainly of Sydney Golden Wattle (*Acacia longifolia*), Sweet-scented Wattle (*Acacia suaveolens*) and Tick Bush (*Kunzea ambigua*). These are of a medium density and reach up to 3m in height. Other common native species are Running Postman (*Kennedia rubicunda*), Blue Flax Lily (*Dianella caerulea* var. *producta*), Kangaroo Grass (*Themeda australis*) and Water Couch (*Paspalum distichum*). These are all of a sparse to medium density and reach heights of 1m.

Table 1. Plant species of state or national conservation significance previously recorded within the locality.

Key
E = Endangered; V= Vulnerable.

Species	Status		Habitat*
	TSC	*EPBC*	
Allocasuarina portuensis	E	E	Restricted to a small area of coastal scrub at Nielsen Park.
Acacia bynoeana	E	V	Woodland and Heath on clayey ridge-tops over sandstone.
Acacia terminalis ssp. *terminalis*	E	E	Found during a previous survey undertaken on an adjacent lot (Lot 11) this being present to the west of the subject site.
Callistemon linearifolius	V	V	Ridgetops and upper slopes on sandstone.
Eucalyptus camfieldii	V	V	Woodland and Heath on clayey ridge-tops.
Syzygium paniculatum	V	V	Littoral rainforest.
Caladenia tessellata	E	E	Very rare orchid occurring in clay loam or sandy soils.
Thesium australe	V	V	Grassland or woodland often in damp sites.
Pimelea curviflora var. curviflora	V	V	Woodland and Heath on clayey ridge-tops over sandstone.
Tetratheca glandulosa	V	V	Woodland and Heath on clayey ridge-tops over sandstone.

* - based on Harden (1992-2002), Fairley and Moore (2001), LesryK Environmental Consultants (2005) and author's field notes.

The occasional Swamp She-Oak (*Casuarina glauca*) as well as one Broad-leafed Paperbark (*Melaleuca quinquinervia*) and one Port Jackson Fig (*Ficus rubiginosa*) also occur onsite, the maximum height of these trees being 10m. Within the western portion of the study site a number of landscaped native species have been planted, these including Mat Rush (*Lomandra longifolia*), Tuckeroo (*Cupaniopsis anarcardioides*) and Sydney Golden Wattle.

The remainder of the site is dominated by a 1.5m layer of exotic species. The density of this vegetation depends on which part of the site they are present in and varies from a sparse to high. The dominant species in this area include Kikuyu (*Pennisetum clandestinum*), Couch (*Cynodon dactylon*), Paspalum (*Paspalum dilatatum*) and Fleabane (*Conyza albida*).

An ephemeral water body approximately 8m long and 3m wide occurs within the southern portion of the site. A medium density layer of Cumbungi (*Typha orientalis*) dominates this area, these plants reaching a height of 2m. The water body is an artefact of the previous decontamination works and is not considered to be of any significant ecological value.

5.1.3. Conservation significance of the vegetation.

Benson and Howell (1994) mapped the vegetation of the Sydney 1:100,000 map sheet. They mapped the subject site and surrounds as Sydney Sandstone Ridgetop Woodland. Whilst this is the case, the vegetation on the site does not conform to any natural vegetation classification due to the impacts of past clearing and the lack of any significant remnant species. However, pre-clearing it is thought that the site would have conformed to a coastal variant of Sydney Sandstone Ridgetop Woodland (LesryK Environmental Consultants 2007).

At a state scale Keith (2002) has classified vegetation communities and estimated the amount of each removed since European settlement. The vegetation in the subject site corresponds to his classification of "Sydney sandstone coastal dry sclerophyll forest". He estimates that there is 3500-4600km^2 of this vegetation type remaining with less than 30% having been cleared since European settlement.

The vegetation community occurring at the site does not conform to any Endangered Ecological Community listed, or currently being considered for listing, on the Schedules to either the *EPBC* or *TSC Acts*.

5.2. Fauna survey.

5.2.1. Habitat types present within the subject site.

As mentioned previously the site has been previously cleared of all vegetation apart from a few mature native trees. The vegetation currently present is regrowth. Therefore, as a result of this past disturbance, only one habitat type was recorded within the subject site, this being a disturbed environment. This habitat type dominates the subject site and is the result of previous development works undertaken in this locality. Predominantly the site is cleared, levelled and devoid of any habitat features suitable for native fauna. Whilst this is the case, two small areas of regrowth vegetation were recorded, the largest of these being present within the eastern portion of the study site. Depending on the levels of regeneration and disturbance within these areas the density varies from sparse to high, whilst their heights reach 3m. In addition the site consists of a few mature trees, these reaching a maximum height of 10m, several semi-mature shrubs (that are to 3m in height) and a regenerative groundcover that supports a mixture of both exotic and native plants. In regards to those mature trees present, none support any hollows suitable for the roosting or sheltering needs of native animals. Within the disturbed environment, accumulations of ground debris are common, as is the presence of urban and construction refuse, soil mounds, timber, pipes, steel and so forth. Sandstone rock material is also present within the area surveyed, this being prominent within the eastern portion of the study site. Crevices, cracks, ledges and benches as well as eroded sandstone rock material are present in association with this.

A small ephemeral wetland (approximately 8m long by 3m wide) is present near to the southern limits of the study area. Dense emergent aquatic vegetation to 2m in height dominates this area. As noted, the "wetland" is an artefact of the previous decontamination works and is of limited ecological value.

The disturbed environment is characteristic of those modified and altered urban environments that surround the subject site, no habitat features observed within Lots 20 to 26 being unique to this locality. Giving consideration to the life cycle needs of those native species recorded, and their adaptation to urban areas, it is not considered that any further development of the subject site would cause the displacement and/or loss of any of these animals. The disturbed environment is not considered significant for the local occurrence of any viable populations of native fauna or their ecological communities, particularly any animals listed under the Schedules to either the *EPBC* or *TSC Acts*. As such, the disturbed environment could be further developed without significantly affecting the biodiversity of the locality, or threatening the presence of any of the native animals recorded, or expected to occur, within the study area.

5.2.2. Wildlife corridors and vegetation links.

Based on a review of topographic maps and aerial photography, combined with a visual assessment of the subject site undertaken at the time of the field investigation, it is noted that the vegetation that is present to the south of the study area (i.e. that which borders St Patrick's College and is known as Vegetated Links P1 and P13) forms a component of a local vegetation corridor. This corridor finishes to the west at Reddall Street, however connectivity eastwards through to both the Sydney Harbour National Park and North Head Army Barracks Military Reserve is possible. In regards to this corridor (which has been enhanced through the undertaking of habitat restoration works), whilst its width is

variable, opportunities do exist for the east – west dispersal of native animals such as the Long-nosed Bandicoot (*Perameles nasuta*). Whilst this locally significant corridor is present to the south of the proposed development area, it is not considered that the establishment of seven residential dwellings within the subject site would present a barrier to the dispersal needs of any native species that are currently utilising and traversing through this bushland.

Similarly, with the retention of the corridor to the south of Lots 20 to 26 movements for any ground dispersing species present would still be possible. The proposed residential dwellings are therefore not considered to present a barrier to the movement patterns of any native fauna, thereby isolating or further fragmenting their habitat areas. Similarly the Proposal would not isolate any interbreeding populations.

5.2.3. Fauna species recorded during the field investigations.

By the completion of the field surveys 8 native birds, 3 reptiles and 1 mammal had been recorded within, or adjacent to, the subject site (Table 2). Of those species detected, the Long-nosed Bandicoot is listed as an endangered population within the Manly LGA.

In addition to the native species recorded, a number of introduced animals were also detected, or indicated as occurring, within the subject site (Appendix 2).

Table 2. Fauna species recorded during the field investigation.

COMMON NAME	**FAMILY and SCIENTIFIC NAME**
MAMMALS	
	Peramelidae
Long-nosed Bandicoot	*Perameles nasuta*
BIRDS	
	Columbidae
Crested Pigeon	*Ocyphaps lophotes*
	Psittacidae
Rainbow Lorikeet	*Trichoglossus haematodus*
	Halcyonidae
Laughing Kookaburra	*Dacelo naxaeguineae*
	Meliphagidae
Little (Brush) Wattlebird	*Anthochaera chrysoptera*
Noisy Miner	*Manorina melanocephala*
	Artamidae
Australian Magpie	*Gymnorhina tibicen*
Pied Currawong	*Strepera graculina*
	Corvidae
Australian Raven	*Corvus coronoides*
REPTILES	
	Gekkonidae
Lesueur's Velvet Gecko	*Oedura lesueurii*
	Agamidae
Eastern Water Dragon	*Physignathus lesueurii*
	Scincidae
Garden Skink	*Lampropholis delicate*

In regards to the detection of those native species recorded:

- All of the birds were observed within, adjacent to, or flying over the subject site, or identified from their distinct calls;
- The Long-nosed Bandicoot (*Perameles nasuta*) was identified through its characteristic conical diggings within a mulched portion of the site;
- Several Garden Skinks (*Lampropholis delicata*) were observed at various locations throughout the subject site whilst conducting the ground debris searches;
- A juvenile Lesueur's Velvet Gecko (*Oedura lesueurii*) was observed in association with a sandstone outcrop that occurs within the eastern portion of the subject site; and
- The Eastern Water Dragon (*Physignathus lesueurii*) was observed in association with the landscaped vegetation within the western portion of the study site.

The species recorded are not considered to be reliant upon those habitats present within the subject site such that the removal or further disturbance of these would threaten the occurrence of these animals. The species recorded are all expected to be present within both the subject site and surrounding locality post-construction. Due to their ability to adapt to, and be tolerant of, urban environments, none of the native species recorded would be adversely affected by the Proposal such that the viability of a local population of that animal would be placed at risk of extinction.

The on-going occupation of the property could potentially influence the diversity of native species present. Whilst this is the case, the species recorded are known to be adaptable to and be tolerant of urban environments, the retention of the vegetated links (e.g. Vegetated Link P1 and P13 - upper) and Sydney Harbour National Park to the rear and south-east of the subject site expected to ensure the long-term presence of these animals.

5.2.4. Fauna species previously recorded within the locality.

Fauna surveys and compilation lists prepared for the locality have identified an additional sixteen (16) native mammals, one hundred and sixty four (164) native birds, twenty five (25) reptiles and ten (10) frogs (Appendix 2).

Of those native species previously recorded, 44 are listed, or currently being considered for listing, under the Schedules to the *EPBC* and/or *TSC Acts* (Table 3). Based on the consideration of the habitat needs of those native species recorded during the field survey, combined with the identification of those habitats present within the subject site, it is expected that, of those state and nationally listed threatened species previously recorded in the locality (as listed in Table 3), four (4) have the potential to be present within, or in the vicinity of, the subject site. For reference, the main habitat requirements of these species, and a consideration of the likely impacts of the Proposal on the local viability of these animals has been provided (Appendix 3). When assessing the extent of likely impact of the Proposal on the local and regional presence of those species presented in Appendix 3, including their movement patterns and interbreeding needs, the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979* have been referred to and drawn upon. None of the threatened animals listed in Appendix 3 are considered to solely rely upon the subject site, such that the Proposal would have a significant impact on the local or regional viability of these species, their populations or habitats.

Table 3. Threatened fauna species previously recorded in the locality.

Legislation
EPBC Act M – Listed as migratory under the *EPBC Act.*
EPBC Act TM – Listed as threatened and migratory under the *EPBC Act.*
E – Endangered population at North Head as listed under the *TSC Act.*
Bold – species potentially present within the subject site.

Common Name	Scientific Name	Legislation
MAMMALS		
Spotted-tailed Quoll	*Dasyurus maculates*	*EPBC Act and TSC Act*
Long-nosed Bandicoot	***Perameles nasuta***	***TSC Act E***
Koala	*Phascolarctos cinereus*	*TSC Act*
Grey-headed Flying Fox	***Pteropus poliocephalus***	***EPBC Act and TSC Act***
Eastern Bentwing Bat	***Miniopterus schreibersii***	***TSC Act***
BIRDS		
Wandering Albatross	*Diomedea exulans*	*EPBC Act TM*
Black-browed Albatross	*Diomedea melanophris*	*EPBC Act M and TSC Act*
Yellow-nosed Albatross	*Diomedea chlorohynchos*	*EPBC Act M*
Shy Albatross	*Diomedea cauta*	*EPBC Act TM and TSC Act*
Sooty Albatross	*Phoebetria fusca*	*EPBC Act TM and TSC Act*
White-chinned Petrel	*Procellaria aequinoctialis*	*EPBC Act M*
Gould's Petrel	*Pterodroma leucoptera*	*EPBC Act TM and TSC Act*
Fairy Prion	*Pachyptila turtur*	*EPBC Act*
Wedge-tailed Shearwater	*Puffinus pacificus*	*EPBC Act M*
Short-tailed Shearwater	*Puffinus tenuiorstris*	*EPBC Act M*
Southern Giant Petrel	*Macronectes giganteus*	*EPBC Act TM and TSC Act*
White-tailed Tropicbird	*Phaeton lepturus*	*EPBC Act M*
Cattle Egret	*Ardea ibis*	*EPBC Act M*
Great Egret	*Ardea alba*	*EPBC Act M*
Eastern Reef Egret	*Egretta sacra*	*EPBC Act M*
Wandering Tattler	*Hetroscelis incana*	*EPBC Act M*
Sooty Oystercatcher	*Haematopus fuliginosus*	*TSC Act*
Arctic Jaeger	*Stercorarius parasiticus*	*EPBC Act M*
Long-tailed Jaeger	*Stercorarius Longicauda*	*EPBC Act M*
Caspian Tern	*Sterna caspia*	*EPBC Act M*
Common Tern	*Sterna hirundo*	*EPBC Act M*
Sooty Tern	*Sterna fuscata*	*TSC Act*
Osprey	*Pandion haliaetus*	*EPBC Act M and TSC Act*
White-bellied Sea-eagle	***Haliaeetus leucogaster***	***EPBC Act M***
Superb Fruit-dove	*Ptilinopus superbus*	*TSC Act*
Swift Parrot	*Lathamus discolor*	*EPBC Act and TSC Act*
Powerful Owl	*Ninox strenua*	*TSC Act*
Barking Owl	*Ninox connivens*	*TSC Act*
White-throated Needletail	*Hirundapus caudacutus*	*EPBC Act M*
Fork-tailed Swift	*Apus pacificus*	*EPBC Act M*
Regent Honeyeater	*Xanthomyza phrygia*	*EPBC Act TM and TSC Act*
Rufous Fantail	*Rhipidura rufifrons*	*EPBC Act M*
Satin Flycatcher	*Myiagra cyanoleuca*	*EPBC Act M*
Black-faced Monarch	*Monarcha melanopsis*	*EPBC Act M*
Spectacled Monarch	*Monacrha trivirgatus*	*EPBC Act M*
Diamond Firetail	*Stagonopleura guttata*	*TSC Act*
REPTILES		
Heath (Rosenberg's) Goanna	*Varanus rosenbergi*	*TSC Act*
AMPHIBIANS		
Giant Burrowing Frog	*Heleioporus australiacus*	*EPBC Act and TSC Act*
Red-crowned Toadlet	*Pseudophryne australis*	*TSC Act*

In relation to the species listed in Table 3, two, the Long-nosed Bandicoot and Grey-headed Flying-fox have the potential to be impacted on by the Proposal due to either the presence of resident individuals to the south of the subject site or previous recordings of these animals within the study area. Based on a precautionary approach, further ecological assessments have been undertaken on these species in Section 9 of this report. Given the structure and condition of the habitat to be modified as part of the Proposal, it is not considered that there would be any impact on the remaining species listed in Table 3 as a result of the future development of the subject site.

In relation to the additional threatened species listed in Table 3, though previously recorded within the locality, it is noted that these animals have specific habitat requirements (e.g. open expanses of water, rainforests, well developed woodlands and caves), no components of which are present within, or in close proximity to, the subject site. As such, no locally viable populations of these species would be present within or beyond the limits of the subject site. Therefore, as no locally viable populations of these animals would be present, it is not considered that the undertaking of the Proposal would have an adverse impact on any of these species, their populations or habitats.

The DECC has prepared, or is currently preparing, recovery plans for the Koala (*Phascolarctos cinereus*), Gould's Petrel (*Pterodroma leucoptera*), Barking Owl (*Ninox connivens*), Long-nosed Bandicoot (*Perameles nasuta*) and Large Forest Owls, these species having been previously recorded within the Manly LGA. As part of these recovery plans certain objectives have been established. Given the minimal extent, and type, of habitat to be modified as part of the Proposal, it is not considered that the development of the subject site would breach any of these objectives such that there would be a significant impact on these animals or their necessary habitats.

6. The Proposal Impacts

6.1. Flora.

Native and weed vegetation would be removed during the development of the subject site. All except one of the native species affected are considered to be common to abundant in the sandstone coastal areas of the Sydney region. A positive impact of development would be the removal of the seven species of noxious weeds from the subject site.

The only pre-construction impact on threatened flora would be the removal of a number of *Acacia terminalis* ssp. *terminalis* individuals and a percentage of its habitat (including the potential soil seed bank). Post-construction, the transplanted *Acacia terminalis* ssp. *terminalis* individuals could be affected by fire, grazing, trampling, altered drainage or other factors associated with human activity. These potential impacts would be minimised through the implementation of the Translocation Management Plan (Total Earth Care 2005) (see Section 6.4 below).

6.2. Fauna.

The potential effects of development of Lots 20 to 26 on fauna pre-, during and post-construction are summarised below. Mitigation measures aimed at minimising these impacts are discussed in Section 6.4.

Potential construction impacts for threatened fauna species and endangered populations would include:

- The temporary and permanent removal of some foraging habitat from the subject site;
- The creation of movement barriers associated with cleared areas/construction activities;
- Noise and human activity; and
- Potential injury/death of individuals.

Potential post-construction impacts for the endangered population of bandicoots include:

- Potential road mortality;
- Barrier effects of roads, driveways and retaining walls;
- Deterrent effects of lighting; and
- Noise and human disturbance.

Overall, approximately 2697m^2 of previously disturbed land that includes some vegetation would be permanently removed as a result of the development. It is noted that any vegetation that occurs within this area is all regrowth, the site having been previous cleared and decontaminated. The loss of this area would be offset through landscaping works, the Proposal including the establishment of 1026.3m^2 of shelter/shrubs and lawns (lawn areas totalling 384.1m^2).

6.3. Cumulative Impacts.

A number of DA's have been approved or submitted for development of Darley North since 2000. Cumulative impacts are summarised in Table 4 below:

Overall, more than 24.493m^2 of habitat would be permanently removed north of Darley Road. At least 12848.5m^2, would be retained/planted in the form of fuel-managed habitat corridors, additional vegetated links, lawns and garden beds. More than 86 trees would be removed.

Table 4. Summary of cumulative impacts north of Darley Road.

Precinct	Notional construction timing (Years)	Vegetation to be permanently removed (m^2)	Vegetation to be retained/planted (m^2)	Trees to be removed
P2	2000-2	1560	3440	-
P3 and P12	2005-7	12,627	3997[1]	-
Decontamination, P1 and P13	2003	1800	Sown with winter grasses	18
Lots 1-8, P13	2004-6	2800	2420	49
Lots 9-12	2006-7	1458	824.3	12
P1 (Lots 13-19)	2007	525	1140.9	7
P1 (Lots 20-26)	2008	3723	1026.3	0
TOTAL	**7**	**24,493**	**12,848.5**	**86**

6.3.1. *Acacia terminalis* ssp. *terminalis* individuals.

When considering and assessing the cumulative impacts of the Proposal on those *Acacia terminalis* ssp. *terminalis* individuals present, the following factors are of relevance:

1. A large population of this subspecies is present within the nearby Sydney Harbour National Park. Through reference to known databases and previous studies prepared for this locality, it is likely that this population is adequately represented within this conservation reserve;

2. The individuals of *Acacia terminalis* ssp. *terminalis* recorded do not comprise a significant area of known habitat for this subspecies. Similarly, the site would not be significant in the overall conservation of this subspecies in either the locality or surrounding region; and

3. It is proposed that the *Acacia terminalis* ssp. *terminalis* individuals (and an area of surrounding soil) would be translocated to those vegetation links that are present (within the nearby St Patrick's Estate). The success rate of relocated individuals has been varied – the overall success generally good but with last summer's (2006-07) extremely high temperatures and the incessant drought many of those individuals transplanted during this period did not survive (Total Earth Care, pers.comm.). Whilst it is acknowledged that the success of a

translocation programme is not guaranteed, the individual (and any seeds within the soil that is collected as part of the plants translocation) is likely to survive due to its ability to germinate well in response to disturbance events. Provided that the transplanting is undertaken during the cooler periods it is likely that the transplanted individuals will survive to maturity.

Whilst it is acknowledged that the Proposal would contribute to the cumulative removal of this species from private land holdings across its range, this impact is considered to be relatively minor based on a consideration of the above three factors.

6.3.2. Long-nosed Bandicoot.

With respect to assessing the impacts of habitat removal on the endangered population of bandicoots, it is important to take into account previous and proposed plantings on the Estate. Vegetation links have been progressively established on the site since 1997. The purpose of these was to provide bandicoots with additional habitat prior to development of Precincts 1 and 3. It has been demonstrated that bandicoots utilise these links for foraging and sheltering purposes (Lesryk ongoing). Another small habitat link was established opposite to the Precinct 2 apartments.

Other areas directly adjacent to Precinct 13 were planted during January to April 2006 as part of the early works for construction of Lots 1-8. Similarly, development of Precincts 3 and 12 is associated with the establishment of a number of major and minor habitat links planted between December 2005 and March 2006, both within the Estate and between the Estate and the nearby National Park. Some of these were previously agreed with DECC, whilst other supplementary plantings have been modified or added during the design process.

Development of Darley North is almost complete after a seven-year period. Lots 9-12 (Precinct 13) are currently underway, with Lots 13-19 (Precinct 1) approved for subdivision. During this time, habitat has been removed and replaced through a staging process aimed at minimising the scale of impact in any one location and the distribution of impacts over the whole of Darley North. By undertaking habitat creation/enhancement works well in advance of construction (i.e. vegetated links) and prior to clearing and construction (i.e. early works program), the availability of some habitat in the immediate area is ensured during development. Monitoring throughout the construction process is important to detect any changes in bandicoot activity as early as possible and to implement further mitigation measures if necessary.

It is noted that there is no early works program for Lots 20 - 26, however, the impacts of construction on these Lots would be minimised through the incorporation of appropriate mitigation measures (see Section 6.4). In the longer term, management protocols and strategies undertaken in consultation with DECC would be implemented to minimise Estate-wide cumulative impacts (see Section 7.0).

6.4. Mitigation Measures.

The Proposal incorporates a number of pre-construction and post-construction mitigation measures that are aimed at minimising the impacts of the development on flora and fauna species.

It is important to note that translocation of threatened plant species is not considered by the DECC to be a mitigation measure but rather an emergency procedure undertaken only where habitat destruction is imminent. Prior to construction, the *Acacia terminalis* ssp. *terminalis* individuals present (including an area of the soil that surrounds this plant) would be excavated and translocated to a recipient site in those vegetation links that are present (within the nearby St Patrick's Estate). A Translocation Management Plan has been previously prepared to guide this process for the translocation of other individuals from Lots 9 to 19. The Management Plan contains guidelines for post-translocation management and monitoring and a map showing the locations of plants to be

salvaged and the recipient site. The management plan is consistent with the *Guidelines for the Translocation of Threatened Plants in Australia* (Vallee et *al.* 2004).

6.4.1. Pre-construction.

Pre-construction mitigation measures for flora and fauna include:

- Conducting a site induction for contractors to alert them to the presence and location of threatened plants and retained bandicoot habitat;
- Translocating the *Acacia terminalis* ssp. *terminalis* individuals and a percentage of their surrounding soil;
- Weed management of the translocated soil;
- Erecting temporary barrier fencing to prevent machinery from damaging or removing surrounding vegetation;
- Incorporating a 20-30cm gap under the barrier fencing to facilitate bandicoot movements throughout the study area; and
- Integrating 'overlaps' in sediment fencing to permit bandicoot access.

6.4.2. Construction.

Construction mitigation measures for flora and fauna include:

- Applying the Bandicoot Construction Protocol (see Appendix 4);
- Continuing to monitor vegetated links quarterly throughout the construction process;
- Constructing, implementing and maintaining soil erosion and sediment control in accordance with requirements of the stormwater management manual *Managing Urban Stormwater – Soils and Construction* (Landcom 2004);
- Ensuring vehicles and machinery do not enter those portions of the site proposed for retention; and
- Removing temporary soil and water management structures only after the site has been stabilised/rehabilitated.

6.4.3. Post-construction.

Post-construction mitigation measures for flora and fauna include:

- Minimising the risk of road kills through enforcing a 'Shared Zone' limiting the speed limit to 15 – 20 kilometres per hour;
- Removing weeds and planting 1026.3m^2 of landscaping;
- Ensuring that the landscape plantings do not include aggressive exotic species that could invade the adjacent bushland;
- Including a covenant prohibiting future leaseholders from owning dogs and cats to minimise the risk of bandicoot predation;
- Incorporating additional mitigation measures as per letters received by Lend Lease Development from the NPWS (now DECC) dated 20 November 2000 and 3 November 2003 (see Section 7.2);
- Preparing a Bandicoot Amelioration Strategy for the entire Estate (see Section 7.1);
- Implementing monitoring and educational programs consistent with the Recovery Plan (see Section 7.1); and
- Continuing to monitor vegetated links during and post-construction (see Section 7.1.1).

7. Long-term management strategies.

A summary of long-term management measures and strategies relevant to the protection and maintenance of bandicoot habitat is presented below:

7.1. Bandicoot Amelioration Strategy.

Since 1996 the Trustees, together with their consultants and the DECC, have developed a range of amelioration measures to ensure that foraging and shelter habitat, and movement corridors, are maintained and/or enhanced during the development of various precincts on the Estate. These are described in the report Bandicoot Management Plan St Patrick's Estate (Bali 2005b). The plan is an evolving document that would eventually apply to the entire Estate (both developed and residual).

7.1.1. Vegetated Links Monitoring.

Development of Precincts 1 and 3 was approved by the Land and Environment Court in 1996. As part of the Conditions of Consent for development of Precinct 1, vegetated links were established within St Patrick's Estate in 1997 (P12), 2000 (P1) and 2002 (P13 upper). These were designed in order to increase the amount of lawn/shrub ecotone, the preferred habitat for Long-nosed Bandicoots. Their primary purpose is therefore to provide bandicoot movement corridors and shelter both within the Estate and between the Estate and Sydney Harbour National Park. As vegetated links were considered to be experimental, they required monitoring.

Quarterly monitoring of foraging activity and bandicoot numbers was undertaken for vegetated links P12, P1 and P13 (upper) from April 2002 to February 2003. In April 2004, a longer term monitoring program was initiated with the aim of collecting additional baseline data for the whole Estate prior to construction (Darley North) and decontamination/construction in the vicinity of existing shelter link P10 (Darley South) and to determine if bandicoots will continue to use established/future vegetated links for foraging and sheltering throughout the construction process. This monitoring program is ongoing.

Vegetated links P1 and P13 are located closest to the subject site. During April 2002 to February 2003, the quality of foraging habitat near P1 appeared to decline. As plantings took a long time to establish, habitat structure remained very open and therefore unsuitable as bandicoot refuge. Furthermore, a central portion of the link was washed away and then restored in 2002. However by February 2005, the link was impenetrable and was used by bandicoots for both foraging and sheltering. The highest frequency of diggings was recorded near P1 in September 2007. Seven bandicoots were observed near P1 in 2007/2008, with some of these taking refuge in the link when disturbed.

Since February 2003, the level of foraging activity north of Darley Road has increased to the highest recorded levels in June 2005. Digging frequency has remained consistently high near vegetated link P12 over this period, but has varied near links P1 and P13 (upper). Fluctuations in the number of diggings are not correlated with bandicoot captures (see Section 7.1.2) that have remained relatively stable over the same period. As the highest levels of foraging corresponded closely with the onset of construction activities on Precincts 3 and 12, it appears that the links are functioning as they were intended by providing additional habitat for bandicoots disturbed by construction activities. Over the past two years foraging activity near P1 has fluctuated greatly. A substantial increase in May and September of 2007 was observed followed by a dramatic decrease in November 2007 and January 2008. It is noted that this trend was also evident in links P7, P10, P13 and P12.

Since monitoring began in March 2004, bandicoot diggings south of Darley Road increased to September 2004 and then decreased to August 2005. Increases were associated with the post-decontamination activities on the site. However, the number of bandicoots observed and captured has remained relatively consistent during the past 2 years.

7.1.2. North Head Monitoring.

The DECC has been monitoring an endangered population of Long-nosed Bandicoots in North Head. Quarterly monitoring sessions involve trapping 20 transects (including four on St Patrick's Estate) over a 3-night period. In addition a more intensive survey is undertaken every two years; this involves trapping 43-46 transects over a 5-night period. Since August 2002, the Church has participated in the program by allowing the DECC to monitor four transects on St Patrick's Estate and by encouraging its consultants to assist with trapping activities. Transects within the Estate were included in the most recent intensive monitoring session held in May 2006.

The number of bandicoots captured along four transects located in St Patrick's Estate during quarterly monitoring is variable. Numbers appeared to decline progressively from August 2002 to February 2004, although this trend could not be correlated with any activities being undertaken on or near the Estate. However, the number of bandicoots captured between May 2004 and November 2006 has remained relatively high and stable (n=16-23) even though construction activities in Precincts 13 and 12 began in January 2005 and January 2006, respectively. This indicates that construction has not resulted in any noticeable decrease in the number of bandicoots using the area. Low numbers have been recorded in February 2006 and 2007, and even lower in February 2008. These however seem to be related to environmental factors.

During intensive trapping on North Head in May 2002, 64 individuals were trapped 117 times over 5 days. Using Population Viability Analysis (PVA), DECC estimated the North Head bandicoot population to be approximately 94 individuals. However, St Patrick's Estate was not included in that estimate. In May 2004, 116 individuals were captured 211 times and the population was estimated at 130-160 bandicoots using PVA. The DECC attributed the apparent population increase to the effectiveness of various mitigation measures implemented across North Head including traffic calming measures, fox control and burning (see Appendix 5). The number of bandicoots captured in May 2006 fell slightly to 102.

The Church will continue to cooperate with DECC in relation to population monitoring on North Head as part of its commitment to the implementation of the Recovery Plan.

7.1.3. Education and Awareness.

It is anticipated that a package of information on threatened plants and endangered populations would be distributed to leaseholders as part of the lease agreement.

Recommendations for education and awareness programs will be incorporated into the Environmental Management System for the Estate. In addition, interpretive material and signage will be incorporated into the Public Walkways Plan which has been developed by Lend Lease Development and is currently being reviewed by Manly Council.

7.2. Additional Mitigation Measures.

On 8th November 2002, the State Government gazetted Amendment No. 24 to the Manly Local Environment Plan (LEP) that considered development in St Patrick's Estate and included the rezoning of Precincts 12 and 13 for residential purposes. In order to mitigate the loss of bandicoot habitat associated with the development, the DECC and Church agreed to implement additional amelioration measures for bandicoots. These are described in letters from the DECC to Lend Lease Development dated 20th November 2000 and 3rd November 2003 and are shown on the attached Vegetated Links Summary Plan (Appendix 6). All but one of the mitigation measures would be incorporated as part of specific DAs that have already been submitted or will be submitted to Council in future. Progress for each of these additional measures is reported briefly below. All works would be undertaken to the satisfaction of the DECC:

- ***Enhancement of shelter habitat (i.e. weeding and planting additional understorey species) including 10m wide strip to the south of Precinct 13 Lots;***

The 10m setback has been incorporated into the design for Lots 1-8 (DA Nos. 277-84/0, Plans L02-L12) and for Lots 9-12 (Plans DA L02-DA L05).

As part of the early works program for Lots 1-8, additional plantings were established in the Conservation Area gardens and in the area immediately to the south of the Lots in January 2005.

- ***Enhancement of shelter habitat (i.e. weeding and planting additional understorey species) thereby linking Precincts 1, 12 and 13 and maintaining a 3m strip of vegetation along the Estate side of the wall;***

This has been incorporated into the Proposal for development of Precincts 3 and 12 and is discussed in the report, *Flora and Fauna Assessment Proposed Residential Development Precincts 3 and 12 St Patrick's Estate, Manly* (Total Earth Care and Ecosense Consulting 2004).

- ***Establishment of new shelter habitat and associated foraging opportunities (i.e. habitat mosaic) in eastern portion of Precinct 12;***

As above.

- ***Establishment of shelter habitat by planting a 2m wide strip along the inside of the perimeter wall from Precinct 3 to immediately east of the main Darley Road entrance;***

As above. Part of this strip has been widened to 4m.

- ***Bush regeneration works (i.e. removal of introduced species and enhancement of existing native vegetation) for bandicoot movement corridors located in Manly Council land (i.e. between Precinct 10 and Spring Cove) and in National Park and (i.e. behind Collins Beach); and***

The area under consideration is shown in the Vegetated Links Summary Plan (Appendix 6). Bush regeneration works would be undertaken in consultation with DECC and taking into consideration in the relevant bushfire hazard assessment (Building Code and Bushfire Hazard Solutions 2004). The timing is planned to coincide with the early works program for development of Precincts 5, 6 and 10.

- ***Enhancement of shelter belt between Precincts 5 and 10;***

This has been incorporated into the Proposal for the development of Precincts 5, 6 and 10 and is discussed further in the Species Impact Statement prepared for the area by Ecosense Consulting Pty Ltd (Bali 2005a). This link has also been extended so that it transects Darley South from east to west.

8. Flora.

8.1. Commonwealth legislative considerations.

The only threatened plant species detected on the subject site was *Acacia terminalis* ssp. *terminalis*. No listed endangered populations of plants or Endangered Ecological Communities occur within the subject site. *Acacia terminalis* ssp. *terminalis* is listed as an endangered species on the *EPBC Act* and is therefore a Matter of National Environmental Significance requiring assessment under this Act.

The following assessment guidelines are used to determine whether the action (i.e. the proposed development) has, will have, or is likely to have a significant impact on *Acacia terminalis* ssp. *terminalis*. If so, referral to the Federal Minister for the Environment, Water, Heritage and the Arts will be required for further consideration or approval.

For the purposes of this assessment it is assumed that all individuals of *Acacia terminalis* ssp. *terminalis* will be removed (i.e. destroyed), even though they would be translocated locally to those vegetation links that are present (within the nearby St Patrick's Estate) and managed according to the Translocation Management Plan.

8.1.1. (a) *Acacia terminalis* ssp. *terminalis*.

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of a population,*

The proposed development will result in the removal of a number of *Acacia terminalis* ssp. *terminalis* individuals and some associated habitat. It is recommended that the plants be translocated to those vegetation links that are present within the nearby St Patrick's Estate. The wider population consists of over 100 individuals many of which occur in the nearby National Park (based on NPWS Wildlife Atlas records). Whilst the removal of any individuals from the population would lead to a decrease in its size, given the proposal to translocate the individual and its soil seed bank, and to manage its survival, this population decrease is expected to be *short-term*. The implementation of the Translocation Management Plan is likely to result in the long-term increase of the size of the Manly/North population of *Acacia terminalis* ssp. *terminalis*. Given the highly disturbed condition of the subject site and the presence of invasive weeds, the individuals are expected to have low long-term viability, with poor survival of any seedlings that may germinate. Translocation and active management of the translocation site is expected to improve the seedling recruitment potential of these plants.

- *reduce the area of occupancy of the species,*

The proposed development would marginally reduce the area of occupancy of *Acacia terminalis* ssp. *terminalis*. Whilst this is the case, much more significant areas of better quality habitat occur elsewhere in both St Patrick's Estate and the nearby Sydney Harbour National Park.

- *fragment an existing population into two or more populations,*

The individuals detected occur within the eastern portion of the subject site amongst native vegetation. This area adjoins better vegetated areas and ultimately links up with Sydney Harbour National Park. North of the subject site only residential developments occur, no native habitat being present within this area that could support another population of *Acacia terminalis* ssp. *terminalis*. As such it is considered that the individuals are at the edge of their distribution range within the locality, the loss of these plants not affecting the connectivity or increasing the fragmentation between any existing populations.

- *adversely affect habitat critical to the survival of a species,*

It is unlikely that the habitat at the site is critical to the survival of this species, given its small size, degraded condition and the extent of suitable habitat in the conservation area of Sydney Harbour National Park.

- *disrupt the breeding cycle of a population,*

The removal of a number of individuals from the Manly/North Head population of *Acacia terminalis* ssp. *terminalis* would not significantly affect the breeding cycle of this population.

- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline,*

The removal of the small amount of disturbed habitat is unlikely to cause the decline of the species in the Manly/North Head area.

- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat*[1],

The plants recorded currently occupy a site that is highly disturbed by earthworks and weed invasion. Invasive species are therefore already well established and are likely to be having a detrimental effect on seedling recruitment and the viability of the species at this location.

- *introduce disease that may cause the species to decline,*

The disturbance that has already occurred on site (particularly the sites decontamination, the importation of fill and the movement of plant and vehicles that track soil, seeds and spores from one location to the other), is expected to have the greatest potential to introduce plant diseases that may cause the decline of the species on the site.

- *interfere with the recovery of the species.*

The loss of a number of individuals and associated potential soil seed bank would not interfere with the recovery of the Manly/North Head population of this species. The recovery of this species in the locality would include the translocation of a number of plants from the proposed development site to the managed vegetated link area. This area is included under the recovery plan for the Long-nosed Bandicoot population in the area monitored by DECC.

The management of the vegetated link and the already translocated *Acacia terminalis* ssp. *terminalis* individuals includes a weed management program. Given the extent of the disturbances already occurring and the inclusion of the individual in the translocation programme of the development, it is considered that the proposed action would not detrimentally affect the recovery of the species.

8.1.1. (b) Expected impact on *Acacia terminalis* ssp. *terminalis.*

The proposed action is unlikely to have a significant adverse impact on *Acacia terminalis* ssp. *terminalis.* Therefore it is not considered that the matter would require referral to the Federal Minister for the Department of Environment, Water, Heritage and the Arts for further consideration or approval.

8.2. State legislative considerations.

8.2.1. *Environmental Planning and Assessment Act 1979.*

The only state listed threatened plant species detected in the subject site was *Acacia terminalis* ssp. *terminalis.* No endangered populations of plants or any Endangered Ecological Communities listed under the *TSC Act* occur within the subject site.

Section 5A of the *Environmental Planning and Assessment Act 1979* (as amended by the *TSC Act*) requires that the following factors (the "seven part test") be considered to determine whether a Proposal is likely to have a "significant effect on a threatened species, its populations, ecological communities or habitats".

For the purposes of this assessment it is assumed that the individuals of *Acacia terminalis* ssp. *terminalis* will be removed (i.e. destroyed), even though they would be translocated locally to those vegetation links that are present (within the nearby St Patrick's Estate) and managed according to the Translocation Management Plan.

[1] Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat, or predation.

8.2.1. (a) *Acacia terminalis* ssp. *terminalis*.

(a) *in the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction,*

Numerous individuals of *Acacia terminalis* ssp. *terminalis* were found throughout Lots 24, 25 and 26. The local (North Head) population of the species consists of at over 100 *Acacia terminalis* ssp. *terminalis* individuals (based on NPWS Wildlife Atlas records), including some 30 individuals that have been translocated from areas to be developed within St Patrick's Estate to a conservation area that is present to the south of the subject site.

The removal of numerous individuals of *Acacia terminalis* ssp. *terminalis* would not place the local Manly/North Head population at risk of extinction.

(b) *in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population, such that a viable local population of the species is likely to be placed at risk of extinction,*

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. The Manly/North Head population of *Acacia terminalis* ssp. *terminalis* is not listed as an endangered population.

(c) *in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

An 'endangered ecological community' is defined as a community specified in Part 3 of Schedule 1 of the *TSC Act* and 'critically endangered ecological community' is defined as a community specified in Part 2 of Schedule 1A of the *TSC Act*. The Manly/North Head population of *Acacia terminalis* ssp. *terminalis* is not listed as an endangered ecological community or a critically endangered ecological community.

(d) *in relation to the habitat of a threatened species, population or ecological community:*

(i) the extent to which the habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community,

The amount of habitat to be removed is small (seeds are dispersed and stored underground by ants as well as dropping below the plant, making estimates of the area of potential soil seed bank difficult). While other areas in the subject site may provide *potential* habitat, that habitat is poor and is highly degraded by mechanical disturbance, weed invasion, altered drainage conditions, and the importation of fill.

The study area is situated at the northern extent of the population's distribution (DECC 2007a). Previously suitable habitat has recently been removed to the east and west with that to the north having been developed some decades ago. Whilst the habitat would not be isolated it is noted that there would be a small amount of contraction in the population's distribution.

The habitat to be removed from the subject site is not considered to be important for the long-term survival of *Acacia terminalis* ssp. *terminalis,* given the larger areas of habitat in the Manly/North Head locality.

(e) *whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Critical habitat has not yet been defined for *Acacia terminalis* ssp. *terminalis.* Nevertheless, any remnant of the size and condition of the subject one is unlikely to constitute critical habitat in any future declaration.

(f) *whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plan for *Acacia terminalis* ssp. *terminalis* has been or is being prepared by DECC. However, the translocation of individuals of the species that do not have long term viability in their current habitat, or that would otherwise be destroyed, would be consistent with broad recovery planning strategies.

(g) *whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process,*

Of the 29 Key Threatening Processes pertinent to mainland NSW that are listed under Schedule 3 of the *TSC Act,* "clearing of native vegetation" is applicable to the Proposal. However, as stated in 8.2.1 (a) above, the loss of the vegetation at the subject site is unlikely to adversely affect the local Manly/North Head population of *Acacia terminalis* ssp. *terminalis.* As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

8.2.1. (b) Expected impact on *Acacia terminalis* ssp. *terminalis.*

While *Acacia terminalis* ssp. *terminalis* is inadequately represented in conservation reserves and the individuals on the subject site are at or near the northern limits of the distribution of this species, it is considered that the proposed development is unlikely to have a significant effect on this plant or its habitat. A Species Impact Statement is therefore not required.

9. Fauna

9.1. Commonwealth legislative considerations

By the completion of the field investigations, no animals listed under the Schedules to the *EPBC Act* had been recorded within, or in the vicinity of, the subject site. Although this is the case, based on the preceding literature review and studies carried out by the authors within the adjacent St Patricks Estate, one species of national conservation significance, the Grey-headed Flying-fox, was identified as potentially occurring in the vicinity of the subject site.

Based on the potential for this species to be present within or adjacent to the subject site, combined with the lack of suitable resources in the direct vicinity of the proposed works and the consultation of known literature sources, it is not considered that the Grey-headed Flying-fox would significantly rely upon the study area for any of its necessary life cycle requirements. Therefore, giving consideration to the Significance Impact Guidelines that are relevant to a vulnerable species, it is not considered that the Proposal would:

- lead to a long-term decrease in the size of an important Grey-headed Flying-fox population, or
- reduce the area of occupancy of an important Grey-headed Flying-fox population, or
- fragment an existing important population into two or more populations, or
- adversely affect habitat critical to the survival of the Grey-headed Flying-fox, or
- disrupt the breeding cycle of an important Grey-headed Flying-fox population, or
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline, or
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, or
- Interfere substantially with the recovery of the Grey-headed Flying-fox.

Therefore, the Proposal can proceed as planned without requiring referral of the matter to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

The proposed construction of seven residential dwellings within Lots 20-26 Montpelier Place, St Patrick's Estate, North Head would not have a detrimental impact on any species of national conservation significance and therefore it is not considered that the matter would require referral to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

9.2. State legislative considerations.

9.2.1. *Environmental Planning and Assessment Act 1979.*

Characteristic diggings of the Long-nosed Bandicoot were recorded within the subject site. In addition, the Grey-headed Flying-fox has been previously recorded within this locality. To consider the impacts of the Proposal on the local and regional viability of these threatened species and populations, an assessment drawing on the criteria provided within Section 5A of the *Environmental Planning and Assessment Act 1979* has been undertaken. This assessment is designed to determine "whether there is likely to be a significant effect on these threatened species, their populations, ecological communities, or habitats", and consequently whether a Species Impact Statement is required.

9.2.1. (a) Long-nosed Bandicoot.

(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."

A 'threatened species' is defined as "a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2" of the *TSC Act*. Therefore the Long-nosed Bandicoot is not a threatened species.

(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. Therefore the Long-nosed Bandicoot is classified as an endangered population.

Bandicoots prefer to forage in deeper moist soils for invertebrates, fungi, seeds, fruit and small vertebrates. During the day, individuals retreat into dense vegetation where they occupy nests made of dry grass, twigs and leaf litter constructed in depressions in the ground or at the base of trees. Movement corridors are also important, linking foraging and refuge habitats. During the present survey bandicoots were identified as utilising the site through the identification of their characteristic conical diggings. Although the site does not appear to contain suitable habitat, individuals may use the area (particularly the perimeter) as a movement corridor and/or foraging habitat. Bandicoots are known to forage and shelter within Precinct 1 and surrounds as shown through capture, radio-tracking and direct observations of individuals and diggings. Use of the site is likely to change seasonally and with soil moisture levels.

A detailed monitoring study undertaken on the Estate in January 1998 indicated that there may be 13 resident and up to 9 transient bandicoots occurring on Darley North. Most recent comprehensive monitoring data collected for the whole of North Head (May 2006) indicated that seven bandicoots were trapped near Precinct 1 (T52). Systematic quarterly monitoring undertaken by the DECC indicates that one to four individuals are regularly trapped near Precinct 13.

The development of the subject site would further disturb an area of approximately 3723m^2, this consisting of both regenerated and planted vegetation and cleared and disturbed areas. It should be noted that bandicoots will forage in newly disturbed/cleared areas as long as these are accessible and close to shelter. During construction, there is the possibility that any resident bandicoots would use these cleared areas for foraging/dispersal opportunities. Bandicoots would also continue to utilise the existing vegetated links (i.e. P1 and P13 [upper]). Post-construction, once the landscaping is complete, it is likely that bandicoots would again shift their home ranges to incorporate the new habitats (i.e. established lawns and garden beds).

Fencing design together with the incorporation of a continuous bandicoot corridor (in the form of backyards landscaping) has maintained permeability to the west and south between the Lots and the surrounding Estate (see Appendix 6). The perimeter road acts as a potential barrier to bandicoot movements and is likely to reduce bandicoot activity within Precinct 1 and hence may be beneficial in minimising the risk of road kills as the amount of habitat available is limited to front and backyards.

The residential development is not expected to increase the number or frequency of feral cats or foxes in the study area. Feral cats are already present in the park but there are presently no foxes on North Head. The latter are clearly a major threat to bandicoots with a single fox killing at least 15 bandicoots and 2 penguins in 2000. DECC has an emergency shooting strategy in place in the event that a fox is detected at North Head. Ownership of pets is not allowed under the lease agreement.

In the long-term, the use of vegetated links for foraging and shelter would continue to be monitored. Monitoring of the existing links was undertaken quarterly from April 2002 to February 2003. Another monitoring program was initiated in April 2004 and will continue throughout construction of Lots 20-26 until 2010. Furthermore, DECC regularly traps bandicoots along a fixed transect near Precinct 1 (T52) as part of its overall North Head monitoring program. By systematically monitoring use of the site by bandicoots, it should be possible to detect any decline in numbers or activity and to implement appropriate mitigation measures if necessary.

An updated report summarising the amelioration measures that have been implemented to date, and that are proposed for the Estate as part of a wider *Bandicoot Management Plan,* has been prepared (Bali 2005b).

The area that is to be developed is generally cleared and highly disturbed, there being no resources present that would be important to the local viability of a Long-nosed Bandicoot population. As such, the life cycle of the species that constitutes the endangered population is unlikely to be disrupted such that the viability of the population is likely to be significantly compromised.

(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."

The final determination of the NSW Scientific Committee defined the distribution of the North Head population of bandicoots as being approximately 360 ha, this encompassing Sydney Harbour National Park (160 ha), the Department of Defence lands and National Artillery Museum (72 ha), the North Head Sewerage Treatment Plant (20 ha), St Patrick's Estate (25 ha), Manly Hospital (15 ha), the Australian Institute of Police Management (3 ha), Manly Council Reserves including Spring Cove, Shelley Beach and Little Manly Point (25 ha) and part of residential Manly (40 ha). The subject site therefore covers approximately 0.4% of the population's distribution.

The Proposal would result in the permanent removal of 72% (2696.7m^2) of the subject site. Once construction is complete, approximately 1026.3m^2 of soft landscaping would be provided. During construction, excluding a number of individual trees, all vegetation on the Lots would be cleared. Although large open areas may form a barrier to bandicoot movement, individuals will still be able to access potential foraging habitat around the edges through gaps in the construction and sediment fences. However, it is important that contractors ensure that they check for any bandicoots that may be sheltering in heavy machinery each morning prior to beginning any works. These issues are taken into account in the Bandicoot Construction Protocol (Appendix 4) developed in consultation with DECC.

Some areas of bandicoot foraging habitat would be altered as a result of development, primarily for the purposes of the construction of terraced houses. However, landscaped habitat would comprise grassy foraging areas and dense shelter, thus maximizing the proportion of ecotone that is preferred by bandicoots. A package of information relating to the natural values of the subject site and to the Estate as a whole would be distributed to leaseholders with the lease agreement.

Lighting, noise and other disturbances may also indirectly affect the suitability of habitat for bandicoots. During construction, the use of heavy machinery would be confined to daylight hours and therefore would not affect bandicoots that are only active between dusk and dawn. Bandicoots are tolerant of some degree of noise and human activity.

The implementation of standard erosion and sedimentation controls would minimise the risk of indirect impacts associated with drainage affecting bandicoot habitat off-site.

Each Lot was assessed separately with regards to the removal/modification of habitat. This is summarised below in Table 5.

Table 5. Summary of bandicoot habitat features for each Lot[2].

Lot Number	Area Planted (m^2)	Area Lawn[3] (m^2)	Percentage Landscaped %	Permeability (Direction)
20	148.6	36.9	N/A	South and West
21	146.5	33.6	N/A	South
22	121.9	46.5	N/A	South
23	169.2	80.6	N/A	South
24	131.8	83.6	N/A	South
25	144.5	77.9	N/A	South
26	163.8	25	N/A	South and East
Total	**1026.3**	**384.1**	**28**	**NA**

[2] Each Lot means from curbside to rear of property.

[3] Subset of area planted (e.g. within the 148.6m^2 of area planted within Lot 20, 36.9m^2 of this is lawn. The remainder is composed of landscaped bed and shrubberies).

Although all existing habitat on Lots 20-26 would be removed or modified during construction, cumulatively these Lots would eventually provide 1026.3m^2 of suitable foraging and shelter habitat. Given the currently degraded and cleared condition of a large percentage of the subject site, this is considered an increase on what is presently available to the foraging needs of bandicoots.

The study area is not considered to constitute a significant regional area of known habitat for the Long-nosed Bandicoot. The vegetated areas within the subject site are highly disturbed, with non-contiguous, broken tree canopies and patchy groundcover being present. The value of the vegetation proposed to be removed is minimal compared to the remaining areas of similar foraging resources (both adjacent to, and beyond the limits of, the subject site). Therefore, the Proposal would not modify or remove a significant area of known regional habitat for the Long-nosed Bandicoot.

(d) "...in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and

72% of the subject site (totalling 2696.7m^2) would be cleared and developed. The development would include the provision of 1026.3m^2 of soft landscaping. The permanent removal of 2696.7m^2 of previously disturbed and cleared land (a large percentage of which offers limited habitat value for bandicoots due to the limited depth of soil present and the open character of the site) is not likely to result in a significant effect on the local or regional presence of the North Head Bandicoot population.

(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and

The Long-nosed Bandicoot is extremely adaptable and tolerant of major habitat disturbance and modifications and is one of the few Australian marsupials to be consistently recorded in urban environments (author's field notes, DECC 2007c). Precinct 1 is already considerably isolated as it is surrounded by an access road and residential development already occurs to the east, west and north. The subject site does however adjoin vegetation links to the south and east. In addition shelter or foraging habitat will be planted during the landscaping works post-construction. Vegetated areas present to the south east of the subject site may also provide suitable foraging and shelter habitats to support the movement of bandicoots into Lots 20-26.

Although a large cleared area would form a barrier to bandicoot movements during construction, permeability would be maintained within the vegetated links directly south of the perimeter road to the south of the subject site and the landscaped area directly east. As part of the works program for Lots 20-26, plantings will be established in the rear courtyards, which will provide potential foraging or shelter habitat for bandicoots that could potentially use the subject site as a stepping stone to more suitable habitat on the estate. The plantings in the front terraced gardens may be potentially suitable for the foraging and sheltering needs of bandicoots and aid in their east-west movement. The removal of a small percentage of currently disturbed vegetated foraging habitats, in addition to the planting of 1026.3m^2 of landscaping, would not further isolate any current interconnecting areas of habitat available to this species.

(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."

Currently, it is unlikely that Precinct 1 provides habitat important to the survival of this species due to its disturbed nature. The vegetation present is quite disturbed and is juvenile regrowth from previous clearing. The amount of vegetation proposed to be removed would not be important for the long-term survival of the Long-nosed Bandicoot at this locality. Adjacent to the Proposal, numerous stands of more suitable habitat is present, these providing foraging, breeding and sheltering opportunities for this species.

Post-construction, permeability within the site and between the subject site and the rest of the Estate will be maintained through fencing design (perimeter fencing would be raised a minimum of 150mm to allow unobstructed access along its length) and side boundary plantings. However, the perimeter road may reduce bandicoot activity within Precinct 1, the benefit of which would be a reduced possibility of road kill/injury at this location.

All seven lots were assessed as one unit with regards to their permeability to bandicoots. Although permeability within the subject site has been reduced due to the housing design, limiting movement from east to west (and vice versa), the use of raised fencing for front and rear gardens would ensure that limited permeability within the subject site and between Lots and the adjacent Estate is retained. Although there will be limited access between the subject site and the adjacent estate this may be beneficial in minimising the risk of road kills as fewer bandicoots are likely to the use the vegetated areas for foraging. The overall location of this precinct is likely to reduce the number of potential bandicoots infiltrating the subject site instead utilising the more suitable vegetated links to the south.

In the long-term, the use of vegetated links for foraging and shelter would continue to be monitored. Furthermore, DECC regularly traps bandicoots along a fixed transect near Precinct 1 (T52) as part of its overall North Head monitoring program. By systematically monitoring use of the site by bandicoots, it should be possible to detect any decline in numbers or activity and to implement appropriate mitigation measures if necessary.

As such, it is considered that the long-term presence of the local Long-nosed Bandicoot population would not be compromised.

(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."

No critical habitat would be adversely affected by the Proposal. The study area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*.

(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."

A Draft recovery plan is currently being prepared for the threatened Long-nosed Bandicoot population at North head. There are nine (9) Priority Actions identified for this species (DECC 2007b). Of these, the following may be relevant:

- Community and land-holder liaison/ awareness and/or education;
- Habitat management: Feral Control; Ongoing EIA - Advice to consent and planning authorities, Provide advice to consent authorities regarding impacts on population, Site Protection (e.g. Fencing/Signage), Erect signage/speed bumps to alert motorists and reduce road mortality;
- Weed Control: Continue weed control program in accordance with Sydney Harbour National Park PoM, Habitat Protection; and
- Monitoring: Monitor population in accordance with recovery program monitoring program.

However, given the amount of habitat likely to be disturbed by the Proposal, its undertaking is not considered to threaten the presence of any Long-nosed Bandicoot individuals, populations or their necessary habitat areas.

(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."

Currently 29 Key Threatening Processes for mainland NSW are listed under Schedule 3 of the *TSC Act*. Of these, in regards to the presence of the Long-nosed Bandicoot, the following are of relevance to the study area:

- Clearing of native vegetation;
- Competition and grazing by the feral European Rabbit;
- Predation by feral cats;
- Predation by the European Red Fox; and
- Removal of dead wood and dead trees.

Whilst this is the case, the percentage of habitat suitable for this species lost due to the undertaking of the Proposal would be minimal. Beyond the study area, the Long-nosed Bandicoot's necessary habitat requirements are well represented, thereby meeting the local and regional requirements of this species. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

9.2.1. (b) Expected impact on the Long-nosed Bandicoot.

The undertaking of the Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Long-nosed Bandicoot population at North Head. The proposed development is therefore unlikely to significantly affect the endangered population of Long-nosed Bandicoots, because:

- The site is highly disturbed and cleared and would not be important to a resident population of this species; and

- The population is protected within the adjoining National Park, where more extensive habitat is present.

Consequently, a Species Impact Statement for the endangered population of Long-nosed Bandicoots is not required.

9.2.1. (c) Grey-headed Flying-fox.

(a) "...in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction..."

During the field investigations, no historic or current Grey-headed Flying-fox camps were recorded within the subject site. Whilst this is the case, individuals have been previously recorded in the vicinity of the site, these having the opportunity to utilise those native plants present. In the locality, those native plants present within the subject site are not considered to constitute a significant foraging resource, other opportunities occurring both adjacent to and beyond the limits of the subject site. Giving consideration to the habitat requirements of this species, its adaptation to urban areas and utilisation of planted horticultural and native species, it is not considered that the development of the study site would disrupt the viability of a local population of this species, such that it would be placed at risk of extinction.

(b) "...in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction..."

An 'endangered population' is defined as a "population specified in Part 2 of Schedule 1" of the *TSC Act*. Therefore the Grey-headed Flying-fox is not an endangered population.

(c) "...in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction..."

The Grey-headed Flying-fox is not listed as an Endangered Ecological Community.

(d) "...in relation to the habitat of a threatened species, population or ecological community:

(i) "...the extent to which habitat is likely to be removed or modified as a result of the action proposed...", and

The Proposal would result in the permanent removal of 2696.7m^2 of previously disturbed and cleared land. Given its cleared and previously disturbed character, the subject site is considered to be of limited habitat value for Grey-headed Flying-foxes. The site is considered to offer limited resources for the foraging or roosting needs of this species.

(ii) "... whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action...", and

The Grey-headed Flying-fox is known to easily negotiate urban infrastructure, including urban areas, roads, open fields and paddocks (LesryK Environmental Consultants 2002, LesryK Environmental Consultants 2004). As such, the Proposal would not present a barrier to the movement patterns of this species such that its habitat areas are likely to become isolated.

(iii) "...the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality..."

The vegetation proposed to be removed would not be important for the long-term survival of the Grey-headed Flying-fox at this locality. Adjacent to the Proposal (particularly within the nearby Sydney Harbour National Park), numerous stands of native vegetation are present, these providing greater foraging opportunities for this species thereby guaranteeing its long-term presence.

(e) "...whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)..."

The study area is not listed as critical habitat under Part 3 Division 1 of the *TSC Act*. Critical habitat for the Grey-headed Flying-fox is yet to be defined. Nevertheless, any remnant of the size and condition of the subject site is unlikely to constitute critical habitat in any future declaration.

(f) "...whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan..."

Thirty-one priority actions have been identified for the Grey-headed Flying-fox (DECC 2007b). Of these the following may be relevant to the current Proposal: Habitat Protection: Protect and enhance priority foraging habitat for Grey-headed Flying-foxes, for example through management plans, local environmental plans and development assessments, and through volunteer conservation programs for privately owned land. However, given the limited amount of habitat available in the study area it is considered unlikely that it would be identified as a priority foraging habitat.

(g) "...whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process..."

Of the 29 Key Threatening Processes pertinent to mainland NSW that are listed under Schedule 3 of the *TSC Act*, "clearing of native vegetation" is applicable to the Proposal. Whilst it is acknowledged that the current proposal would result in the clearance of some native vegetation potentially available for the foraging needs of the Grey-headed Flying-fox, it is not considered that the clearance that would take place would result in a significant loss of habitat for this species from the locality. As such, it is not considered that the Proposal would constitute a significant Key Threatening Process such that the life cycle requirements of this species would be compromised.

9.2.1. (d) Expected impact on the Grey-headed Flying-fox.

The Proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle requirements of the Grey-headed Flying-fox. No habitats were observed within the area of possible impact (including both direct and indirect impacts) that would be considered significant for the conservation and preservation of this species. Due to its ability to negotiate urban infrastructure, no Grey-headed Flying-fox corridors would be disturbed, and no significant areas of local or regional habitat would be removed or isolated. During the field survey, no resident individuals of this species were recorded within, or adjacent to, the subject site. As such, no locally viable populations of this animal are considered to occur. Therefore, the expected impacts associated with the Proposal on the Grey-headed Flying-fox are considered to be minimal, and therefore, the preparation of a Species Impact Statement is not considered necessary.

10. Conclusions.

The Proposal is not considered to affect, threaten or have a significant adverse impact on any of those plants or animals listed under the *EPBC Act*. Therefore, it is not considered that the matter would require referral to the Federal Minister for the Environment, Water, Heritage and the Arts for further consideration or approval.

Whilst it is acknowledged that a number of individuals of *Acacia terminalis* ssp. *terminalis* and signs indicative of the Long-nosed Bandicoot were recorded in the subject site, and that the Grey-headed Flying-fox has been previously recorded in close proximity, based on a consideration of the assessment criteria provided under Section 5A of the NSW *Environmental Planning and Assessment Act 1979*, it is not considered that the Proposal would have a significant impact on the local or regional presence of any of these species. As such, a Species Impact Statement that further considers the impacts of the Proposal on *Acacia terminalis* spp. *terminalis*, the Grey-headed Flying-fox or the North Head population of the Long-nosed Bandicoot is not required.

Based on the results of the flora and fauna surveys, combined with a review of known literature and database sources, it is not considered that there are any ecological constraints to the Proposal proceeding as planned. The proposed development of Lots 20-26 Montpelier Place, St Patrick's Estate, North Head would not significantly affect any populations of any native plants, animals, populations or ecological communities such that they are placed at risk of extinction. Similarly the construction of

seven residential dwellings would not remove or significantly affect any habitats of local, regional, state or national conservation concern providing that the recommendations contained within this report are followed.

11. Recommendations

In addition to the mitigation measures highlighted in Sections 6.4 – 7.2 the following recommendations to ensure the Proposal is undertaken in an ecologically sustainable manner are presented:

- Before translocation of the *Acacia terminalis* spp. *terminalis* individuals is undertaken, the weeds around the individual should be removed by the method determined by the Translocation Management Plan, so that weeds are not carried to the translocation site, and seeds of the Acacia have the best possibility of germination and growth. Growth of any weeds from the soil after translocation should also be removed as required to maintain optimum growth and recruitment conditions for *Acacia terminalis* spp. *terminalis*.

- The *Acacia terminalis* spp. *terminalis* individuals to be translocated should be removed using a front-end loader bucket, and include as much of the surrounding soil as possible so that any Acacia seed in the soil is also translocated.

- The post planting recommendations presented in the Translocation Management Plan for the Sunshine Wattle should be adhered to. These recommendations should include regular watering of any translocated individuals particularly during extended heat intervals for a minimum period of six months.

- Those infestations of noxious weeds present should be treated prior to the development of the site.

- Prior to the commencement of the project the proponent should liaise with the local (weed) control authority to determine the best methods for the treatment of the Morning Glory (*Ipomea indica*), Asparagus Fern (*Protasparagus aethiopicus*), Lantana (*Lantana camara*), Mickey Mouse Plant (*Ochna serrulata*), Castor Oil Plant (*Ricinus communis*), Cassia (*Senna pendula* var. *glabrata*) and Crofton Weed (*Ageratina adenophora*) infestations.

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Appendix 1: Flora species recorded within the subject site.

Key
* Introduced species
N – Species listed as noxious in the Manly LGA.

SCIENTIFIC NAME	COMMON NAME
CONIFEROPSIDA	CONIFERS
Juniperaceae	
* *Juniperus* sp.	Juniper
MAGNOLIOPSIDA	**FLOWERING PLANTS**
MAGNOLIIDAE	**DICOTYLEDONS**
Aizoaceae	
Carpobrotus glaucescens	Pig Face
Asclepiadaceae	
* *Gomphocarpus fruiticosus*	Narrow-leaf Cotton Bush
Asteraceae	
* **N** *Ageratina adenophora*	Crofton Weed
* *Bidens pilosa*	Cobbler's Pegs
* *Circium vulgare*	Thistle
* *Conyza albida*	Fleabane
Casuarinaceae	
Casuarina glauca	Swamp She-Oak
Commelinaceae	
Commelina cyanea	Creeping Christian
Convolvulaceae	
* **N** *Ipomoea indica*	Morning Glory
Dilleniaceae	
Hibbertia scandens	Golden Guinea Flower
Euphorbiaceae	
Breynia oblongifolia	Breynia
* *Euphorbia peplus*	Petty Spurge
* **N** *Ricinus communis*	Castor Oil Plant
Fabaceae: Caesalpinioideae	
* **N** *Senna pendula** var. *glabrata*	Cassia
Fabaceae: Faboideae	
* *Cytisus scoparius*	Scotch Broom
Glycine clandestine	Love Creeper
Kennedia rubicunda	Scarlet Runner
Fabaceae: Mimosoidea	
Acacia longifolia var. *longifolia*	Sydney Golden Wattle
Acacia suaveolens	Sweet-scented Wattle
Acacia terminalis ssp. *terminalis*	Sunshine Wattle
Malvaceae	
* *Sida rhombifolia*	Paddy's Lucerne
Moraceae	
Ficus rubiginosa	Port Jackson Fig
Myrtaceae	
Kunzea ambigua	Tick Bush
Melaleuca quinquenervia	Broad-leaved Paperbark
Ochnaceae	
N **Ochna serrulata*	Mickey Mouse Plant
Pittosporaceae	
Pittosporum undulatum	Sweet Pittosporum
Plantaginaceae	
* *Plantago lanceolata*	Plantain

SCIENTIFIC NAME	COMMON NAME
Polygonaceae	
* *Acetosa sagittata*	Turkey Rhubarb
Primulaceae	
* *Anagallis arvensis*	Scarlet Pimpernel
Sapindaceae	
Cupaniopsis anacardioides	Tuckeroo
Umbelliferae	
* *Foeniculum vulgare*	Fennel
Verbenaceae	
* **N** *Lantana camara*	Lantana
* *Verbena bonariensis*	Purple Top
LILIIDAE	**MONOCOTYLEDONS**
Asparagaceae	
* **N** Protoasparagus *aethiopicus*	Asparagus Fern
Cyperaceae	
**Cyperus eragrotis*	
Juncaceae	
Juncus sp.	Rush
Lomandraceae	
Lomandra longifolia	Mat-rush
Phormiaceae	
Dianella caerulea var producta	Flax-lily
Poaceae	
* *Briza minor*	Shivery Grass
* *Chloris gayana*	Rhodes Grass
Cymopogon refractus	Barbwire Grass
Cynodon dactylon	Couch
* *Paspalum dilatatum*	Paspalum
Paspalum distichum	Water Couch
* *Pennisetum clandestinum*	Kikuyu
* *Stenotaphrum secundatum*	Buffalo
Themeda australis	Kangaroo Grass
Typhaceae	
Typha orientalis	Cumbungi

Appendix 2: Fauna species recorded or known to occur in the vicinity of the subject site.

Source of Records

1 = Species recorded during the present study.
2 = DECC (2007a).
3 = Skelton *et al.* (Bower Gully section) (2003).
4 = Manly City Council (2006).

Key

A - Indicates species listed under the *EPBC Act.*
F - Migratory Family listed under the *EPBC Act.*
M - Species listed as migratory listed under the *EPBC Act.*
B - Indicates species listed under the *TSC Act.*
E - Species is Endangered.
V - Species is Vulnerable.
EN - Endangered population at North Head as listed under the *TSC Act.*
* - Indicates introduced species.

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		MAMMALS					
			Tachyglossidae				
		Short-beaked Echidna	*Tachyglossus aculeatus*		x		
			Dasyuridae				
V	V	Spotted-tailed Quoll	*Dasyurus maculatus*		x		
		Brown Antechinus	*Antechinus stuartii*		x		
			Perameliidae				
	EN	Long-nosed Bandicoot	*Perameles nasuta*	x	x	x	
			Phascolarctidae				
	V	Koala	*Phascolarctos cinereus*		x		
			Petauridae				
		Sugar Glider	*Petaurus breviceps*		x		
			Pseudocheiridae				
		Common Ringtail Possum	*Pseudocheirus peregrinus*		x	x	
			Phalangeridae				
		Common Brushtail Possum	*Trichosurus vulpecula*		x	x	
			Macropodidae				
		Swamp Wallaby	*Wallabia bicolor*		x		
			Pteropodidae				
V	V	Grey-headed Flying Fox	*Pteropus poliocephalus*		x	x	x
			Vespertilioidae				
		Gould's Wattled Bat	*Chalinolobus gouldii*		x		
	V	Eastern Bentwing Bat	*Miniopterus schreibersii*		x		
		Little Forest Bat	*Vespadelus vulturnus*		x		
			Molossidae				
		White-striped Freetail Bat	*Nyctinomus australis*		x		
			Muridae				
		Water Rat	*Hydromys chrysogaster*		x		
		* House Mouse	*Mus musculus*		x		
		Bush Rat	*Rattus fuscipes*		x		
		* Black Rat	*Rattus rattus*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		* Unidentified rat	*Rattus sp.*	x			
			Canidae				
		Dingo	*Canis lupus dingo*		x		
		* Fox	*Vulpes vulpes*		x		
		* Dog	*Canis familiaris*		x	x	
			Felidae				
		* Feral Cat	*Felis catus*		x	x	
			Leporidae				
		* Rabbit	*Oryctolagus cuniculus*	x	x	x	
		BIRDS					
			Phasianidae				
		Brown Quail	*Coturnix ypsilophora*		x		
			Turnicidae				
		Painted Button-quail	*Turnix varia*		x		
			Diomedeidae				
MV		Wandering Albatross	*Diomedea exulans*		x		
M	V	Black-browed Albatross	*Diomedea melanophris*		x		
M		Yellow-nosed Albatross	*Diomedea chlorohynchos*		x		
MV	V	Shy Albatross	*Diomedea cauta*		x		
ME	V	Sooty Albatross	*Phoebetria fusca*		x		
			Procellariidae				
M		White-chinned Petrel	*Procellaria aequinoctialis*		x		
		Great-winged Petrel	*Pterodroma macroptera*		x		
ME	E	Gould's Petrel	*Pterodroma leucoptera*		x		
		Antarctic Prion	*Pachyptila desolata*		x		
V		Fairy Prion	*Pachyptila turtur*		x		
M		Wedge-tailed Shearwater	*Puffinus pacificus*		x		
		Buller's Shearwater	*Puffinus bulleri*		x		
M		Short-tailed Shearwater	*Puffinus tenuiorstris*		x		
		Fluttering Shearwater	*Puffinus gavia*		x		
ME	E	Southern Giant Petrel	*Macronectes giganteus*		x		x
		White-faced Storm Petrel	*Pelagodroma marina*		x		
		Common Diving-Petrel	*Pelecanoides urinatrix*		x		
			Pelecanidae				
		Australian Pelican	*Pelecanus conspicillatus*		x		
			Sulidae				
		Australasian Gannet	*Morus serrator*		x		
			Phaethontidae				
M		White-tailed Tropicbird	*Phaeton lepturus*		x		
			Phalacrocoracidae				
		Pied Cormorant	*Phalacrocorax varius*		x		
		Little Pied Cormorant	*Phalacrocorax melanoleucos*		x		
		Great Cormorant	*Phalacrocorax carbo*		x		
		Little Black Cormorant	*Phalacrocorax sulcirostris*		x		
			Podicipedidae				

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Hoary-headed Grebe	*Poliocephalus poliocephalus*		x		
			Spheniscidae				
	EN	Little Penguin	*Eudyptula minor*		x		
F			**Anatidae**				
		Pacific Black Duck	*Anas superciliosa*		x		
		Australian Wood Duck	*Chenonetta jubata*		x		
			Rallidae				
		Lewin's Rail	*Rallus pectoralis*		x		
			Ardeidae				
		White-necked Heron	*Ardea pacifica*		x		
		White-faced Heron	*Egretta novaehollandiae*		x		
M		Cattle Egret	*Ardea ibis*		x		
M		Great Egret	*Ardea alba*		x		
M		Eastern Reef Egret	*Egretta sacra*		x		
		Striated Heron	*Butorides striatus*		x		
		Nankeen (Rufous) Night Heron	*Nycticorax caledonicus*		x		
			Threskiornidae				
		Australian White Ibis	*Threskiornis molluca*		x		
F			**Scolopacidae**				
		Whimbrel	*Numenius phaeopus*		x		
M		Wandering Tattler	*Hetroscelis incana*		x		
			Haematopodidae				
	V	Sooty Oystercatcher	*Haematopus fuliginosus*		x		
F			**Charadriidae**				
		Masked Lapwing	*Vanellus miles*		x		
F			**Recurvirostridae**				
		Black-winged Stilt	*Himantopus himantopus*		x		
		Red-necked Avocet	*Recurvirostra novaehollandiae*		x		
			Laridae				
M		Arctic Jaeger	*Stercorarius parasiticus*		x		
M		Long-tailed Jaeger	*Stercorarius Longicauda*		x		
		Silver Gull	*Larus novaehollandiae*		x		
		Pacific Gull	*Larus pacificus*		x		
M		Caspian Tern	*Sterna caspia*		x		
M		Common Tern	*Sterna hirundo*		x		
		White-fronted Tern	*Sterna striata*		x		
	V	Sooty Tern	*Sterna fuscata*		x		
		Crested Tern	*Sterna bergii*		x		
		Common Noddy	*Anous stolidus*		x		
F			**Accipitridae**				
		Black-shouldered Kite	*Elanus axillaris*		x		
M	V	Osprey	*Pandion haliaetus*		x		x
		Whistling Kite	*Haliastur sphenurus*		x		
M		White-bellied Sea-eagle	*Haliaeetus leucogaster*		x		
		Little Eagle	*Hieraaetus morphnoides*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Brown Goshawk	*Accipiter fasciatus*		x		
		Swamp Harrier	*Circus approximans*		x		
F			**Falconidae**				
		Peregrine Falcon	*Falco peregrinus*		x		
		Australian Hobby	*Falco longipennis*		x		
		Brown Falcon	*Falco berigora*		x		
		Nankeen Kestrel	*Falco cenchroides*		x		
			Columbidae				
	V	Superb Fruit-dove	*Ptilinopus superbus*		x		x
		Topknot Pigeon	*Lopholaimus antarcticus*		x		
		White-headed Pigeon	*Columba leucomela*		x		
		* Rock Dove	*Columba livia*		x	x	
		* Spotted Turtle-dove	*Streptopelia chinensis*		x	x	
		Brown Cuckoo-dove	*Macropygia amboinensis*		x		
		Bar-shouldered Dove	*Geopelia humeralis*		x		
		Brush Bronzewing	*Phaps elegans*		x		
		Crested Pigeon	*Ocyphaps lophotes*	x	x		
		Wonga Pigeon	*Leucosarcia melanoleuca*		x		
			Cacatuidae				
		Yellow-tailed Black Cockatoo	*Calyptorhynchus funereus*		x		
		Galah	*Eolophus roseicpilla*		x		
		Little Corella	*Cacatua sanguinea*		x		
		Sulphur-crested Cockatoo	*Cacatua galerita*		x		
			Psittacidae				
		Rainbow Lorikeet	*Trichoglossus haematodus*	x	x	x	
		Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*		x		
		Little Lorikeet	*Glossopsitta pusilla*		x		
		Australian King Parrot	*Alisterus scapularis*		x		
		Red-winged Parrot	*Aprosmictus erythropterus*		x		
E	E	Swift Parrot	*Lathamus discolor*		x		
		Crimson Rosella	*Platycercus elegans*		x		
		Eastern Rosella	*Platycercus eximius*		x		
		Australian Ringneck	*Barnardius zonarius*		x		
		Red-rumped Parrot	*Psephotus haematonotus*		x		
			Cuculidae				
		Pallid Cuckoo	*Cuculus pallidus*		x		
		Brush Cuckoo	*Cuculus variolosus*		x		
		Fan-tailed Cuckoo	*Cuculus flabelliformis*		x		
		Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*		x		
		Shining Bronze-Cuckoo	*Chrysococcyx lucidus*		x		
		Common Koel	*Eudynamys scolopacea*		x		
		Channel-billed Cuckoo	*Scthrops novaehollandiae*		x		
			Centropodidae				
		Pheasant Coucal	*Centropus phasianinus*		x		
			Strigidae				

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
	V	Powerful Owl	*Ninox strenua*		x		x
		Southern Boobook	*Ninox novaeseelandiae*		x		
	V	Barking Owl	*Ninox connivens*		x		
			Tytonidae				
		Barn Owl	*Tyto alba*		x		
			Podargidae				
		Tawny Frogmouth	*Podargus strigoides*		x		
			Apodidae				
M		White-throated Needletail	*Hirundapus caudacutus*		x		
M		Fork-tailed Swift	*Apus pacificus*		x		
			Alcedinidae				
		Azure Kingfisher	*Alcedo azurea*		x		
		Laughing Kookaburra	*Dacelo naxaeguineae*	x	x		
		Sacred Kingfisher	*Todiramphus sanctus*		x		
			Coraciidae				
		Dollarbird	*Eurystomus orientalis*		x		
			Menuridae				
		Superb Lyrebird	*Menura novaehollandiae*		x		
			Neosittidae				
		Varied Sittella	*Daphoenositta chrysoptera*		x		
			Maluridae				
		Superb Fairy-wren	*Malurus cyaneus*		x	x	
		Variegated Fairy-wren	*Malurus lamberti*		x		
			Pardalotidae				
		Spotted Pardalote	*Pardalotus punctatus*		x		
		Striated Pardalote	*Pardalotus striatus*		x		
		Rockwarbler	*Origma solitaria*		x		
		White-browed Scrubwren	*Sericornis frontalis*		x	x	
		White-throated Gerygone	*Gerygone olivacea*		x		
		Brown Gerygone	*Gerygone mouki*		x		
		Brown Thornbill	*Acanthiza pusilla*		x		
		Yellow Thornbill	*Acanthiza nana*		x		
		Striated Thornbill	*Acanthiza lineata*		x		
		Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*		x		
			Meliphagidae				
		Red Wattlebird	*Anthochaera carunculata*		x		
		Little (Brush) Wattlebird	*Anthochaera chrysoptera*	x	x		
		Spiny-cheeked Honeyeater	*Acanthagenys rufogularis*		x		
		Noisy Friarbird	*Philemon corniculatus*		x		
		Little Friarbird	*Philemon citreogularis*		x		
ME	E	Regent Honeyeater	*Xanthomyza phrygia*		x		x
		Noisy Miner	*Manorina melanocephala*	x	x	x	
		Lewin's Honeyeater	*Meliphaga lewinii*		x		
		Yellow-faced Honeyeater	*Lichenostomus chrysops*		x		
		White-eared Honeyeater	*Lichenostomus leucotis*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Yellow-tufted Honeyeater	*Lichenostomus melanops*		x		
		White-plumed Honeyeater	*Lichenostomus pencillatus*		x		
		White-naped Honeyeater	*Melithreptus lunatus*		x		
		White-cheeked Honeyeater	*Phylidonyris nigra*		x		
		New Holland Honeyeater	*Phylidonryis novaehollandiae*		x		
		Eastern Spinebill	*Acanthorhynchus tenuirostris*		x		
		Scarlet Honeyeater	*Myzomela sanguinolenta*		x		
			Orthonychidae				
		Eastern Whipbird	*Psophodes olivaceus*		x		
			Petroicidae				
		Rose Robin	*Petroica rosea*		x		
		Eastern Yellow Robin	*Eopsaltria australis*		x		
		Jacky Winter	*Microeca fascinans*		x		
			Pachycephalidae				
		Crested Shrike-tit	*Falcunculus frontatus*		x		
		Grey Shrike-thrush	*Colluricincla harmonica*		x		
		Golden Whistler	*Pachycephala pectoralis*		x		
		Rufous Whistler	*Pachycephala rufiventris*		x		
			Dicruridae				
		Grey Fantail	*Rhipidura fuliginosa*		x		
M		Rufous Fantail	*Rhipidura rufifrons*		x		
		Willie Wagtail	*Rhipidura leucophrys*		x		
		Leaden Flycatcher	*Myiagra rubecula*		x		
M		Satin Flycatcher	*Myiagra cyanoleuca*		x		
M		Black-faced Monarch	*Monarcha melanopsis*		x		
M		Spectacled Monarch	*Monacrha trivirgatus*		x		
		Magpie Lark	*Grallina cyanoleuca*		x		
		Spangled Drongo	*Dicrurus bracteatus*		x		
			Oriolidae				
		Olive-backed Oriole	*Oriolus sagittatus*		x		
		Figbird	*Sphecotheres viridis*		x		
			Campephagidae				
		Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		x		
			Artamidae				
		Grey Butcherbird	*Cracticus torquatus*		x		
		Pied Butcherbird	*Cracticus nigrogularis*		x		
		Australian Magpie	*Gymnorhina tibicen*	x	x	x	
		Pied Currawong	*Strepera graculina*	x	x		
			Corvidae				
		Australian Raven	*Corvus coronoides*	x	x		
			Hirundinidae				
		Welcome Swallow	*Hirundo neoxena*		x		
		Tree Martin	*Hirundo nigricans*		x		
			Motacillidae				
		Richard's Pipit	*Anthus naovaeseelandiae*		x		

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
F			**Sylviidae**				
		Golden-headed Cisticola	*Cisticola exilis*		x		
			Passeridae				
		* House Sparrow	*Passer domesticus*		x		
			Fringillidae				
		* European Goldfinch	*Carduelis carduelis*		x		
			Ploceidae				
		Red-browed Finch	*Neochmia temporalis*		x		
	V	Diamond Firetail	*Stagonopleura guttata*		x		
			Dicaeidae				
		Mistletoebird	*Dicaeum hirundinaceum*		x		
			Zosteropidae				
		Silvereye	*Zosterops lateralis*		x		
			Pycnonotidae				
		* Red-whiskered Bulbul	*Pycnonotus jocosus*		x		
F			**Muscicapidae**				
		Russet-tailed Thrush	*Zoothere heinei*		x		
		* Common Blackbird	*Turdus merula*		x		
			Sturnidae				
		* Common Starling	*Sturnus vulgaris*		x		
		* Common Myna	*Acridotheres tristis*		x		
		REPTILES					
			Chelidae				
		Eastern Snake-necked Turtle	*Chelodina longicollis*		x		
			Gekkonidae				
		Wood Gecko	*Diplodactylus vittatus*		x		
		Lesueur's Velvet Gecko	*Oedura lesueurii*	x	x		
		Southern Leaf-tailed Gecko	*Phyllurus platurus*		x		
		Thick-tailed Gecko	*Underwoodisaurus milii*		x		
			Pygopodidae				
		Burton's Snake-lizard	*Lialis burtonis*		x		
		Common Scaly-foot	*Pygopus lepidopodus*		x		
			Agamidae				
		Eastern Water Dragon	*Physignathus lesueurii*	x	x	x	
		Bearded Dragon	*Pogona barbata*		x		
			Varanidae				
	V	Heath (Rosenberg's) Goanna	*Varanus rosenbergi*		x		
			Scincidae				
		Red-throated Skink	*Bassiana platynota*		x		
		Wall Skink	*Cryptoblepharus virgatus*		x		
		Striped Skink	*Ctenotus robustus*		x		
		Copper-tailed Skink	*Ctenotus taeniolatus*		x		
		Eastern Water Skink	*Eulamprus quoyii*		x	x	
		Grass Skink	*Lampropholis delicata*	x	x	x	

A	B	COMMON NAME	FAMILY & SCIENTIFIC NAME	1	2	3	4
		Garden Skink	*Lampropholis guichenoti*		x	x	
		Eastern Blue-tongued Lizard	*Tiliqua scincoides*		x	x	
		Rainbow Litter Skink	*Lygisaurus foliorum*		x		
			Boidae				
		Diamond Python	*Morelia spilota spilota*		x		
			Colubridae				
		Brown Tree Snake	*Boiga irregularis*		x		
		Common Tree Snake	*Dendrelaphis punctulata*		x	x	
			Elapidae				
		Golden Crowned Snake	*Cacophis squamulosus*		x		
		Yellow-faced Whip Snake	*Demansia psammophis*		x		
		Eastern Tiger Snake	*Notechis scutatus*		x		
		Red-bellied Black Snake	*Pseudechis porphyriacus*		x		
		Eastern Brown Snake	*Pseudonaja textilis*		x		
		Bandy Bandy	*Vermicella annulata*		x		
		AMPHIBIANS					
			Myobatrachidae				
		Common Eastern Froglet	*Crinia signifera*		x	x	
V	V	Giant Burrowing Frog	*Heleioporus australiacus*		x		
		Eastern Banjo Frog	*Limnodynastes dumerilii*		x		
		Ornate Burrowing Frog	*Limnodynastes ornatus*		x		
		Striped Marsh Frog	*Limnodynastes peronii*		x	x	
		Spotted Grass Frog	*Limnodynastes tasmaniensis*		x		
	V	Red-crowned Toadlet	*Pseudophryne australis*		x		x
			Hylidae				
		Green Tree Frog	*Litoria caerulea*		x		
		Peron's Tree Frog	*Litoria peronii*		x		
		Leaf Green Tree Frog	*Litoria phyllochroa*		x		

Appendix 3. Threatened fauna species known to have been previously recorded within this portion of the Manly Local Government Area.

Key
EPBC Act M – species listed as migratory under the *EPBC Act.*
EPBC Act TM – Species listed as threatened and migratory under the *EPBC Act.*
* - habitat requirements were generally extracted from Frith (1997), Cogger (2000), Strahan (1995), NPWS (1999), NPWS (2000) and the NSW Scientific Committee (2007), with other references used being identified in the bibliography.

Common and Scientific Name	Legislation	Habitat Requirements*	Presence Consideration and Potential Impacts
BIRDS			
White-bellied Sea-eagle *Haliaeetus leucogaster*	*EPBC Act* M	The White-bellied Sea-eagle is associated with coastal areas and bays all around Australia, and inland areas of large rivers, lakes and swamps. It spends most of its time soaring above these water bodies hunting for fish, tortoises, sea snakes, waterfowl and sometimes rabbits on land.	Unlikely to be present due to a lack of its necessary habitat requirements. Therefore, this species would not be disturbed as a result of the undertaking of the Proposal.
MAMMALS			
Long-nosed Bandicoot *Perameles nasuta*	*TSC Act* E	The Long-nosed Bandicoot has been recorded in woodlands, rainforests, wet and dry forests, open areas, heathlands and grasslands. Within these habitats they shelter during the day in a nest that is lined with grass and leaves, a number of which may be utilised in a given area. This species is known to be tolerant of major disturbances and is consistently recorded in urban environments. The Long-nosed Bandicoot feeds on a variety of invertebrates, as well as some plant material and fungi. Mating occurs throughout the year in the Sydney region. The home ranges of the Long-nosed Bandicoot are in the order of 4.4 ± 0.8ha for males and 1.7 ± 0.2ha for females.	During the present survey bandicoots were identified as utilising the site through the identification of their characteristic conical diggings. Although the site does not appear to contain suitable habitat, individuals may use the area (particularly the perimeter) as a movement corridor and/or foraging habitat. The degraded and essentially cleared nature of the site is expected to limit the occurrence of this species. Whilst this is the case, due to its nearby presence, based on a precautionary approach an assessment, using the seven part test as provided under Section 5A of the *Environmental Planning and Assessment Act 1979*, has been provided within Section 9.2 of this report.

Common and Scientific Name	Legislation	Habitat Requirements*	Presence Consideration and Potential Impacts
Grey-headed Flying-fox *Pteropus poliocephalus*	*EPBC Act* *TSC Act*	A canopy-feeding frugivore, blossom-eater and nectarivore which inhabits a variety of habitats. Roosts and breeds communally in 'camps', with these camps containing between 500 and 5,000 individuals. Individuals generally exhibit a high fidelity to traditional camps and return annually to give birth and rear offspring. Foraging occurs opportunistically on both native and exotic plants, often at distances between 30 and 70 km from camps.	During the field investigation, no active or historic flying-fox camps were identified. Individuals of this species known to forage within the vicinity of the subject site on occasion. Based on a precautionary approach an assessment, using the criteria provided under the *EPBC Act* and Section 5A of the *Environmental Planning and Assessment Act 1979*, has been provided within Section 9 of this report.
Eastern Bentwing-bat *Miniopterus schreibersii*	*TSC Act*	This species is the dominant cave-dwelling bat in south-eastern Australia. It occurs in a variety of habitats and roosts in caves, storm water channels, mines and houses. Feeds on insects caught on the wing from within eucalypt woodlands and forests.	The absence of caves and other suitable roosting site would negate the presence of this species. Therefore, this species would not be disturbed as a result of the undertaking of the Proposal.

Aim: To minimise bandicoot mortality and injury and to protect bandicoot habitat in areas not subject to construction activity.

- Ensure that all retained areas are clearly identified and marked to avoid any accidental damage/destruction
- Erect temporary chain wire fencing around the construction site. Gaps of at least 20-30 cm are to be provided at the bottom of the fencing, so as not to impede bandicoot movement around and through the construction site.
- All construction workers on the site, including sub contractors and visitors to the work site, are to be made aware of the presence of bandicoots through induction training by a suitably qualified and experienced person.
- A systematic clearing approach must be determined by a suitably qualified and experienced person prior to the commencement of clearing that is to include progression of clearing in one direction towards areas of retained habitat.
- Vegetation clearing to be undertaken using hand tools in the first instance and checking or likely shelter sites (at the base of vegetation and under deep litter) so as to cause bandicoots to be flushed from sheltering sites to other retained areas. Ideally all clearance to be completed within one day so that bandicoots do not re occupy partially cleared areas overnight.
- Earth moving or other large machinery is not to be used until the level of vegetation clearance achieved cannot support a bandicoot sheltering or nesting. Appropriate level of clearance to be determined by a suitably qualified person.
- If cleared vegetation is stockpiled on the site temporarily, then its removal from the site must be undertaken by hand, not large machinery.
- Operating hours are to be confined to 0700 to 1800 on weekdays and 0700 to 1300 on Saturdays to limit disturbance. No machinery is to be used within one half hour of dusk.
- All machinery and construction material stock piles are to be inspected daily prior to operations commencing to ensure that no bandicoots are sheltering.
- If an injured bandicoot is found, it must be reported to the NPWS Harbour North Office on 9977 6732, or if unavailable contact the Sydney Metropolitan Wildlife Service on 9413 4300.
- If a dead bandicoot is found, it must be reported to NPWS on the above number. A NPWS Ranger will need to check the body for a microchip, therefore, if possible put the body in a plastic bag and refrigerate or keep cool.
- Undertake monitoring of the vegetated links throughout construction as per Monitoring Protocol.

Department of Environment and Climate Change (NSW)

NEWS RELEASE NEWS RELEASE NEWS RELEASE

August 12, 2004

Bright future for North Head bandicoots

Measures taken by the Department of Conservation and Environment (DEC) to protect the endangered long-nosed bandicoot population of North Head are reaping rewards, with bandicoot numbers on the rise.

Results of the latest survey found the population had grown to between 130 and 160 individuals, up from an estimated 100 in the 2002 bandicoot census.

The five-day survey involved local DEC staff, threatened species officers, volunteers, and researchers from the University of NSW setting 276 live traps across the entire headland.

DEC Threatened Species Manager, Robert Humphries, said the results of the survey were extremely encouraging.

"Over the last few years we have put in place a range of measures to help in the recovery of these highly endangered native animals," Mr Humphries said.

"We have maintained an extensive fox baiting program, greatly reducing the major threat from this predator.

"The installation of speed bumps and restriction of night time access to North Head since 1998 are also helping by reducing road kills at night when the bandicoots are most active.

"In late 2003, local staff undertook a number of hazard reduction burns that have rejuvenated some of the long unburnt heath on North head. A number of bandicoots were found foraging in these areas.

"There had been concerns that the drought may be having detrimental effects on the colony but the increase points to a population who is faring well.

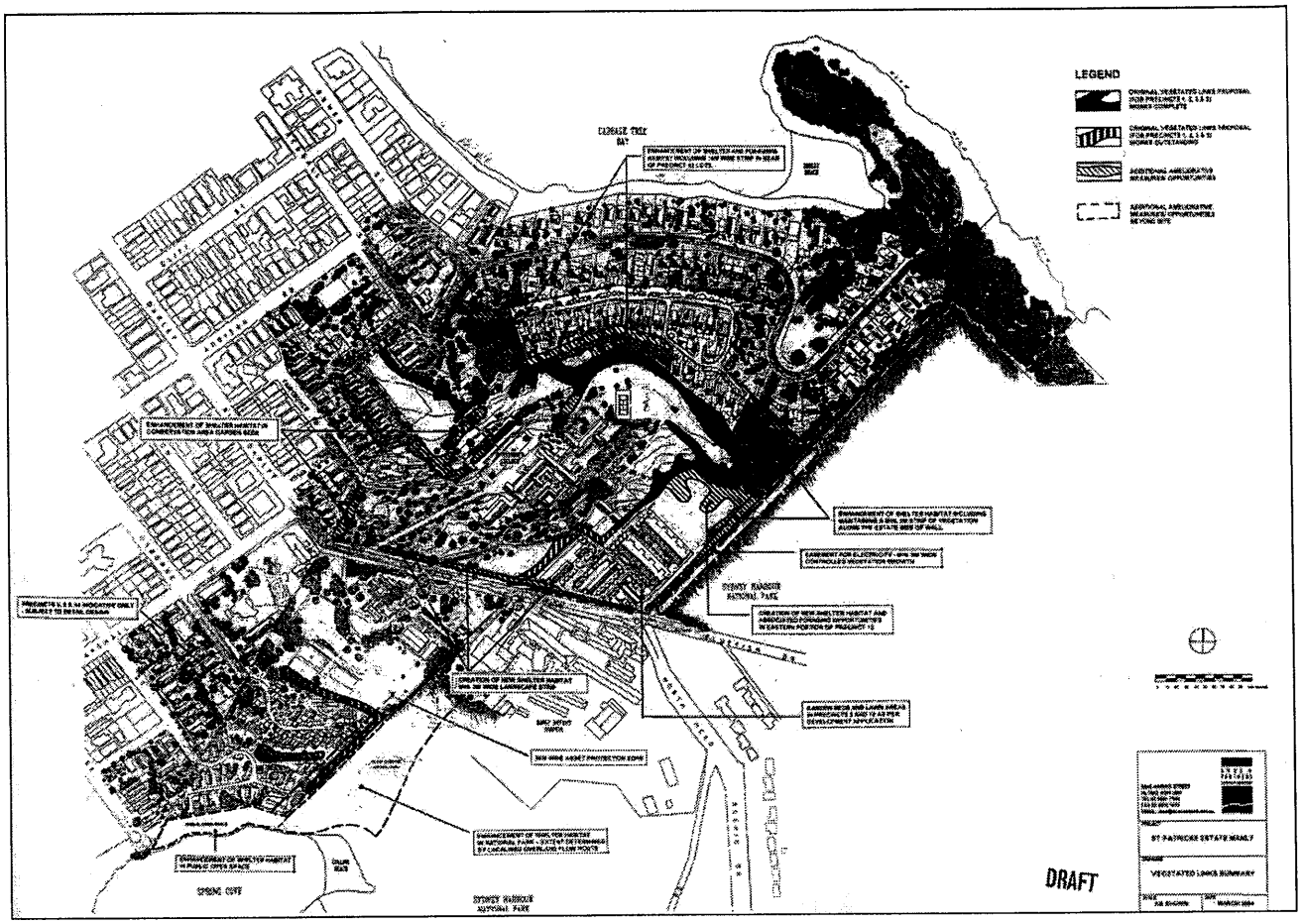
"Whilst wild populations naturally undergo seasonal and annual variations in abundance, the results have found a good sex ratio and distribution of age classes across the population – a sign of a healthy colony. "

The long nosed bandicoot is the most common bandicoot species in NSW, however like Manly's Little Penguin population, the North Head bandicoot population is surviving in isolation in the heart of Sydney.

It was declared an endangered population by the independent NSW Scientific Committee in 1997.

Department of Environment and Conservation news releases are on the web:
www.epa.nsw.gov.au/media/

Appendix 6. Vegetated links summary plan.



Construction Environmental Management Plan
St. Patrick's Estate Manly

5 April 2007

Prepared for:
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DISTRIBUTION

Construction Environmental Management Plan
St. Patrick's Estate Manly
5 April 2007

Copies	Recipient	Copies	Recipient
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This document was prepared for the sole use of Lend Lease Development and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HLA-Envirosciences Pty Limited and Lend Lease Development.

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ABBREVIATIONS

AS	Australian Standard
CLO	Community Liaison Officer
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DNR	Department of Natural Resources
DP	Department of Planning
ECP	Environmental Control Plan
EMP	Environmental Management Plan
EMS	Environmental Management System
Hazmat	Hazardous Material
ISO 14001	International Standard for Environmental Management Systems
LEC	Land and Environment Court
LGA	Local Government Area
MSDS	Material Safety data Sheet
OEMP	Operational Environmental Management Plan
PCB	Poly Chlorinated Biphenyl
PEMP	Precinct Environmental Management Plan
Precinct	An area of St Patrick's Estate as defined on the map entitled Figure 1
REP	Regional Environmental Plan
SEPP	State Environmental Planning Policy
SHFA	Sydney Harbour Foreshore Authority
TCM	Total Catchment Management
TSS	Total Suspended Solids

1 INTRODUCTION

1.1 About this document

This Construction Environmental Management Plan (CEMP) has been prepared for all construction works associated with the development of St. Patrick's Estate (the Estate), Manly. It is part of a suite of documents that seek to ensure that the owners of the site, the Trustees of the Roman Catholic Church for the Archdiocese of Sydney (the Trustees), meet all their statutory obligations and comply with the adopted environmental policy. The CEMP is an Estate-wide document which sets the framework within which construction is to be undertaken, across the Estate, and forms part of the Environmental Management System (EMS) for the Estate. Specifically the CEMP defines the environmental management responsibilities, and reporting channels for all personnel involved in the development. All personnel are responsible for ensuring that their activities are conducted in accordance with all legislative requirements and the requirements of this CEMP at all times.

1.2 Land use context

The Estate is located south-east of Manly, on an area of North Head known as The Eastern Hill. The Estate was granted to the Roman Catholic Church in the 1860's, with the Archbishop's residence and St Patrick's Seminary subsequently being established in the 1880's. The location of the site is shown in **Figure 1**.

Today the Estate consists of approximately 22 hectares which is divided into northern and southern portions by Darley Road. For simplicity, the Manly LEP 1988 Amendment No. 24 has divided the Estate into 14 precincts, based on existing and proposed land use. The current and proposed land uses are summarised in **Table 1** below and are shown in **Figure 2**.

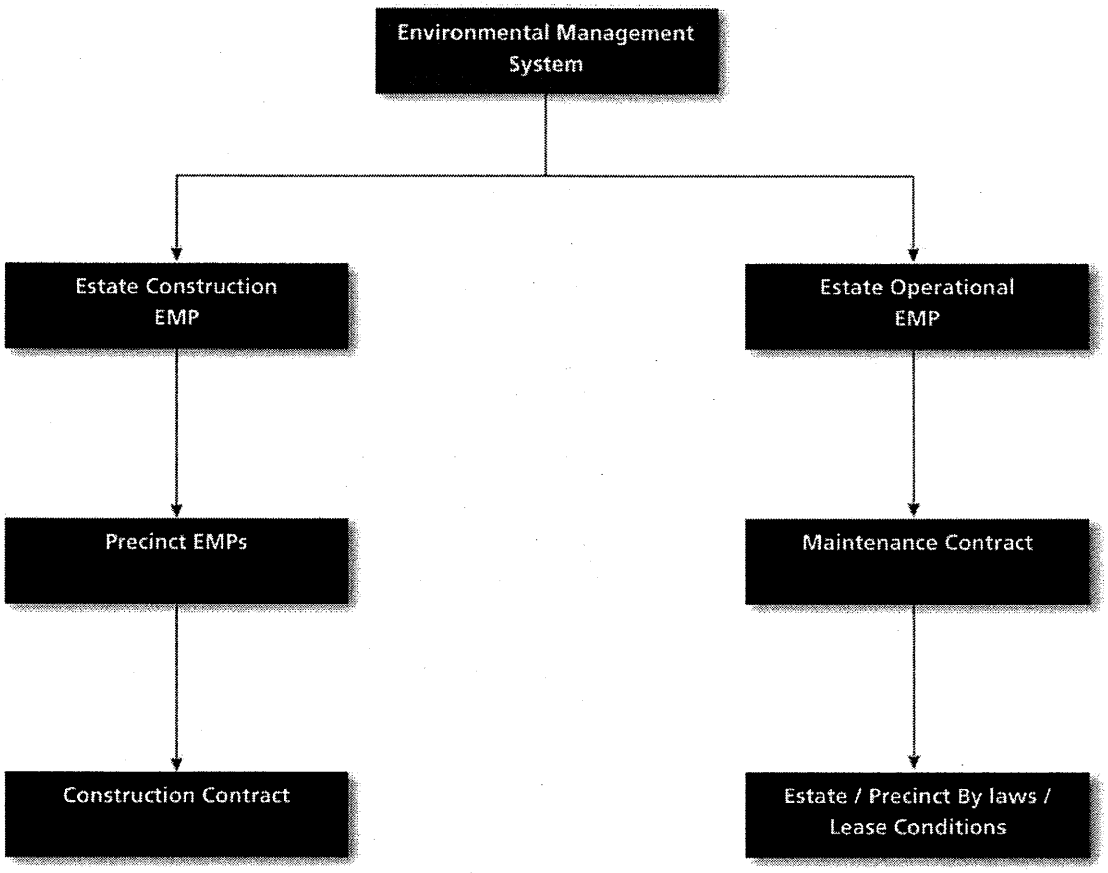
Table 1: Current and Proposed Land Uses for Each Precinct

Precinct	Current Land Use	Proposed Land Use
Precinct 1	Open space. Sparsely vegetated (trees and scrub) containing numerous bedrock outcrops. Area remediated in 2004.	Residential with gardens and accessible soil (detached housing)
Precinct 2	Mixed residential with gardens and accessible soil and minimal access to soil. Limited open space (attached housing and apartments)	Attached houses and apartments divided by large lawns and open space.
Precinct 3	Open space. Sparsely vegetated	Mixed residential with landscaping. Limited open space.
Precinct 4	Open space and secondary school (St Paul's College).	Open space and secondary school (St Paul's College)
Precinct 5	Open space used for unauthorised recreational purposes (exercising and walking pets by locals)	Residential with landscaping and accessible soil. (detached housing)

Precinct	Current Land Use	Proposed Land Use
Precinct 6	Open space. Vegetated with grass and mature trees.	Residential with landscaping and accessible soil. (detached housing/apartments)
Precinct 7	Open space	Open space
Precinct 8	Undeveloped bushland.	Undeveloped bushland
Precinct 9	No redevelopment residential precinct exists	No redevelopment residential precinct exists
Precinct 10	Open Space. Vegetated with established native and exotic vegetation maintained by gardener and used for unauthorised recreational purposes (exercising and walking pets by locals)	Residential with landscaping and accessible soil (detached housing).
Precinct 11	Archbishop's Residence; southern portion occupied by playing fields used by the students of St Paul's College (Precinct 4). Additional areas of open space.	Open space and residential with gardens and accessible soil. Archbishop's Residence; southern portion occupied by playing fields used by the students of St Paul's College (Precinct 4).
Precinct 12	Open space. Predominantly vegetated with numerous sandstone bedrock outcrops; adjacent to large filled platform to the east of the precinct.	Residential - apartments
Precinct 13	Predominantly vegetated with grass with some heavy tree vegetation in the northern portion.	Residential with landscaping and accessible soil (detached housing).
Precinct 14	Open space and school/residential with minimal access to soil. (operating as hospitality college).	Open space and school/residential with minimal access to soil. (operating as hospitality college).

1.3 Background to CEMP

A CEMP was originally required as a condition of the consent granted by the NSW Land and Environment Court (LEC) for all precincts on the Estate, with the exception of Precinct 2. The Trustees then took the opportunity to develop an environmental management framework as depicted below:



The LEC conditions of consent were the catalyst for the development of an Estate-wide environmental management framework. In addition the conditions of consent subsequently issued by Manly Council for the Estate development also require that an EMS and EMP documents are prepared. The relevant conditions of recent development consent are outlined below.

> *"In order to achieve the environmental performance and outcomes proposed in the application, required by conditions of this consent and any subsequent statutory approvals, the applicant and owner shall deliver and implement an Environmental Management Plan and Environmental Management System. These shall be documented and submitted to council and approved by Group Manager, Land Use Management prior to the development commencing. The Environmental Management System shall be in accordance with International Standard ISO 14001 unless otherwise approved by Group Manager, Land Use Management. The EMP/ EMS shall address all relevant issues including:*

- *Management of environment risks;*
- *Vegetation and landscape management;*
- *Soil management;*
- *Stormwater management;*
- *Groundwater management;*
- *Sewage management;*
- *Management of habitat, ecological systems and conservation of fauna;*

- *Management of noise;*
- *Management of fire*
- *Management of both construction activities, maintenance activities and their associate impacts*
- *Transition from construction phase to permanent occupation phase*
- *In particular the EMP/EMS shall identify the following elements of the ongoing environmental management of the development:*

  i) organisational structure;

  ii) responsibilities and accountabilities

  iii) ownership and management control

  iv) resources and funding

  v) environmental management policy (which shall be consistent with the proposal and this consent)

  vi) proposed mechanisms for implementing the policy and the requirements of this consent

  vii) performance indicators proposed and targets to be achieved

  viii) methods of measuring performance and taking checking and corrective action

  ix) a record system of actions taken to manage the environment, performance, monitoring results and consequent corrective actions such as records to be available for council inspection at any time

  x) an audit system accessible to council to verify the EMS/EMP

  xi) preparedness for emergencies

Given the broad range of the above conditions, an Estate-wide strategy has been developed to take a holistic view of environmental management across the entire Estate. The Estate-wide strategy accepts that the Estate will be developed and released for sale/occupation on a precinct by precinct basis, and therefore precinct specific CEMPs will be developed to support this Estate wide CEMP.

2 ENVIRONMENTAL POLICY

The overarching policy of the Estate development is to be an ecologically sustainable community. The purpose of the Estate is to develop and operate a desirable living space that enables a sense of community amongst the residents and lessees, whilst ensuring the protection the surrounding environmental values.

The Estate developers are committed to managing and minimising potential construction and operational impacts on the local community, surrounding biophysical and natural environment, whilst ensuring that the Estate development delivers a desirable and livable community.

The key policy objectives are:

- compliance with all applicable laws, policies and regulations;
- achieve best practice in environmental management through construction and operation of the Estate development;
- no environmental harm;
- protection of local amenity for the surrounding community; and
- continual improvement in environmental management.

The mechanisms adopted to achieve these objectives are:

- the establishment and maintenance of an EMS in accordance with ISO 14001:2004 for the construction and thereafter the lifetime of the Estate;
- retaining an Environmental Manager for the Estate;
- development of EMPs covering construction, operations at both the broader Estate level and for each precinct, or cluster of precincts;
- the incorporation of EMP details into the contracts for construction and maintenance of the Estate to ensure attention to detail and use of best practice management techniques and appropriate technologies; and
- communication of environmental goals and policies via formal channels such as leases and by-laws.

2.1 Environmental Objectives for Construction

This CEMP provides an environmental manual for use by the management and operational staff involved in the construction stages of the development. It also forms an advisory document to regulatory agencies and stakeholders. The principal objectives of the CEMP are to:

- ensure that all works associated with the Project are undertaken in accordance with the conditions of consent, Manly LEP 1988 and other statutory requirements;
- prevent, reduce or effectively manage the release of pollutants to the environment;
- strive for continual improvement in the environmental performance of the Project; and
- promote environmental awareness amongst employees, sub-contractors, other stakeholders and the community.

The CEMP outlines environmental management responsibilities, relevant legislation, incident management, corrective action procedures, complaint handling responsibilities, auditing

requirements, training programs, environmental monitoring requirements, as well as specific environmental management actions to be undertaken in relation to the construction works.

The CEMP will form part of the quality plans which are prepared for works on the site, and will inform the precinct specific CEMPs.

3 ENVIRONMENTAL MANAGEMENT RESPONSIBILITIES

3.1 Organisational Structure and Parties

The structure of Estate Management is set out in **Figure 3.** The relationship of this CEMP to the overarching EMS and to the supporting documentation such as precinct specific CEMPs, construction contracts and lease documentation is outlined in the figure shown in Section 1.

3.1.1 The Trustees

The Trustees are the owners of the land which forms the Estate. The land includes open space as well as a number of buildings including Moran House, Cardinal Cerretti Chapel, Kelly House, the Convent, Archbishops Palace, the buildings that comprise St Paul's School and others around the Estate. Much of the curtilage of the Estate has been long since subdivided for residential housing. Most of this land to the east and north of the main Seminary has been subdivided and sold on a long leasehold basis.

Figure 3 shows that the Trustees as owners of the Estate, delegate all day to day management to the Property Managers.

3.1.2 Development Partners

Lend Lease Development Pty Ltd a division of the Lend Lease Group, has joined with The Trustees to advise, explore options, undertake planning and feasibility works, obtain approvals and build new development precincts. Precinct 2 has already been completed using this development model, and a number of development approvals which have been granted which are yet to proceed.

3.1.3 The Property Manager

The Property Manager for construction will be responsible for ensuring the smooth development of the Estate, this includes all tasks which would normally be performed by the owner of the land. For construction activities the Property Manager is Lend Lease Development.

3.1.4 Project Managers

Lend Lease Development have retained the services of Project Managers to oversee the delivery of the developments which are approved to proceed. This role also includes compliance with all conditions of consent to the satisfaction of the various statutory authorities having jurisdiction over the works. In the context of this document, the role involves taking overall responsibility for the implementation of the CEMP and the action plan in **Section 12** of this document.

3.1.5 Environmental Manager

An Environmental Manager would be appointed to oversee all environmental aspects of the development of the Estate. The Environmental Manager would also be jointly responsible with the Project Manager for compliance with all conditions of consent and legislative requirements applicable to the Estate.

3.1.6 The Design Team

The Development Partners and the Project Managers have appointed a multi disciplinary design team comprising architects, civil & structural engineers, surveyors, environmental scientists, landscape architects, fauna experts, hydrological, acoustic, geotechnical and irrigation experts. From time to time, other consultants and advisors are retained as their skills are required.

3.1.7 Contractors

Each development varies slightly, as does the procurement methodology. The proposed development includes residential apartment buildings, single and attached dwellings and serviced building blocks. The final mix will depend on approvals in each precinct as well as market considerations.

The Estate tends to be under-serviced with public utilities; consequently the first contractor tends to be undertaking civil engineering works in readiness for the building programme.

Building contractors engaged on specific developments generally follow the civil works. These are mostly engaged by the Development Partners and are under the direct management of the Project Manager.

3.2 Responsibilities

The Property Manager is responsible for the upkeep and management of the Estate, this includes the construction of residential developments in the precincts where the necessary approvals have been granted. As such, the Property Manager and their appointed Project Managers are responsible for the appropriate environmental management of the site during the works. The Project Managers are also responsible for ensuring that any contractors employed during the works conduct their operations in accordance with the environmental management principles contained in this plan and relevant statutory requirements. The general environmental responsibilities of the key managerial roles are outlined below.

Property Manager

The Property Manager is ultimately responsible for the orderly development of the land in accordance with relevant consents and environmental legislation. In relation to this CEMP they will:

- approve the CEMP;
- ensure implementation of the CEMP by the Project Manager;
- cause the CEMP to be reviewed and amended, if required; and
- conduct audits of the Project Manager's activities every three months during the construction of any individual precinct or phase of works.

Project Manager

The Project Manager is responsible for the actual development of the Estate from design to completion. They will engage contractors as required, monitor their performance to ensure environmental objectives and targets are met and be responsible for the sale of the developed properties. With regard to the CEMP they will:

- ensure implementation of the CEMP at site level and on a precinct by precinct basis;

- maintain all necessary registers, databases, and records as required in the CEMP;
- complete non-conformance and corrective action reports and follow up corrective actions as required;
- ensure monitoring is conducted as required in the CEMP; and
- ensure a smooth transition from construction to occupation phases.

The Project Manager also has a proactive role in day to day site activities, effectively working as a site supervisor. In this capacity the Project Manager will:

- ensure preparation and implementation of the PEMP in day-to-day site operations;
- prepare environmental control plans (ECP) as required. These can be location specific (eg sediment and erosion control plans) or they can be issue specific, such as the bandicoot protocol. The Project Manager can also request contractors prepare specific ECP's where these are deemed necessary;
- obtain all statutory licences and approvals prior to the commencement of works. This requirement can be delegated to the successful tenderer depending on how the tenders are let;
- complete incident reports and complaint reports and follow up as required;
- be the first point of contact for either the community or regulatory authorities who may have queries in relation to the Estate development;
- ensure adequate training of all employees and contractors during site induction;
- initiate non-conformance and corrective action reports and manage corrective measures as required; and
- conduct regular site inspections.

Environmental Manager

The Environmental Manager is responsible for the implementation and maintenance of this CEMP (including supporting EMPs), and for reporting on the environmental performance of the Estate. In addition to those tasks listed in this estate-wide CEMP (and supporting EMPs) the Environmental Manager is responsible for:

- the continuing applicability of objectives and targets to the operation of the Estate;
- the conduct of internal audits and other checking mechanisms;
- organisation of external audits under the direction of the Property Manager;
- organisation and facilitation of the management review process;
- administration of this CEMP on behalf of the Property Manager; and
- the formulation of a strategy to communicate environmental monitoring results and achievements to all stakeholders, during construction and operational phases of development. The Environmental Manager will also carry out this strategy once approved by the Property Manager.

Contractors

- implementation of all relevant aspects of the CEMP;
- complete all works in a manner mindful of potential environmental impacts;
- preparation of ECP's as directed by the Project Manager;

- reporting all non-conformance and/or complaints to the Project Manager; and
- undertake corrective action in response to requests made by the Project Manager regarding specific environmental safeguards.

4 STATUTORY REQUIREMENTS

4.1 Manly Council Environmental Planning Instruments

The principal environmental planning instrument (EPI) for St Patrick's Estate is the Manly Local Environmental Plan 1988 (Amendment No. 24, Gazetted 8 of November 2002). The primary objectives of the LEP are to:

- protect the significant heritage values of the St Patrick's Estate College;
- reinforce the significance of the Estate and its role as a buffer area between the National Park and the adjacent urban areas;
- maintain the heritage and visual significance of the land and existing buildings;
- maintain the natural and cultural landscape qualities of the Estate;
- preserve the existing native fauna on the Estate by prohibiting the keeping of cats and dogs;
- provide reasonable public access, and including pedestrian connection from Spring Cove to Shelley Beach via the Estate lands;
- extend the opportunities for public access between areas of foreshore open space;
- protect the water quality of Spring Cove and Cabbage Tree Bay and sustain the existing natural drainage system;
- permit uses within the heritage buildings which are compatible with their historic significance;
- allow for extensions and additions to the principal buildings that are items of environmental heritage, i.e. Moran House and the Archbishop's residence;
- allow for development within the "buildable areas" identified in the Concept Development Plan, and development of a minor or temporary nature in the grounds of Moran House; and
- ensure development in the residential zone integrates with the established landscape and has minimal impact, visual or otherwise, on the heritage significance of the Estate and its flora and fauna.

Manly Council administers a suite of development control plans (DCPs) that apply to the site and provide guidelines for development controls and essential services. These DCP's include the following:

- Manly Development Control Plan for the Residential Zone 2001;
- Manly Development Control Plan for Energy Efficient Buildings 1998;
- Manly Development Control Plan for Access 1996; and
- Manly Development Control Plan for Waste Minimisation and Management 2000.

The Conservation Management Plan (CMP) was endorsed by the NSW Heritage Office on 2 April 2003. The CMP is supplemented by additional controls in the form of Amendment 24 to Manly LEP 1998 (gazetted 8 November 2002).

4.2 Other Environmental Planning Instruments

A range of state and regional environmental planning instruments also apply to the Estate. They include:

- *State Environmental Planning Policy No. 19 – Bushland in Urban Areas* aims to protect and preserve bushland within urban areas and maintain their value to the community, their aesthetic value and their value as a recreational, educational and scientific resource.
- *State Environmental Planning Policy No. 56 – Sydney Harbour Foreshores and Tributaries* aims to coordinate the planning and development of land comprising the foreshores of Sydney Harbour and its tributaries.
- *State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55)* is a state-wide planning control for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The policy makes remediation permissible across the State, defines when consent is required, requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires councils to be notified of all remediation proposals;
- *State Environmental Planning Policy No. 65 – Design Quality of Residential Flat Development* – aims to raise the design quality of residential flat development throughout the state through the application of a series of design principles.
- *State Environmental Planning Policy No. 71 – Coastal Protection* – aims to ensure that development in the NSW coastal zone is appropriate and suitably located, to ensure a consistent and strategic approach to coastal planning and management and to also ensure a clear assessment framework for the coastal zone.
- *State Environmental Planning Policy – Building Sustainability Index: BASIX 2004* operates in conjunction with Environmental Planning and Assessment Amendment (Building Sustainability Index: BASIX) Regulation 2004 to ensure the effective introduction of BASIX in NSW. The SEPP ensures consistency in the implementation of BASIX throughout the State by overriding competing provisions in other environmental planning instruments and development control plans, and specifying that SEPP 1 does not apply in relation to any development standard arising under BASIX. The draft SEPP was exhibited together with draft Environmental Planning and Assessment Amendment (Building Sustainability Index: BASIX) Regulation 2004.
- *Sydney Regional Environmental Plan No. 23 Sydney and Middle Harbours (SREP)* aims to establish a framework which encourages a consistent and coordinated approach to the planning, development and management of the waterway, islands and foreshores of Sydney and Middle Harbours. It also aims to preserve and enhance, where possible, the natural, scenic, environmental, cultural and heritage values of the land to which the plan applies.
- *Development Control Plan for SREP 23 – Sydney and Middle Harbours* regulates development in the subject area in order to protect ecological communities and scenic qualities, provide siting and design principles for new structural developments and identify potential foreshore access locations in the area.

4.3 Development Consent Conditions

Conditions of development consent are issued by the consent authority pursuant to provisions contained within the *Environmental Planning and Assessment Act 1979* and the *Environmental*

Planning and Assessment Regulation 2000. This CEMP incorporates the conditions of consent issued for the Estate to date. It has been assumed that future consents would be similar to those already issued.

Any future development applications for the Estate would be in accordance with this CEMP, and conditions of consent would be recognised in the relevant Precinct EMP.

4.4 Key Statutory Documents

All statutes relevant to environmental management at the site shall be complied with including but not limited to the statutes listed in the following table. The table lists relevant legislation and policies, the authority(s) responsible for implementation, and the main environmental issues relating to each statute. It should be noted that the environmental issues associated with each statute are indicative only and may not be limited to those checked in the table below.

		Environmental Issues				
Legislation or Policy	**Authority**	**Ecosystem**	**Community**	**Resource & Services**	**Pollution/ Contam. Control**	**Waste Mgt**
Legislation						
Australian Heritage Council Act 2003 (Cth)	Australian Heritage Council			✓		
Catchment Management Authorities Act 2003	DNR	✓				
Contaminated Land Management Act, 1997	DEC		✓		✓	
Environmental Planning and Assessment Act 1979	DP, Local Govt	✓	✓	✓		
Environmentally Hazardous Chemicals Act 1985	DEC				✓	✓
Heritage Act 1977	Heritage Council		✓			
Land and Environment Court Act 1979	NSW Land and Environment Court		✓			
Local Government Act 1993	Manly Council			✓		
National Parks and Wildlife Act 1974	DEC	✓				
Native Vegetation Conservation Act, 1997 Native Vegetation Act 2003	DEC/ DNR	✓				
Occupational Health and Safety Act 2000 & Occupational Health and Safety Amendment (Dangerous Goods) Act 2003	Work Cover		✓	✓	✓	

		Environmental Issues				
Legislation or Policy	**Authority**	**Ecosystem**	**Community**	**Resource & Services**	**Pollution/ Contam. Control**	**Waste Mgt**
Pesticides Act 1999	DEC				✓	
Protection of the Environment Operations Act 1997	DEC		✓		✓	✓
Rivers and Foreshores Improvement Act 1948	DNR				✓	
Roads Act 1993	RTA		✓			
Soil Conservation Act 1938	DNR	✓		✓	✓	
Threatened Species Conservation Act 1995	DEC	✓				
Waste Avoidance and Resource Recovery Act 2001	DEC			✓		✓
Policy						
State Environmental Planning Policy No. 65 – Design Quality of Residential Flat Development	DP		✓			
State Environmental Planning Policy No. 56 – Sydney Harbour Foreshores and Tributaries	DP	✓			✓	
State Environmental Planning Policy No. 55 – Remediation of Land	DEC/DP		✓		✓	
State Environmental Planning Policy No. 19 – Bushland in Urban Areas	DP	✓				
State Environmental Planning Policy No. 71 – Coastal Protection	DP		✓			
State Environmental Planning Policy - Building Sustainability Index: BASIX 2004	DP		✓			✓
Sydney Regional Environmental Plan No. 23 – Sydney and Middle Harbour	DP	✓				
Development Control Plan for SREP No. 22 – Parramatta River and SREP No. 23 – Sydney and Middle Harbours	DP	✓	✓			
Manly Local Environmental Plan 1988	Manly Council	✓	✓	✓		

		Environmental Issues				
Legislation or Policy	Authority	Ecosystem	Community	Resource & Services	Pollution/ Contam. Control	Waste Mgt
Manly Local Environmental Plan 1988 (Amendment No. 24)	Manly Council	✓	✓	✓		
Manly Development Control Plan for the Residential Zone 2001	Manly Council		✓	✓		
Manly Development Control Plan for Energy Efficient Buildings 1998	Manly Council			✓	✓	
Manly Development Control Plan for Access 1996	Manly Council		✓	✓		
Manly Development Control Plan for Waste Minimisation and Management 2000	Manly Council					✓
St Patrick's Estate Conservation Plan	Property Manager	✓	✓			

Note: All Acts are assumed to be Acts of the NSW Parliament, unless otherwise noted.

4.5 Approvals, Licences, Permits

The following environmental approvals, licences or permits are also associated with the works and must be obtained.

- In the event of an Aboriginal artefact or site being discovered during the works, work in the area shall cease, and DEC and Council shall be notified. In this situation, a qualified archaeologist shall be engaged to survey any sites or artefacts and the relevant Aboriginal community representatives shall be contacted. Under the *National Parks and Wildlife Act, 1974,* a permit is required from the DEC for consent to disturb or destroy any Aboriginal artefact or site;
- In the event of any relic (artefact or site over 50 years of age) being discovered during works, work in the area shall cease, and NSW Heritage Office and Council shall be notified. In this situation, a qualified archaeologist shall be engaged to survey any sites or artefacts. Pending advice from Council and the Heritage Office, an excavation permit, under the *Heritage Act, 1977* to allow the destruction or removal of the relic is likely to be required;
- Under the Occupational Health and Safety Amendment (Dangerous Goods) Act 2003, depending on the quantities involved, storage of flammable liquids would require approvals and licences from WorkCover. An application would need to be made to WorkCover for a Licence to Keep Dangerous Goods. A licence is not required for storage of under 50,000 litres of distillate but it must be stored in compliance with AS 1940 - the SAA Flammable and Combustible Liquids Code and meet EPA requirements for bunding. If more then 50,000 litres of distillate is to be stored then a Licence to Keep Dangerous Goods is required from WorkCover. Similarly if more than 100 litres of petroleum is to be stored then a Licence to Keep Dangerous Goods is required from WorkCover and EPA requirements for bunding must be met;

- Construction Certificates are required before carrying out building work or subdivision work pursuant to section 109C(1)(c) of the *Environmental Planning and Assessment Act 1979*;
- Fire Safety Certificate; and
- Occupation Certificates are required before a building which has been completed can be legally occupied (*Environmental Planning and Assessment Act 1979* s 109C(1)(c)).

5 KEY ENVIRONMENTAL RISKS

An environmental risk assessment has been conducted and is included within Appendix A.
The key environmental and social risks, of which all on-site personnel and delivery service providers must be aware of, are:

- the potential for off-site sedimentation impacts, including potential impacts on the protected marine habitat, adjacent residents and public services should stormwater runoff and erosion controls not be fully and appropriately implemented;
- pollution of surrounding soils, groundwater and the marine environment by hazardous material spill;
- loss of topsoil and sediments due to unrestricted wind and water erosion of unconsolidated areas;
- impact to existing Bandicoot population due to disturbance of foraging and/or shelter habitat;
- impact on native vegetation, including any rare or endangered species and other natural habitat as a direct/indirect result of construction activities;
- air quality impacts including dust and noise associated with construction activities;
- damage and/or disturbance to any identified/discovered heritage structures and/or vegetation;
- damage and/or disturbance to Aboriginal artefacts and sites; and
- management of any site surface or storm waters.

The key social risks include:

- noise and vibration effects upon nearby residences; and
- disruption to local traffic flows along designated construction access corridors.

6 KEY ENVIRONMENTAL OBJECTIVES AND TARGETS

The construction of residential development on the Estate entails construction activity in a location that may be subject to potential risk of degradation of existing water quality should appropriate environmental controls not be implemented. The site is effectively comprised of two catchments that drain directly into marine environments. The topography and geomorphology of the site may tend to facilitate the ease with which surface runoff and groundwater enter receiving environments. As a consequence, a policy of 'minimum-impact' will be established and implemented to regulate construction activities on the Estate. To achieve this policy, a series of objectives and targets (displayed in **Table 5.1**) have been established to guide the execution of all works on the Estate, and provide all personnel working on the Estate with tangible goals.

Achieving minimal impact: environmental issues and relevant goals.

Environmental Aspects	Objective	Key Performance Indicator	Target	Accountability
Erosion and Sediment Control	Minimise erosion and sediment loss from site.	Levels of TSS and turbidity in receiving waters and evidence of soil erosion. In storms up to the 5 year ARI event discharged stormwater must contain less than 50mg/L of suspended solids	No deposition of sediments outside construction site and no uncontrolled discharges from the site.	Project Manager, all contractors.
Waste Minimisation and Management	Minimise waste, maximise reuse and recycling and dispose of all wastes appropriately.	Volume of solid, liquid and hazardous wastes disposed of to landfill. Spill incidents.	Maximise recycling of construction materials. Optimum separation of waste into relevant containers.	Project Manager, all contractors, waste removal service provider.
Hazardous Materials (Hazmat)	Contain all Hazmat and ensure complete storage integrity to avoid any spills.	Number of spill incidents.	Zero spill incidents	Project Manager, all contractors, Hazmat waste removal service provider.
Noise and Vibration	To ensure minimum noise emissions and to comply with DEC guidelines.	Number of complaints and compliance with project-specific noise goal levels	Continual adherence to DEC noise goals listed in **Appendix C** and minimal noise complaints registered to Community Liaison Officer and DEC.	Project Manager, all Contractors and delivery vehicles.
Air Quality and Dust Control	Minimise local impacts related to exhaust emissions and dust generation.	Number of related incidents and registered complaints.	Minimal odours, exhaust emissions, dust or any other airborne particles to leave the site. No complaints.	Project Manager, all contractors, delivery vehicle contractors.

Environmental Aspects Cont.	Objective	Key Performance Indicator	Target	Accountability
Construction Traffic and Access	Minimise impact upon local traffic access.	Volume of daily traffic to site and number of vehicle-related incidents.	No significant impact upon local traffic access, parking, and no traffic-related incidents or complaints.	Project Manager, all contractors, all delivery vehicles.
Ecological Management	Minimise impacts on native habitats, native and protected flora and fauna species within and adjacent to the Estate.	Integrity of ecological habitats on Estate.	No discernible impact on bandicoot and penguin populations or their habitats.	Project Manager, all contractors.
Heritage and Archaeology	Minimise impact upon identified/discovered European and Aboriginal heritage items and sites.	Integrity of key heritage items on the Estate.	No damage to any known heritage artefacts or sites. No damage to newly-discovered heritage items and sites.	Project Manager, all contractors.
Landscape	Reduce the impact of the new contemporary buildings from the setting of the significant buildings on the Estate.	Landscaping that promotes the integrity of landscape aspects including settings of significant buildings on the Estate	No significant impact to natural character of the surrounding area.	Project Manager, all contractors.
Community Liaison	Enable adequate community feedback via 'good neighbour' policy.	Number of complaints to Community Liaison Officer and to DEC.	Initial response to complaints within 24 hours.	Environmental Manager, Project Manager.

7 MONITORING AND INSPECTIONS

7.1 Site Inspections

The Project Manager or delegated representatives shall carry out ***regular site inspections*** on precincts which are affected by construction activities to ensure that the CEMP and all Work Method Statements are followed and responsibilities are met. These inspections must take place, but findings need not be formally recorded unless a non-conformance is identified (see **Section 7.3**).

Detailed inspections of the site shall be undertaken by the Project Manager or a suitably qualified delegate on a ***weekly*** basis during construction. The Site Inspection Report as shown in **Schedule B.1** shall be completed for each work area. Copies of these reports will be forwarded to Council if requested. During periods of rainfall greater than 10 mm per day, all work areas will be visited and the erosion control facilities inspected.

An independent environmental consultant (the Consultant) will conduct inspections during earthworks and observations will be fully documented in a site evaluation report. This is particularly to be undertaken in relation to potential impacts on aboriginal heritage. The Consultant must be informed of earthworks and construction progress so that site visits can be undertaken when deemed appropriate by the Consultant.

7.2 Reporting

Weekly reporting is to be initiated and implemented by the Project Manager to provide a means of measuring any adverse impacts that construction activity may have upon the natural environment. Any Non-Conformance Reports are to be incorporated into this reporting system. Refer to ISO 14001:2004.

The Consultant is to prepare a Site Auditor Report for aboriginal heritage matters and a Site Audit Statement, following initial earthworks and following receipt of a suitable site validation report from the environmental consultant.

7.3 Non-Conformance and Corrective Action Reports

Non-conformances noted in the Site Inspection Reports or reported to the Project Manager are to be recorded in a Non-Conformance and Corrective Action Report. A copy of the Non-Conformance Report is provided in **Schedule B.2**. Details of the non-conformance, including any immediate corrective actions undertaken, are to be recorded by the Project Manager. The Project Manager may also initiate a Non-Conformance and Corrective Action Report.

It is the responsibility of the Project Manager to immediately initiate corrective actions, if required. The Non-Conformance and Corrective Action Report must include details of the corrective action proposed and an appropriate close out date. The report should be signed, dated and filed.

7.4 Incident Management Reports

Any incidents on site that are likely to cause pollution shall be reported immediately to the Project Manager. The Project Manager will meet with the notifying party as soon as practicable following an incident in order to commence investigations and make recommendations. Any spills or accidents, and the corrective actions undertaken, shall be documented in a Non-Conformance and Corrective Action Report (**Schedule B.2**).

Note: Any incident that has the potential to generate off-site environmental impacts shall be reported to the Project Manager who shall then report the incident and mitigation measures to DEC immediately on ph: 131 555.

7.5 Complaint Reporting

All complaints regarding pollution and environmental issues caused by the development works shall be referred to the Project Manager immediately. In the absence of the Project Manager, the Project Manager's office is to be notified. Details of the complaint are to be documented in the site's Complaints Register (sample register included in **Schedule B.3**). The Project Manager shall respond to any complaints within 24 hours and provide (at least) an interim solution to the potential environmental issue. If it is impractical to generate a solution within 24 hours, then a second response, including a reasonable solution, is to be developed and communicated to the complainant as soon as possible. This follow-up contact should also be recorded in the complaints register.

If a complaint identifies a non-conformance, a Non-Conformance and Corrective Action Report is to be initiated (**Schedule B.3**). These are to be stored in a central register and referred to when recurring environmental issues are first identified in order to generate solutions in the minimum amount of time.

8 CEMP AUDITING

A suitably qualified environmental specialist shall conduct audits on the implementation of the CEMP in addition to more regular audits of precinct CEMPs. An initial audit will be conducted within 4 weeks of commencement of on-site activities and every 3 months thereafter during construction of the Estate. An CEMP audit shall be conducted at completion of construction.

Audits of the precinct CEMPs shall involve a review of all environmental documents, records, monitoring results, and ECPs to ensure compliance with the requirements of the CEMP. The audits shall also identify whether or not Non-Conformance and Corrective Action Reports have been accurately and effectively implemented. If any deficiency is detected, the Project Manager shall initiate a Non-Conformance Report and initiate the appropriate corrective action. Key environmental and procedural issues to be covered by the audit shall include, but may not be limited to:

- the environmental aspect strategies and implementation plans presented in **Section 11**;
- emergency response and spill contingency procedures;
- general site issues;
- adherence to reporting procedures;
- complaint management;
- consents, licences and leases; and
- environmental training.

Performance Indicators, identified within each Strategy table in **Section 11** of this CEMP, are to be reported on, where practicable, in the audit reporting documents to be compiled every 3 months.

Records can be made available to Council, where required to allow Council to review the results of the audits and assess compliance with relevant condition of consent.

9 ENVIRONMENTAL TRAINING

The Project Manager, in consultation with the Environmental Manager for the Estate, shall be responsible for ensuring that all employees and contractors working on-site have received environmental training in relation to this CEMP as part of the Estate induction process. Records of all persons to have undergone environmental training are to be held by the Project Manager (see sample training register, **Schedule B.4**).

Training shall be structured to ensure all workers understand their obligation to exercise due diligence in relation to environmental matters. Issues to be covered include but may not be limited to:

- relevant environmental legislation;
- erosion and sediment control;
- dangerous goods and chemicals / hazardous materials;
- reporting procedures;
- complaint management;
- general site issues;
- traffic and access;
- noise and vibration;
- air quality and dust control;
- vegetation management;
- bandicoot identification and habitat;
- waste management;
- emergency response and spill contingency; and
- heritage and archaeology.

10 RECORDS

The Project Manager shall ensure that records of all documentation are maintained arising from implementation of the EMP and environmental management. Records will include:

- approvals, licences and permits;
- monitoring results;
- site inspection reports;
- audit results;
- Non-Conformance and Corrective Action Reports;
- training register;
- complaints register;
- MSDS register;
- chemicals database;
- waste register;
- environmental correspondence; and
- miscellaneous items.

All records shall be maintained in a legible state and stored by the Project Manager. Records shall be made available to authorised Council officers upon submission of a formal request.

11 EMERGENCY RESPONSE CONTACT NUMBERS

In the event of any incident, the first priority shall be the safety of all personnel and the community in the immediate vicinity. Following this, further environmental impact shall be prevented/minimised by stabilising the situation and following the appropriate incident management procedures. Relevant staff shall then be contacted and emergency procedures enacted.

Emergency procedures and contact telephone numbers shall be displayed in a prominent position within each site working area.

Emergency Response Contacts for St Patrick's Estate

Position	Name	Phone	Mobile
Project Manager (Precincts 1, 13, 5, 6 & 10)	Lachlan Project Management	TBA	TBA
Project Manager (Precincts 3 & 12)			
Environmental Manager	TBA		
Manly Council			
Department of Environment and Conservation	Pollution Line	131 555	-
Emergency Services	Fire Brigade Police Ambulance	000 000 000	-

12 ENVIRONMENTAL MANAGEMENT ACTIVITIES

The following sections set out the environmental management activities and mitigation measures, which shall be undertaken or complied with during the construction of a residential precinct.

It is essential that prior to the commencement of works, the Project Manager ensures that the personnel responsible for implementing the CEMP are aware of their designated tasks.

For clarity, the environmental aspects have been presented separately. Each aspect has been divided into two sections: a Strategy and an Implementation Plan. The Strategy section details the overall strategies used to achieve the objectives stated in the tables and to provide strategic guidance on training, monitoring and reporting requirements. The associated Implementation Plan for each environmental aspect provides detailed information about the tasks required to achieve the listed strategies. The Implementation Plan is designed to be altered at any time and modified to suit changing priorities and requirements as circumstances dictate.

12.1 Erosion and Sediment Control - Strategy

Key Environmental Objectives:

- Minimise the potential for erosion (across the Estate) and the consequent deposition of sediment into receiving waters.
- Minimise disturbance to the hydrologic regime of the surrounding landscape and maximise opportunities for stormwater recycling on the Estate.
- Protect groundwater from contamination which could result from construction activities.

Description:

Construction activity on the Estate involves disturbing soils so that landscaping, building foundations and vegetation management activities can be conducted. The potential exists for unconsolidated soils to be eroded by water and wind action.

Strategies:

- All construction activities, including subdivision, are to be conducted in accordance with the Soil and Water Management Plan for the Estate.
- Develop a comprehensive soil and water management plan for works to be undertaken in each precinct. This will form part of the PEMP.
- A suitably qualified consultant will be appointed to oversee the installation of the soil and water management works on each precinct.
- Only areas directly required for construction will be disturbed. They will be minimised in size, clearly marked and no activity will be permitted outside these areas.
- Clean runoff will be diverted around disturbed areas to minimise the volume of water requiring treatment.
- For storms less than the design capacity of the sediment basin, all site waters during subdivision, construction and landscaping shall be contained on site, and released only when suspended solids are less than 50 mg/L in order to avoid pollutants entering the Harbour or Council's stormwater drainage system.
- Sediment/ erosion control plans are to be submitted to the Project Manager for approval (with a copy also provided to the Environmental Manager) and are to be implemented prior to commencement of any works.
- Sediment control mechanisms shall be monitored and remain in place until affected surfaces have reverted to pre-existing levels or construction is completed.
- Drains, gutters, roadways and access ways are to be maintained free of sediment.
- Where foundations of buildings are cut into sandstone, roof runoff will be directed onto the area immediately downslope.
- Construction of seepage collars within the backfill of service trenches to allow for groundwater drainage.

Performance Indicators:

- All workers are trained regarding erosion and sediment control measures, and maintenance thereof.
- There is no visible evidence that sediment has left the construction site.
- Stormwater discharges from the site to have a suspended solid content of less than 50 mg/L.

Monitoring/Reporting Requirements:

- Regular visual inspection of sediment control devices and sediment load in sediment basins.
- Routine monitoring of the Bureau of Meteorology website to assess storm risk. Prior to and during storms, sediment control measures will be checked and monitored to ensure their effectiveness.
- Weekly visual inspection of sediment marker within sediment basin to ascertain when sediment removal is required.
- Frequent monitoring and recording of suspended sediment load in discharge water from sedimentation basins to ensure that the sediment load is less than 50 mg/L.
- Perilodic inspection of all designated significant trees will be undertaken by the landscape contractor during construction.
- Sediment and erosion control measures will be adjusted to suit new construction activities and will be checked by the Foreman and Site Engineer.
- The Foreman is to conduct a daily check on surrounding roadways for silt from trucks.

Training Requirements:

- Identification of potentially unstable soils.
- Correct implementation of soil erosion control measures.

Key Legislation

- Catchment Management Act 1989
- Protection of the Environment Operations Act 1997
- Rivers and Foreshores Improvement Act 1948
- Soil Conservation Act 1938

Soil and Water Management – Implementation Plan

Task #	Task	Responsibility	Monitoring	Deliverables/ Outcome	Timing
Site Preparation and Cleaning					
12.1.1	All workers, contractors and consultants shall undergo a training and awareness program as detailed in the Conditions of Consent.	Project Manager	Training register completed	All employees inducted	Prior to works commencing
12.1.2	Barrier fencing will be erected to demarcate the limits of the construction area in accordance with the detailed Soil and Water Management Plans for each construction precinct.	Contractor		Fencing to be erected	Prior to works commencing
12.1.3	Sedimentation controls are to be installed as depicted in the Soil and Water Management Plan inspected frequently, and cleaned out to maximise their effectiveness.	Contractor	Sedimentation controls installed and working	Correct application of all relevant guidelines.	Installation prior to works commencing. Monitoring frequently
12.1.4	The erosion and sedimentation control measures shall be incorporated into all activities prior to initial disturbance and must remain in place until inspection and approval by the Project Manager and the erosion hazard reverts to its pre-existing level.	Contractor	-	Adherence to guidelines.	For the duration of the works
12.1.5	No site works shall commence prior to inspection and approval of sediment control installations by Council/ Accredited Certifier and the supervising consultant.	Project Manager	-	Sign off on PEMP	Prior to works commencing
12.1.6	Install measures to ensure the protection of the public stormwater system	Contractor	Measures outlined in Soil and Water Management Plan installed	No pollution to public stormwater system	Prior to commencement of works
12.1.7	The sediment and erosion control plan shall be submitted to Council/Accredited Certifier	Project Manager	-	Sign off on Construction Certificate	Prior to the issuing of Construction certificate

Task #	Task	Responsibility	Monitoring	Deliverables/ Outcome	Timing
Sediment Control					
12.1.8	Silt fences shall be constructed on the downslope side of each site and across all potential runoff sites (as depicted in the Soil and Water Management Plan).	Contractor	Monitor for sedimentation downstream of silt fences.	Silt fences installed	Prior to construction
12.1.9	Temporary construction site entry/exit constructed and runoff diverted to suitable control systems to prevent tracking loose material onto adjoining public place (as depicted in Soil and Water Management Plan).	Project Manager/ contractors	Monitor for effective runoff results.	Temporary construction site entry/exit constructed	Prior to construction
12.1.10	Construct measures to divert upstream flows around existing stormwater system (as depicted in Soil and Water Management Plan).	Contractor	Monitor for effects of diversion at downstream locations.	Appropriate measures to effect diversion.	Prior to construction
12.1.11	Construct a geotextile filter pit surround around all sediment basins (as depicted in the Stormwater Management Plan).	Contractor	Inspect for appropriateness.	Geotextile filter pit evident	As pits are constructed
12.1.12	All stockpiles shall be protected from scour and erosion. Loose material should not be stockpiled near roadways, drainage pits or watercourses (as described in the Soil and Water Management Plan).	Contractor	-	Cover loose stockpiles with appropriate weather-proof measures.	At all times
12.1.13	Stockpiles scheduled to remain unattended for more than 2 weeks will be covered with a geotextile fabric or seeded with a temporary vegetation core.	Contractor	-	Unattended stockpiles covered to prevent sediment moved	As appropriate
12.1.14	Erosion and sediment control devices to be cleaned out following storm events and inspected/cleaned of sediment and floating rubbish at frequent and regular intervals.	Contractor	-	Monitor to check action is completed.	Following storm events.
12.1.15	Any retaining walls required due to excavation or filling adjacent to site boundaries or drainage lines shall be constructed to the requirements of Council prior to such work commencing.	Project Manager	-	Record of Council approval on file	As appropriate

Task #	Task	Responsibility	Monitoring	Deliverables/ Outcome	Timing
12.1.16	A copy of the Soil and Water Management Plan shall be kept on-site at all times and made available to Council officers on request	Project Manager/Contractor	-	Plan available on site	Prior to the commencement of works, and for the duration of works
Runoff					
12.1.17	Following a significant rainfall event (ie, 10mm or greater of rain), stormwater discharge from the detention ponds shall be tested to ensure a suspended solids content of less than 50mg/L. Should an exceedance of these guidelines occur, the Project Manager should immediately initiate a non-conformance form, and investigate and rectify the sediment source(s) as soon as possible.	Project Manager/Contractor	Undertake regular testing during extended rainfall periods.	Compilation of results for reporting (Results in tabular format).	As required, during rainfall events.
12.1.18	If a precinct contains dispersible soils (as defined in *Managing Urban Stormwater – Soils and Construction)*, then provision shall be made to add gypsum at the rate of 32kg/100m^3 of basin capacity within 24 hours of the end of a storm event, as prescribed by that manual.	Project Manager/Contractor	Gypsum added in accordance with *Managing Urban Stormwater – Soils and Construction*	Dispersible soils flocculated in the sediment basin	As required, within 24 hours of the end of a storm event
12.1.19	For discharge from a sediment basin, the inlet of the pump suction hose will be equipped with a float to ensure that only clean water from the top of the basin is discharged.	Contractor	-	Only clean water pumped out of basin	At all times
12.1.20	Roofwater, surface and storm water from paved areas within the development shall be collected and disposed of using the sediment and stormwater control measures to the satisfaction of Council.	Project Manager		Stormwater control plan accepted by Council's Group Manager	Prior to commencing work
12.1.21	There shall be no alterations to any detention systems i.e. to surface levels, grates, pipes, curbs or any other structure related to theses systems without the prior consent in writing from Council.	Project Manager	Inspections undertaken by Land Use Planning	No unauthorised alterations discovered during inspections	At all times

Task #	Task	Responsibility	Monitoring	Deliverables/ Outcome	Timing
12.1.22	Construct turf-lined swales (as depicted in Soil and Water Management Plan).	Contractor	Monitor effectiveness.	Turf-lined swales constructed	Prior to construction
12.1.23	Install sandbag sediment traps upstream of existing pits (as depicted in Stormwater Management Plan).	Contractor	Monitor for siltation and sedimentation at downstream locations.	Effective sediment traps.	Prior to construction
12.1.24	Install sandbag kerb inlet sediment traps around sediment basins (as depicted in the Stormwater Management Plan).	Contractor	Inspect for integrity and effectiveness.	Effective sediment traps installed	On completion of pavement
12.1.25	Stormwater pipes and pits should be well maintained and kept clear of debris and sediment.	Contractor	Monitor for potential blockages.	Free-flowing pipes capable of discharging maximum flows.	Frequently, and after heavy rainfall events
Sediment basins					
12.1.26	Construct sedimentation traps/basin including outlet control and overflow as depicted in Soil and Water Management Plan. The basins will be sized on the basis that subsoil materials are Class F and that the basins meet the requirements set out in the *NSW Department of Housing document Managing Urban stormwater – Soil and Construction (1998).*	Contractor	Monitor for sediment build-up and litter collection	Effective traps that are easily cleaned. .	Prior to construction
12.1.27	Within 24 of a significant rainfall event (ie, 10mm or greater of rain), inspect the detention basins and stormwater treatment devices and remove any build-up of debris.	Project Manager/Contractor	Detention basins and stormwater treatment devices	Basins clear of storm debris	As required by storm events
12.1.28	A marker will be placed inside each basin indicating the level to which water must be drawn down after a storm. This 'dry weather' marker also indicates the maximum level of sediment that can be retained. Drawdown should occur within 5 days of storm event.	Contractor	Marker checked frequently.	Draw down within 5 days of storm.	Frequently
Groundwater					
12.1.29	A periodic inspection of all designated significant trees within the construction precinct will be undertaken by the landscape	Project Manager/ Landscape	Periodic	Healthy trees on site	During construction

Task #	Task	Responsibility	Monitoring	Deliverables/ Outcome	Timing
	consultant, and the results reported to the Project Manager. Where any tree shows signs of distress, the local groundwater conditions will be investigated.	Consultant			
Rehabilitation					
12.1.30	Construction works are to be staged to allow progressive rehabilitation within each precinct. Grasses, mulches and mats selected for rapid revegetation will be used at strategic locations such as long batters.	Project Manager/Contractor	-	Successful staging of works to allow progressive rehabilitation.	During construction
12.1.31	Stabilisation works & landscaping/ revegetation of batters, open drains and other areas susceptible to scouring shall be given high priority to ensure that bare ground is rehabilitated, if required, once construction work for that area is complete.	Project Manager/Contractor	Inspection for bare ground and unstable areas	Appropriate stabilisation works conducted immediately, where possible.	As required
12.1.32	The period between completion of construction and commencement of permanent rehabilitation shall be less than 10 working days.	Project Manager/Contractor	-	Programs ensure no surfaces are left longer than 10 working days	When appropriate

12.2 Waste Management and Minimisation - Strategy

Key Environmental Objectives:

- Responsible disposal of all wastes generated on the Estate.
- Reuse and recycle liquid and solid wastes where possible.

Description:
Waste materials generated on site are to be managed such that recycling is maximised and the volume of waste transported to landfill is minimised.

Strategies:

- Develop a Waste Management Plan in accordance with Council's Development Control Plan for Waste Minimisation and Management.
- Ensure correct requirements for Trade Waste Disposal are being met by undertaking discussions with the Trade Waste Office of Sydney Water.
- Segregation, storage, labelling and disposal of various waste types derived from construction activities. Maximise recycling where possible.
- Destination of excavated materials to be approved before commencement of works.
- Contain on-site construction-related effluent and dispose of appropriately.

Performance Indicators:

- Imported fill must consist of certified clean materials.
- All waste contractors and receiving waste facilities must be appropriately licensed.
- Volumes of recycling are maximised in order to minimise landfill.

Monitoring/Reporting Requirements:

- Monitoring of solid and liquid waste movements and containment measures.
- Copies of all relevant waste dockets/receipts maintained.
- Report all spill incidents to relevant authorities.

Training Requirements:

- Educate all contractors of waste management system.

Key Legislation:

- Protection of the Environment Operations Act 1997
- Waste Avoidance and Resource Recovery Act 2001

Waste Management and Minimisation – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
Waste Disposal					
12.2.1	Details of the proposed disposal location of any excavated material from the development site shall be provided to Council 48 hours prior to construction works commencing.	Project Manager	-	Pre-arranged list of waste destinations.	Prior to construction.
12.2.2	Waste disposal and recycling shall be included in the induction training for new employees/contractors to site	Project Manager	Training register completed	Promotion of principles in environmental training.	Prior to commencement of site works
12.2.3	Construction contractors shall adopt practices which maximise recycling principles and minimise waste generation. Waste streams must be separated on site.	Contractor	Regularly inspect recycling bins to ensure no contamination of streams	Provision of recycling facilities and designated locations for separate waste streams.	At all times.
12.2.4	Only licensed waste contractors to dispose of construction waste from site.	Contractor	-	Waste contractor details	At all times.
12.2.5	Monthly reporting of waste removed (number of skips/truckloads).	Contractor	Monitor waste movements frequently	Tabular report of waste movements.	Monthly.
Recycling and Waste Minimisation					
12.2.6	Excavated topsoil and other suitable fill material are to be reused on site where possible. Note ripped sandstone is not to be used as a filling material on precincts 5 and 10, irrespective of its origin.	Contractor	Monitor for compatibility with 'receiving' environment.	Ensure no ripped sandstone is utilised on Precincts 5 and 10.	When required. At all times
12.2.7	Any fill imported onto the Estate is to consist of certified clean material only.	Contractor	-	Certificate	At all times
12.2.8	Where appropriate, existing materials on site will be reused or recycled, including: • green waste will be shredded and used for mulch on landscaping;	Contractor	Monitor waste pathways to ensure correct application of reuse/recycling.	Waste minimised and re-used	When required.

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
	• uncontaminated sediment from the sediment basins and silt fences/silt traps will be reused for landscaping where possible.				
12.2.9	All concrete/concrete washout waste is to be collected and disposed of appropriately off-site, where on-site reuse is not practicable.	Contractor	-	No spilled pours left on estate	At all times
Hazardous or Industrial Waste					
12.2.10	Hazardous or industrial waste (eg asbestos sheeting) must be stored in an environmentally safe manner and must be effectively separated from other waste streams.	Contractor	Inspect waste streams regularly to ensure no cross contamination	No cross-contamination	At all times
12.2.11	Records will be retained for at least three years from the date of transportation, on any hazardous or industrial waste that is transported for treatment or disposal, including: • the amount and type of hazardous waste that is transported; • the name of the transporter and that transporter's licence number; • the date of transportation; and • the name and location of the waste facility that receives the waste.	Project Manager/Contractor	-	Records of waste handling and transportation	Generated as appropriate stored for 3 years
12.2.12	Hazardous or industrial waste can only be transported by a licensed contractor who must be advised of the type of waste being transported;	Project Manager/Contractor	-	Contractor licences verified	Prior to engaging contractor
12.2.13	Hazardous or industrial waste can only be transported to a controlled waste facility or to a waste facility that can otherwise lawfully receive that waste.	Project Manager/Contractor	-	Records of waste receipt	As appropriate
12.2.14	Pending Council approval, weeds are to be sent off-site to putrescible waste	Contractor	Check mulches for evidence of	Weed disposal procedure in place.	As appropriate.

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
			weeds.		
Domestic Waste					
12.2.15	Recycling bins shall be provided within the site working area for personal litter. These shall be serviced regularly to ensure the area remains tidy.	Contractor	Monitor each precinct for litter during works.	Series of labelled, easily-accessed bins.	At the commencement of works and for the duration of works. Servicing on an as needed basis.
12.2.16	Site amenities (Portaloos) shall be provided on-site and serviced regularly by approved collection companies.	Project Manager/Contractor	Check for integrity.	Contract with approved company	At the commencement of works and for the duration of works. Servicing on an as needed basis.

12.3 Chemicals & Dangerous Goods (Fuel) Management

Key Environmental Objectives:

- To receive store, utilise and dispose of chemicals and hazardous materials in an environmentally appropriate manner.

Description:

Hazardous materials may exist in solid, gaseous and liquid forms commonly associated with aged buildings and /or historical commercial/ on residential land uses. These materials include fuels, compressed gasses, solvents, paints, asbestos, PCB's and other construction-related substances. The site is surrounded by sensitive receivers, hence any escape of these chemicals is likely to have serious environmental consequences. Appropriate management measures must be instituted to prevent environmental incidents.

Strategies:

- Transport onto and transfer within the Estate to be in accordance with best practice procedures.
- Inventory of the types of hazardous materials used to be recorded in a central register including relevant MSDS.
- Ensure containment measures are installed adequate to prevent contamination and spill kits are maintained on site and ready for use.
- Storage facilities, plant and equipment checks to be conducted to ensure no leaks.
- Hazardous Materials Surveys of any buildings or associated structures to be demolished, refurbished or removed.
- All waste materials to be disposed of appropriately.

Performance Indicators:

- No spill incidents with the potential to cause environmental degradation.
- Nil specification of hazardous materials to be used in construction.

Monitoring/Reporting Requirements:

- Daily visual assessment of hazmat storage facilities.
- Recording of any hazmat movements.

Training Requirements:

- Educate contractors of hazardous material handling procedures and spill contingency procedures.

Key Legislation:

- *Protection of the Environment Operations Act 1997*
- *Occupational Health and Safety Amendment (Dangerous Goods) Act 2003*
- *Environmentally Hazardous Chemicals Act 1985*

Chemicals & Dangerous Goods (Fuel) Management – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.3.1	Storage and handling procedures shall be made available to all employees and covered during induction training.	Project Manager/Contractor	Training register completed	Individual copies of procedural instructions.	During induction
12.3.2	If no hazardous materials are identified, demolition may proceed in accordance with the Conditions of Consent.	Project Manager	Inspect for hazardous materials	Results of survey	Prior to works commencing
12.3.3	Identification of any hazardous materials in structures shall result in a Work Plan being submitted to Group Manager, Land Use Management (Manly Council) before any further work can continue. The Work Plan shall be in accordance with the Conditions of Consent.	Project Manager/Contractor	-	Submission of Work Plan to Council	Prior to works commencing
12.3.4	A Chemical Database is to be maintained on site as an inventory of all stock (fuels, oils, explosives, chemicals, etc.) in hand and supply quantities held on site.	Project Manager	Monitor against MSDS and amounts of actual chemicals held on-site.	Centrally located Chemical database.	At all times
12.3.5	A Materials Safety Data Sheet (MSDS) Register is to be maintained on site. The Register is to contain MSDS for all fuels, oils and chemicals used on site.	Project Manager/Contractor	Monitor MSDS for correct use.	MSDS centrally located.	At all times
12.3.6	Ensure any areas used for the storage of fuels, oils and other chemicals are contained in an impervious, suitably bunded area. The capacity of bunded area shall be not less than 110% of the volume of the largest fuel storage vessel within the bund. A sump shall be provided for pumping out the bund.	Contractor	Monitor bunds for leaks and structural integrity.	Appropriate bunding, either fixed or mobile.	At all times
12.3.7	The EPA is to be provided with information on the generation, storage, treatment or	Project Manager/Contra	Inspect any hazardous or	Correspondence with DEC	Prior to commencement of work

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
	disposal of hazardous or industrial waste.	ctor	industrial waste		
12.3.8	Any asbestos cement sheeting shall be removed in accordance with the requirements of the WorkCover authority and DEC.	Project Manager/Contractor	Inspect to ensure no asbestos cement sheeting on site	Waste records	As appropriate
12.3.9	Site compounds and fuel storage areas are to be located away from drainage lines or areas prone to surface water flows.	Contractor	Check for leaks.	Appropriately located storage areas.	At all times
12.3.10	All flammable materials shall be kept in a sign posted locked area within the site compound, or at least be capable of being locked to prevent theft or misuse.	Contractor	Check storage area for security and leaks.	Appropriately stored flammable materials	At all times
12.3.11	Plant and equipment checklist to be completed regularly by operators and repairs undertaken if required.	Plant Operators	Inspect to ensure that checklists are completed.	Completed checklists	Frequently and as required
12.3.12	The integrity of storage tanks, drums and bunds shall be regularly checked to ensure that leakage is not occurring and that the potential for spillage is minimised.	Contractors	Monitor for 'slow' leaks.	No leaks from storage areas and facilities	Frequently
12.3.13	Waste fuel from defuelling or other contaminated fuels should be placed into drums and tightly capped until collected, reused and/or disposed of.	Contractors	Check integrity of capping on drums.	Appropriately stored waste and contaminated fuels	As required.
12.3.14	Any incident that involves a spill of fuel or chemicals with the potential to impact the off-site environment, shall be reported immediately to the Project Manager. Within 24 hours of a significant spill, the Project Manager will prepare a report in accordance with the Emergency Management Plan.	Project Manager/Contractors	Check entry to Environmental Incidents Register	Report prepared	If necessary

12.4 Noise and Vibration - Strategy

Key Environmental Objectives:

- Manage noise and vibration on the Estate in order to minimise disruption to local fauna and to reduce amenity impacts on nearby residents, St Paul's School, Manly Hospital and Moran House.

Description:

Noise generated on the Estate during construction will be created by vehicle movements, generators, heavy machinery (e.g. excavators) and hand-held machinery and tools. Some additional vehicle noise may be generated by the thoroughfare of vehicles using transport corridors to and from the site.

Strategies:

- Operation of all plant, vehicles and hand-held equipment is to be in accordance with EPA Industrial Noise Policy Guidelines.
- Faulty equipment should be identified as early as possible and repaired immediately.
- Scheduling of works should be strictly in accordance with the Conditions of Consent granted for each Precinct.

Performance Indicators:

- Measure by number of noise complaints received from adjoining properties or statutory authorities.
- Operation of plant and equipment below project specific noise goal levels.
- No notices/warnings received from statutory authorities for exceeding noise levels or work outside the approved hours.

Monitoring/Reporting Requirements:

- Any noise complaints or feedback from residents to be recorded and monitored.

Training Requirements:

- Educate contractors of operating times.
- Training in use of noise monitoring equipment.

Key Legislation:

- *Protection of the Environment Operations Act 1997*
- *Construction Safety Act 1912*
- *Occupational Health and Safety Act 2000*

Noise– Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.4.1	No work shall occur outside permitted working hours (dawn to dusk within the period 7.00am to 6.00pm Monday to Friday and 7.00am to 1.00pm on Saturday only) or as specified in the relevant precinct DA conditions.	Project Manager/Contractors	-	No work outside designated hours	-
12.4.2	Residents likely to be affected by noise emissions from particular operations must be advised at least five (5) days in advance of the nature and extent of the work to be carried out. Such notice is to be conveyed by a letterbox drop or media release.	Project Manager	Copy of notification in register.	Notification achieved	As required
12.4.3	All vehicles, construction plant and equipment used on site will be fitted with appropriate residential type silencers. The contractor or operator shall supply a certificate certifying the presence of the appropriate silencer and compliance with reversing alarm requirements. All vehicles and machinery used on site will comply with maximum noise requirements with respect to reversing alarms and noise emissions from stationary machinery (eg compressors)	Contractors	Randomly check vehicles are appropriately fitted	Certificates of compliance	Regularly
12.4.4	The operating noise level of plant and equipment shall comply with DEC requirements which are specified in Appendix C.	Contractor	Periodic Testing	Records of testing	Regularly
12.4.5	All work activities shall comply with DEC guidelines on noise and vibration.	Contractor	Periodic Testing	Records of testing	Regularly
12.4.6	Establish a complaints register to record noise minimisation performance. Complaints to be recorded in a single location. Where it is noticed that certain weather conditions coincide with noise complaints, then future noisy activities should be avoided whilst adverse weather conditions prevail.	Project Manager	Complaints Register completed	Complaints received minimised	As required
12.4.7	Demolition is to be conducted in accordance with AS 2601: 1991.	Contractors	Monitor to ensure demolition as per standard	Standard adhered to	As required
12.4.8	Demolition is to be conducted by a registered demolition contractor.	Project Manager		Registration cited	Prior to engagement

12.5 Air Quality and Dust Control - Strategy

Key Environmental Objectives: • Maintain the current levels of local air quality during construction activities. • Minimise the potential for dust generation on the Estate during construction activities.
Description: Heavy machinery (mobile and fixed) may contribute to emissions (diesel pollution) to the local atmosphere. Exposed soils and unsealed vehicle access may contribute to dust generation and affect local air quality, impact upon native fauna and flora and reduce resident amenity.
Strategies: • Where possible, implement dust reduction measures to all aspects of construction activity. • All equipment should be assessed to ensure exhaust emissions do not exceed EPA guidelines.
Performance Indicators: • No visible dust for more than 15 continuous minutes during construction activities. • No air quality incidents or registered complaints.
Monitoring/Reporting Requirements: • Regular monitoring of potential for dust generation and equipment exhaust discharge. • Report any incidents on a weekly basis.
Training Requirements: • Educate contractors about monitoring for potential dust-conducive conditions.
Key Legislation: • Protection of the Environment Operations Act 1997

Air Quality and Dust Control – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.5.1	Areas to be disturbed will be limited in order to minimise surfaces with the potential to generate dust.	Project Manager	Monitor disturbed sites	Undisturbed areas marked and separated from construction area	Prior to works commencing
12.5.2	Dust-generating activities are to be controlled, wet suppression techniques using water sprays shall be employed in dry and windy conditions.	Project Manager	Monitor activities for dust generation	Minimal dust emissions	As necessary when dry and windy weather conditions prevail
12.5.3	Wet suppression techniques shall be employed on stockpiles. Stockpile wetting shall be undertaken earlier in the day before wind strength increases. The amount of wetting shall be managed to ensure that the surface of stockpiles remains moist at all times.	Project Manager	Check for moisture content of exposed areas.	Moist stockpiles	As required
12.5.4	Trafficable areas shall be watered regularly using a water cart or water sprays to minimise dust emissions from the site.	Project Manager	Monitor exposed areas and unsealed access roads for moisture content.	Minimal dust emissions	As required
12.5.5	All vehicles shall not exceed the maximum speed limit of 20 km/h within all areas of the Estate.	Contractors	-	Safe traffic movement through the Estate	-
12.5.6	Ensure all vehicle loads leaving the site are covered prior to leaving the site. Ensure all tailgates are properly secure where trucks transport material off site.	Project Manager	Check that covers on loads are secure and cover entire load.	Covered trucks preventing material transport	Regularly
12.5.7	All equipment used on site should be well maintained and regularly serviced.	Project Manager	Monitor for leaks in hydraulic and pressurised systems.	Equipment serviced	Regularly
12.5.8	If visible smoke can be seen from any equipment for longer than 10 seconds duration, the equipment shall be	Plant Operator/	Records of servicing	Equipment serviced	Regularly

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
	taken out of service and adequately repaired or tuned.	Project Manager			
12.5.9	Combustible waste material shall not be burnt on site.	Project Manager	-	No evidence of burning	-

12.6 Construction Traffic and Access - Strategy

Key Environmental Objectives:

- Reduce potential for impacts on local pedestrians, road users and residents during construction works.
- Minimise any adverse environmental impacts related to fauna, flora, air emissions, water quality and soil contamination.
- Maintain ecological integrity and surrounding resident amenity

Description:

Estate construction will result in a large workforce and substantial numbers of delivery vehicles. A traffic management plan will be prepared for the development of each precinct which sets out access points and heavy vehicle routes, on site parking areas, traffic circulation within the site and any measures required to reduce traffic congestion or conflict.

Strategies:

- Access routes and entrance/egress points clearly signposted.
- Restriction of access to the Estate's precincts under construction.
- Schedule deliveries to reduce traffic disruption and local traffic flows during peak hour times.
- Maintain specific access corridors for each construction site.
- Reduce opportunities for vehicle-borne transfer of sediments off-site.
- Access is to comply with Section 4.3.2 – Planning for Bushfire Protection 2001.
- Develop a construction traffic management plan which includes details of access, number and type of vehicles associated with construction and the length of construction.

Performance Indicators:

- No complaints from adjoining residents or properties along the access routes.
- No vehicle-related incidents, eg fines/warnings from the RTA, Manly Council or the NSW Police for trucks accessing the site or deviating from designated routes.
- Access to each precinct as specified in Conditions of Consent.

Monitoring/Reporting Requirements:

- Regular checking of access corridors and designated parking areas for congestion.
- Report any incidents in weekly reporting schedule.
- Accurate recording and prompt resolution of public complaints.

Training Requirements:

- Educate all contractors of access points and designated routes during construction of each Precinct.
- Hazmat spill procedures from vehicles in accordance with hazmat spill contingency procedures.

Key Legislation:

- *Transport Administration Act 1988*
- *Roads Act 1993*

Construction Traffic and Access – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.6.1	Only site personnel and authorised visitors shall be permitted to enter the work areas.	Project Manager	Monitor for unauthorised access	No unauthorised access	Regularly
12.6.2	Delivery of materials deliveries to be planned and scheduled to minimise disruption to other users and local residents.	Project Manager/Contractors	Monitor to ensure deliveries arrive at scheduled times.	Delivery times minimise disruption	Regularly
12.6.3	All contractors alerted to and use designated heavy vehicle (>3 tonnes tare) routes to and from the site.	Project Manager	Record of maps	Contractors supplied with designated route maps	Prior to undertaking work on site
12.6.4	All construction traffic for internal works shall access the site via the main road entrance of each precinct.	Project Manager	Ensure that no unauthorised access occurs.	Minimal impact of construction traffic	At all times
12.6.5	Vehicles carrying materials from the site shall at all times be covered to prevent the escape of dust or other material.	Project Manager	Monitor for materials escaping from trucks.	Ensure covers are adequate to cover loads.	Regularly
12.6.6	Vehicles departing the site shall proceed through a "shaker-pad" facility or similar to prevent site material tracking onto the public road system.	Project Manager	Monitor effectiveness of shaker-pad facility	Provide shaker-pad facility.	Regularly
12.6.7	Speed limit of 20 km/h shall be adhered to at all times.	Drivers/ Project Manager	Observe vehicles within the site.	Safe traffic movements	At all times
12.6.8	Construction site entry and exit points will be clearly sign posted and attended, when required, during busy periods	Project Manager/Contractors	-	Safe traffic movements	When required
12.6.9	Adequate parking shall be provided for all employees and contractors involved in construction activities	Project Manager	-	No traffic conflicts with parked vehicles within construction areas	At all times during construction period

12.7 Ecological Management

Key Environmental Objective:

- Minimise the impacts on native species and their habitats on the Estate and within adjacent Sydney Harbour National Park, and the waters of Sydney Harbour as a result of construction activities.

Description:

The Estate straddles the ridge along North Head and comprises 2 catchments – Cabbage Tree Bay (Pacific Ocean) and Spring Cove (Sydney Harbour). Both catchments adjoin Sydney Harbour National Park (SHNP). SHNP supports endangered populations of the Long-nosed Bandicoot (*Perameles nasuta*) and the Little Penguin (*Eudyptula minor*). The Little Penguin breeding colony is the only one found on the NSW mainland. The penguins are resident in Spring Cove and do not use areas of the Estate for habitat. The bandicoot population is found within the SHNP and adjacent residential areas. A series of vegetated links have been established to provide movement corridors for bandicoots and other native species. In addition protected flora species exist within some precincts and these need to be maintained in accordance with the requirements of precinct specific conditions of consent.

Fire events in the SHNP are possible and could adversely impact upon infrastructure within the Estate. Weeds on-site are a threat to native flora species.

Strategies:

- Minimise removal of native vegetation strictly in accordance with the Conditions of Consent granted for each precinct.
- Protect bandicoots and their habitat and maintain bandicoot access between the site and adjacent bushland..
- Implement a Weed Management Strategy and a Bushfire Management Plan.
- Maintain and protect Little Penguin habitat at Spring Cove by controlling the quality of water leaving the site.
- Maintain and protect all identified threatened species.
- Adopt Soil and Water Management Plan and integrate into ecological management.
- Maintain appropriate asset protection zones.
- Weed monitoring on the Estate should be conducted regularly, especially towards end of construction process.
- Rehabilitate disturbed areas in accordance with the Precinct Ecological Management Plan.

Performance Indicators:

- No construction access to habitat areas not directly impacted by development.
- No bandicoot deaths or injuries due to construction activities.
- Noxious and environmental weeds kept low.
- No significant degradation of water quality.

Monitoring/Reporting Requirements:

- Regular monitoring of all ecological aspects within this plan.

Training Requirements: • Identification of protected flora and fauna species within each precinct and buffer/protection zones. • Monitoring of vegetated links. • Identification of weeds.
Key Legislation: • *Protection of the Environment Operations Act 1997* • *National Parks and Wildlife Act 1974* • *Native Vegetation Conservation Act 1997* • *Native Vegetation Act 2003* • *Catchment Management Act 1989* • *Threatened Species Conservation Act 1995* • *Noxious Weeds Act 1993*

Ecological Management – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.7.1	Any removal of native vegetation shall be undertaken strictly in accordance with the Conditions of Consent and the precinct Ecological Management Plan.	Contractor	Monitor vegetation removal	Correct procedures implemented.	Regularly
12.7.2	Trees to be removed shall be marked prior to the start of construction works in accordance with the Conditions of Consent and the precinct Ecological Management Plan.	Project Manager	Ensure correct trees are marked.	No removal of protected trees	Prior to construction
12.7.3	Vegetation identified for retention in the Conditions of Consent and the precinct Ecological Management Plan shall be retained. Retained trees and vegetation are to be clearly identified and fenced off from construction work.	Contractor	Ensure that 'protected' trees are correctly identified.	No removal of protected trees	Prior to construction
12.7.4	Changes to soil levels are not permitted within 4 metres of the trunk of a tree to be retained unless approved by Council's Group Manager, Land Use Management. Proposals to change soil levels within 4 metres of a tree to be retained shall be supported by an arborist's report.	Project Manager	Ensure soil levels are retained	No changes to soil levels in demarcated areas.	Regularly
12.7.5	Building materials, solids, spoil or the driving or parking of vehicles are not permitted within 4 metres of the trunk of any tree to be retained.	Project Manager / Contractors	Monitor to ensure no activity within 4 m of protected tree	Protected trees to have clear areas within 4 metres.	At all times
12.7.6	All works requiring removal of tree branches, roots etc shall be undertaken by or at the direction of a qualified arborist.	Project Manager	-	Consultation with arborist evident	As required
12.7.7	Imported straw bales should be seed free.	Contractor	Check for compliance.	No spread of introduced species	As required
12.7.8	Suitable timber should be chipped for reuse on site as mulch to 15 by 50 mm nominal maximum size.	Contractor/ Project Manager	Check to ensure timber is re-used	No timber suitable for mulching to be present in waste bins	As required
12.7.9	Existing landscaping is to be retained and maintained where possible.	Contractors	Check for extent of disturbance.	Disturbed areas minimised	As required
12.7.10	Revegetation and replanting across the site shall be undertaken in accordance with the Conditions of Consent and the precinct Ecological Management Plan.	Contractors	Ensure all criteria are met.	Consent conditions satisfied	At all times

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.7.11	All new landscape works are to be adequately maintained to establishment.	Contractors	Monitor and maintain new works	Survival of new landscaped areas	Regularly.

Ecological Management – Implementation Plan Cont.

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.7.12	All DEC management actions outlined in the Conditions of Consent are to be adhered to. Co-operate with DEC in implementation of bandicoot recovery plan.	Project Manager/ Contractors	Monitor zones	Buffer zone established between bandicoot habitat and construction zone.	Regularly
12.7.13	Perform all works in accordance with a Bandicoot Construction Protocol to minimise bandicoot mortality and protect bandicoot habitat during construction.	Project Manager	Protocol established and retained on site	Construction Protocol requirements are met.	At all times
12.7.14	No unleased pets (dogs or cats) are allowed onto the Estate at any time during the construction of each Precinct (Appendix D).	Project Manager/ Contractors	Contractors are not permitted to enter the Estate with pets in their vehicles.	No pets sighted	At all times
12.7.15	No human access is permitted outside the designated construction area.	Project Manager	Regularly monitor restricted access to ensure no breach has occurred	No construction workers sighted at Collins Beach or in protected habitat areas.	At all times
12.7.16	All recommendations relating to fire management in Conditions of Consent and Fire Threat Assessment report are to be adhered to.	Project Manager/ Contractors	Monitor for all criteria in Conditions of Consent.	Conditions of consent satisfied	Regularly
12.7.17	The Project Manager shall participate in any programs developed by DEC that monitor the effectiveness of Consent Conditions in maintaining habitat values.	Project Manager	-	Correspondence with DEC.	As appropriate
12.7.18	Eliminate existing noxious and environmental weeds in construction areas and provide on-going control.	Contractor	Monitor control of weeds	No weeds evident after construction is complete and re-occurrence controlled.	Regularly

12.8 Heritage and Archaeology

Key Environmental Objective:

- To conserve all known heritage and archaeological artefacts on the Estate.
- To identify and assess any heritage and archaeological artefacts discovered during the course of construction activities on the Estate.

Description:

Several structures on the Estate are listed on the NSW Heritage Register. These will be identified in each specific PEMP. Throughout the construction process, other heritage items of significance to early European settlements or Aboriginal people may be uncovered on site.

Strategies:

- Observe Conditions of Consent as applicable to each Precinct.
- Follow the recommendations of the St Patrick's Estate Conservation Management Plan (Tanner & Associates, 1995) where works take place in the vicinity of Moran House (St Patrick's College), the Archbishop's Residence, the Cardinal Cerretti Memorial Chapel, the Cardinal Freeman Pastoral Centre and/or St Therese's Covent.
- All newly-discovered heritage items are to be managed in an appropriate manner.

Performance Indicators:

- No breach of conditions.

Monitoring/Reporting Requirements:

- Monitor existing heritage items for damage during construction works.
- Monitor excavation works (when required) for items of heritage/archaeological significance.
- Report any archaeological discoveries to the Project Manager and relevant authorities.

Training Requirements:

- Educate contractors of the potential for heritage and archaeological items to be discovered on the Estate.
- Educate all on-site personnel of procedures to be taken upon discovery of heritage items/sites.

Key Legislation:

- *Australian Heritage Commission Act 1975 (Cth)*
- *Heritage Act 1977 (NSW)*
- *National Parks and Wildlife Act 1974*

Heritage and Archaeology – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.8.1	Monitoring of ground disturbance activities by a qualified archaeologist and a member of the Local Aboriginal Land Council, in precincts where this is required by the Conditions of Development Consent.	Project Manager	Records of qualified consultants on site	Monitoring requirements to be noted in PEMP,	During ground disturbing activities.
12.8.2	Monitor all excavation works for potential heritage items. In the event of an item of significance being discovered during construction works, work in the area shall cease, and the NSW Heritage Council shall be advised immediately.	Project Manager	Record results of monitoring	Report all heritage finds to NSW Heritage Office.	As required
12.8.3	Consult with the LALC 2 weeks in advance of construction works commencing and request that they assist in monitoring works in areas of potential aboriginal interest or as identified in the relevant PEMP.	Project Manager	Record results of monitoring	Stakeholder involvement and identification of any items of aboriginal significance.	2 weeks prior to construction
12.8.4	In the event of a potential Aboriginal artefact, relic or site being discovered during construction works, work in the area shall cease, and DEC shall be advised immediately.	Project Manager	Record results of monitoring	Report any artefacts or sites to DEC	As required
12.8.5	In the event of discovery of human remains or archaeological deposits originating from Indigenous or non-Indigenous cultures are exposed, works must cease immediately and Council informed. If human remains are uncovered, the Police must also be informed.	Project Manager	Record results of monitoring	Report any discoveries of human remains to Council and the Police.	As required
12.8.6	The sun dial on the Palace Land is to be retained in its present location or otherwise relocated to the satisfaction of the NSW Heritage Council.	Project Manager	Correspondence with Heritage Council if required	No disruption to sub dial	As appropriate
12.8.7	All existing fabric on the Archbishop's residence shall be recorded in accordance with the NSW Heritage Council Recording Guidelines prior to the	Project Manager	-	Report recording existing fabric by suitably qualified	Prior to commencement of works

	commencement of any new works adjacent to this building and a copy provided to Council's Group Manager, Land Use Management.			heritage consultant.	
12.8.8	All permits to carry out archaeological investigations or excavations under the *Heritage Act 1977* are to be obtained prior to the commencement of any new works.	Project Manager		Permits recorded	Prior to commencement of works
12.8.8	An easement of 5 metres in width either side of the centreline of the axial pathway is to be provided. No buildings are to be constructed within this easement.	Project Manager		Plans	Included in design

12.9 Community Liaison

Key Environmental Objectives:

- To maintain a 'good neighbour' policy with local residents and action groups by reducing disturbances and confining any potential loss of amenity.

Description:

There has been some community opposition to the development of the Estate. By ameliorating the potential for visual, noise, aquatic and access disturbances on the site and the potential for off-site environmental impacts, both residential amenity and environmental objectives can be achieved in tandem.

Strategies:

- Ensure the community is able to contact the Project Manager or Community Liaison Officer at all times during construction.
- Establish a system of recording all complaints.
- Response to complaints within 24 hours

Performance Indicators:

- No complaints to government agencies.
- Documented response to complainant within 24 hours and, once corrective action has been taken, no recurrence of the complaint.

Monitoring/Reporting Requirements:

- Monitor feedback from community to gain appreciation of where improvements to environmental performance can be made.

Training Requirements:

- Community Liaison Officer to educate all on-site personnel of 'good neighbour' policy and residential amenity.

Key Legislation:

- *Protection of the Environment Operations Act 1997*

Community Liaison Program – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.9.1	The approved hours of work and a 24 hour telephone number shall be prominently displayed at all times on the construction site.	Project Manager	-	Wide dissemination of phone number.	-
12.9.2	The 24-hour telephone contact number shall be provided to Manly Council prior to the commencement of construction works.	Project Manager	Records of advice to Council	Phone number included in PEMP.	Prior to Construction
12.9.3	A Community Liaison Officer (CLO) shall be appointed to manage all liaison with residents and regulatory authorities throughout construction. The CLO shall be involved in project management and contactable by mobile phone and email.	Project Manager	-	CLO appointed.	Prior to and during construction phase.
12.9.4	CLO is to record all complaints and report nature and basis of claims. All complaints and positive feedback are to be integrated into construction management principles to improve performance.	Project Manager/CLO	Record of complaints register	Complaints register established and consent conditions met	Regularly
12.9.5	The CLO or Project Manager shall respond to all complaints within 24 hours, with follow-up if necessary to achieve a solution.	Project manager/ CLO	Monitor complaints register	Achievement of solutions in most cases.	Frequently
12.9.6	Community liaison officer to maintain complaints register which includes: • date and time • type of communication • name and contact details of complainant • nature of complaint • response to complaint • nature and date(s) of follow up action required, including further phone calls where required	CLO to records complaints and refer to Project Manager	Monitor entries to complaints register	Complaints register	Frequently

Task #	Description	Responsibility	Deliverables/Monitoring	Timing
12.9.7	Community liaison officer to monitor press, collect local feedback and prepare appropriate material for distribution, take phone calls and organise community liaison meetings if required.	CLO to monitor and respond to community concerns	Records of calls, emails, meetings kept	Regularly

12.10 Emergency Management

Key Environmental Objectives:

- To minimise the impact that an emergency could have both on the Estate, and in the surrounding environment.

Description:

Emergencies on the Estate are considered unlikely but could include machinery accidents injuring personnel, oil/chemical spills, fire including bushfire, security breaches and failure of environmental controls such as stormwater management or tree protection.

Strategies:

- Prepare a Site Emergency Response Plan which details:
  - the location of emergency facilities (fire fighting equipment, spill kits etc);
  - procedures to be adopted to minimise risk to persons, property, and the environment; and
  - training for all personnel to ensure they are prepared adequately.

Performance Indicators:

- Site Emergency Response Plan in place.
- Correct procedures followed in the event of an actual or potential emergency.
- Training records to show plan is understood.

Monitoring/Reporting Requirements:

- Weekly visual inspection of all emergency response equipment.

Training Requirements:

- Induction and training of all new equipment.

Key Legislation:

- *Protection of the Environment Operations Act 1997*
- *Occupational Health and Safety Act 2000*
- *Occupational Health and Safety Regulations 2001*

Emergency Management – Implementation Plan

Task #	Description	Responsibility	Monitoring	Deliverables/ Outcomes	Timing
12.10.1	Site Emergency Response Plan to be implemented	Project Manager	Plan retained on site	Plan in place	Prior to commencement of construction
12.10.2	All personnel working on site to be trained in Emergency Response Procedures	Project Manager	Training register completed	All personnel appropriately trained	Prior to each contractor starting work
12.10.3	Emergency response equipment to be checked frequently to ensure its location. All equipment to be maintained and certified as per manufacturers instruction	Project Manager	Frequent inspection of site records.	Equipment tags are compliant with service dates	Frequently
12.10.4	Emergencies must be reported to the Project Manager immediately. The Project Manager will contact the necessary authorities (EPA & Council) in the event of off-site environmental impacts.	All personnel	Environmental Incident Register completed	Emergencies reported and dealt with	When required
12.10.5	All emergencies are to be fully investigated, and site procedures amended as required to mitigate against further occurrences of similar incidents.	Project Manager	-	Written investigation into incident	Investigation to be completed within two weeks of an incident.

FIGURES

APPENDIX A
ENVIRONMENTAL ASPECTS REGISTER

A 1 ENVIRONMENTAL ASPECTS REGISTER

Issue	Effect	Likelihood	Consequence	Risk Level	Controls & Safeguards
Erosion and Sediment Control					
Uncontrolled sediments entering receiving environments	Sedimentation of receiving waters	Likely	Moderate	Low	Stormwater control measures implemented on site.
	Erosion of topsoils from site	Likely	Moderate	Low	Stormwater control measures implemented on site.
	Impact on penguin habitat and/or protected marine reserve.	Possible	Significant	Moderate	Ensure sedimentation basins operating effectively.
Waste Management and Minimisation					
Liquid waste spills, loose litter and debris	Pollution of soils	Low	Moderate	Moderate	Correct handling and transfer procedures followed. All litter placed in appropriate containers.
	Pollution of surface water	Low	Moderate	Low	Maintenance of stormwater control measures
	Pollution of penguin habitat and receiving waters	Low	Significant	High	Maintenance of stormwater control measures, sedimentation basins and waste water disposal receptacles.
Chemicals and Dangerous Goods Management					
Fuel and Chemical Spills	Pollution of soils	Low	Moderate	Moderate	Ensure complete integrity of storage containers. Establish correct handling procedures.

Issue	Effect	Likelihood	Consequence	Risk Level	Controls & Safeguards
	Pollution of receiving waters and groundwater	Low	Significant	Moderate	Maintain monitoring system for evidence of pollutants. Establish correct clean-up procedures.
Noise and Vibration					
Public Amenity	Disruption to residents and surrounding native habitats	Low	Minor	Low	Operating things for machinery traffic controls
Air Quality and Dust Control					
Local Air Quality	Local air pollution from machinery exhaust	Unlikely	Minor	Low	Report and repair faulty equipment
	Dust generation from construction activities, roadways or exposed surfaces or soil stockpiles.	Low	Minor	Low	Staged works, dust suppression activities and air quality monitoring when required.
Construction Traffic and Access					
Preservation of local traffic access and native wildlife	Noise created by passing construction vehicles	Low	Minor	Low	Construction operation times restrict vehicle access.
	Blocked access to thorough fares	Unlikely	Minor	Low	Ensure local road rules are made aware to contractors
	Death and injury to native wildlife	Unlikely	Significant	Low	Ensure contractors are aware of local native fauna.

Issue	Effect	Likelihood	Consequence	Risk Level	Controls & Safeguards
Ecological management					
Protection of fauna and flora	Injury or death to Bandicoots	Unlikely	Significant	Low	Use DEC Bandicoo Recovery Plan as guide to management. Promote awareness amongst contractors.
	Loss of trees and flora	Unlikely	Significant	Low	Maintain vegetated links via landscape maintenance
	Invasion of weeds	Unlikely	Moderate	Low	Landscape Maintenance Plan.
	Consolidation of pest fauna	Unlikely	Moderate	Low	Pest control strategies integrated with DEC Bandicoot Recovery Plan
Heritage and Archaeology					
Damage to existing structures	Damage to any heritage listed items on site or surrounds	Unlikely	Significant	Low	Strategies and controls within Conservation Management Plans
	Disturbance of Aboriginal sites and artefacts	Low	Significant	Low	Conservation Management Plan DEC requirements.
Community Liaison					
Maintenance of positive relatationships	Increase in complaints and negativity regarding construction	Unlikely	Moderate	Low	Ensure Community Liaison Officer and/or Project Manager are available on a 24hr basis. Establish response strategy to manage complaints

Issue	Effect	Likelihood	Consequence	Risk Level	Controls & Safeguards
Emergency Management					
	Emergency contingency measures may result in further environmental impacts	Unlikely	Moderate	Low	Correct procedures applied to minimise environmental impacts.

APPENDIX B
ENVIRONMENTAL MANAGEMENT SCHEDULES

B.1 SAMPLE SITE INSPECTION REPORT

Site/Area:	Date
Reported By:	Time:
Weather Conditions:	Wind Speed:

Item	COMMENTS (INCLUDE ANY IMMEDIATE CORRECTIVE ACTIONS UNDERTAKEN)
Have all persons on site received induction and environmental training?	
Are all erosion control measures in place?	
Are sedimentation basins in good condition?	
Are filter fences in good condition?	
Are all drains and berms clear?	
Is the quality of water leaving the site good?	
Water quality and erosion control comments:	
Are dusty conditions observed? If yes, what operations are creating dust?	
Are internal and external roads free of dust and tracking marks?	
Are all trucks leaving the site covered?	
Are all stockpiles moist and/or covered and/or protected?	
Dust control comments:	
Are any adverse noise conditions occurring on site:	
Noise comments:	
Are all fuels and chemicals stored correctly and in appropriately bunded areas?	
Are bunds free of stormwater, and are gate valves locked?	
Other Issues/General comments:	

Note: If immediate corrective action could not be undertaken to remedy situation, please initiate Non-Conformance and Corrective Action Report.

B.2 SAMPLE NON-CONFORMANCE AND CORRECTIVE ACTION REPORTS

Date:	
Reporter:	
Time:	
Site/Area:	
Problem:	
Cause:	
Report to:	
Corrective Action:	
Signed by Project Manager upon completion:	
Date	

B.3 SAMPLE COMPLAINTS REGISTER

Date	Time	Type of Communication	Name, address contact ph of complainant	Nature of complaint	Response	Date of response	Signature/Position

Note: This register should be used for complaints received by the Public, Council or Statutory Authorities

Should a compliant identify a non-conformance that can not be immediately rectified, please initiate a Non-Conformance and Corrective Action Report.

B.4 SAMPLE ENVIRONMENTAL INCIDENTS REGISTER

Date	Time	Type of Incident	Location on site	Nature of incident	Response	Date of response	Consultation Required? – If yes, provide details including Name, Department and Date Consulted	Signature/ Position

Note: Should an incident identify a non-conformance that can not be immediately rectified, please initiate a Non-Conformance and Corrective Action Report.

B.5 SAMPLE ENVIRONMENTAL TRAINING REGISTER

Date	Person	Company/Contractor	Type and Duration of Training	Signature/Position	Any follow-up training required?

APPENDIX C
NOISE CRITERIA

The NSW Environment Protection Authority's criteria for noise generated by construction sites are based on the noise level experienced at residential properties. The criteria state that for construction periods:

- of 4 weeks or less, the L_{10} noise level due to construction should not exceed the existing L_{90} background noise level by more than 20 decibels;
- between 4 and 26 weeks the L_{10} noise level due to construction should not exceed the existing L_{90} background noise level by more than 10 decibels;
- for construction periods longer than 26 weeks, the criteria for a continuously operating source should apply, which generally means that the L_{10} noise level due to construction should not exceed the existing L90 background noise by more than 5 decibels.

Tables 1: Typical Equipment Noise Levels – Demolition and Earthworks

Item	Typical Plant	Max Noise Level (dB(A) at 7m
Bulldozer	Caterpillar D7	88
Front End Loader	Wheeled	90
Jack Hammers	With silencing bags	85
Compactor	Caterpillar 825	85
Compactor	Vibrating plate	92
Vibratory roller	10-12 tonne	89
Water cart		88
Excavator	Kato 70	86
Rock Breaker	On Kato 750	97
Backhoe		88
Compressor	1500 CFM	80

Table 2: Typical Equipment Noise Levels – Construction

Item	Typical Plant	Max Noise Level (dB(A) at 7m
Truck		80
Crane	Truck mounted	85
Compressor	600 CFM	75
Generator	Diesel	79
Concrete Truck		83
Concrete Pump		84
Concrete Vibrator		80
Welder		85
Concrete saw		93

Source: Australian Standard AS2436 - 1981

APPENDIX D
BANDICOOT CONSTRUCTION PROTOCOL

BANDICOOT CONSTRUCTION PROTOCOL

Aim: To minimise bandicoot mortality and injury and to protect bandicoot habitat in areas not subject to construction activity.

- Ensure that all retained areas are clearly identified and marked to avoid any accidental damage/destruction
- Erect temporary chain wire fencing around the construction site. Gaps of at least 20-30 cm are to be provided at the bottom of the fencing, so as not to impede bandicoot movement around and through the construction site.
- All construction workers on the site, including sub contractors and visitors to the work site, are to be made aware of the presence of bandicoots through induction training by a suitably qualified and experienced person.
- A systematic clearing approach must be determined by a suitably qualified and experienced person prior to the commencement of clearing that is to include progression of clearing in one direction towards areas of retained habitat.
- Vegetation clearing to be undertaken using hand tools in the first instance and checking or likely shelter sites (at the base of vegetation and under deep litter) so as to cause bandicoots to be flushed from sheltering sites to other retained areas. Ideally all clearance to be completed within one day so that bandicoots do not re occupy partially cleared areas overnight.
- Earth moving or other large machinery is not to be used until the level of vegetation clearance achieved cannot support a bandicoot sheltering or nesting. Appropriate level of clearance to be determined by a suitably qualified person.
- If cleared vegetation is stockpiled on the site temporarily, then its removal from the site must be undertaken by hand, not large machinery.
- Operating hours are to be confined to 0700 to 1800 on weekdays and 0700 to 1300 on Saturdays to limit disturbance. No machinery is to be used within one half hour of dusk.
- All machinery and construction material stock piles are to be inspected daily prior to operations commencing to ensure that no bandicoots are sheltering.
- If an injured bandicoot is found, it must be reported to the DEC Harbour North Office on 9977 6732, or if unavailable contact the Sydney Metropolitan Wildlife Service on 9413 4300.
- If a dead bandicoot is found, it must be reported to DEC on the above number. A DEC Ranger will need to check the body for a microchip, therefore, if possible put the body in a plastic bag and refrigerate or keep cool.
- Undertake monitoring of the vegetated links throughout construction as per Monitoring Protocol.

Levy Online Payment Receipt

LONG SERVICE BUILDING & CONSTRUCTION

Thank you for using our Levy Online payment system. Your payment for this building application has been processed.

Applicant Name:	LEND LEASE DEVELOPMENT
Levy Application Reference:	5004652
Application Type:	DA
Application No.:	107/08
Local Government Area/Government Authority:	MANLY COUNCIL
Site Address:	22 MONTPELIER PLACE
	MANLY
	NSW
	2095
Value Of Work:	$1,200,000
Levy Due:	$4,200
Levy Payment:	$4,200
Online Payment Ref.:	587412423
Payment Date:	31/03/2010 4:09:19 PM

Lend Lease
MANAGEMENT SERVICES

ABN #:43662868065
Manly Council
PO Box 82
MANLY NSW 1655
Ph 9976 1500 Fax 9976 1400
Email: records@manly.nsw.gov.au
Website: www.manly.nsw.gov.au

Lend Lease
Management Services
Limited
ACN 059 923 465

Level 4
30 The Bond
30 Hickson Road
Millers Point
NSW 2000
Australia
Telephone
(02) 9277 2488
Facsimile
(02) 9237 5599

49

Date 06/04/2010 17:01
Receipt 00684160:0001 Terminal 1:390
Westpac Bank Cheque (Lend Lease manageme

and remittance

Details Amount

Builders Deposits - 10000.00
010.2008.00000107.001
22 Montepelier

Total Value: 10000.00
Tendered
Cheque 10000.00
Change 0.00

Thank you for Prompt Payment

	Other Comment	Entity Invoiced	Amt Paid
	RTN CHQ TO J ABOOD LVL 5/ 25 M	DEV	10,000.00
			$10,000.00

Entity Invoiced - See back for full name.