Extension of Rehoboth Christian School, 92 Kenwick Road, Kenwick

Association for Christian Education Inc.

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1249
March 2007

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
31/08/06	**Referral received**	
06/03/07	**ARI Level of Assessment set and EPA report to the Minister for the Environment**	**28**

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APPEAL PERIOD CLOSE:
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Contents

1. Introduction and background

This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the proposal to expand the Rehoboth Christian School in Kenwick by Association for Christian Education Inc.

Section 44 of the *Environmental Protection Act 1986* (EP Act) requires the EPA to report to the Minister for the Environment on the outcome of its assessment of a proposal. The report must set out:

- The key environmental factors identified in the course of the assessment; and
- The EPA's recommendations as to whether or not the proposal may be implemented, and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may include in the report any other advice and recommendations as it sees fit.

The proponent has submitted a referral document setting out the details of the proposal, potential environmental impacts and appropriate commitments to manage those impacts.

The EPA considers that the proposal, as described, can be managed to meet the EPA's environmental objectives, subject to the EPA's recommended conditions being made legally binding.

The EPA has therefore determined under Section 40 of the EP Act that the level of assessment for the proposal is Assessment on Referral Information (ARI), and this report provides the EPA advice and recommendations in accordance with Section 44 of the EP Act.

2. The proposal

The Association for Christian Education Inc. (the proponent) proposes an extension to the Rehoboth Christian School in Kenwick on part of Lot 107 and on Lot 105A. (Refer to Figure 1). The extension is to allow for additional education facilities to accommodate a primary school.

The proposal involves:

- development on 1.0 hectare (ha) of currently undeveloped land most of which is categorised as a Conservation Category Wetland and which includes 0.60 ha of a Threatened Ecological Community (TEC); and
- conservation management of 2.3 ha of two TECs in the remainder of the school lot, including:
    - full rehabilitation of 0.18 ha of TEC claypan wetlands;
    - partial rehabilitation of 0.66 ha TEC claypan wetlands; and
    - development of a series of management plans for the area, including:
        - a Wetland Rehabilitation Plan;
        - a Wetland Management Plan; and
        - a Drainage and Nutrient Management Plan.

Figure 1: Proposal area

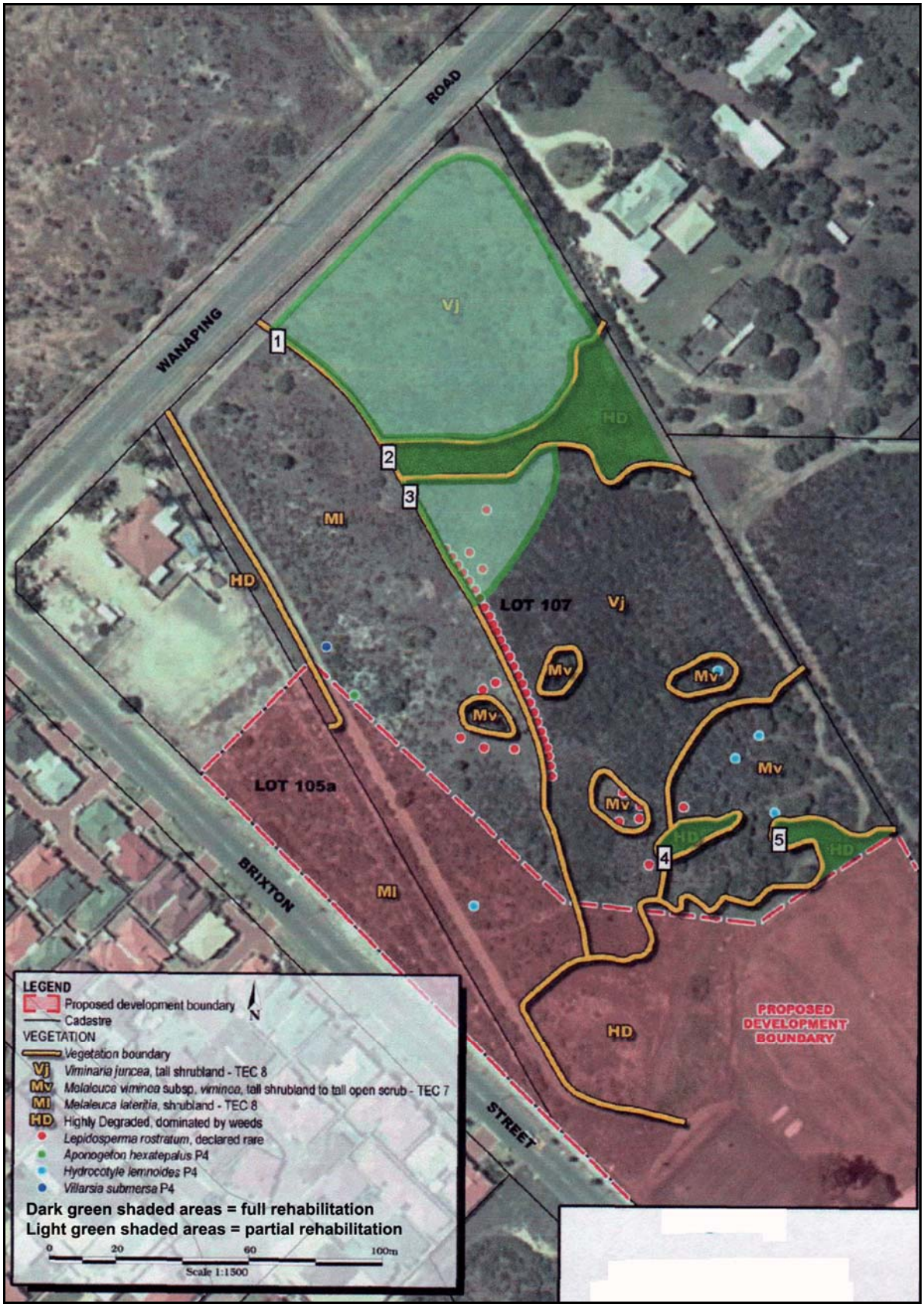


Figure 2: Vegetation mapping and proposed rehabilitation areas

Figure 3: Proposed conservation area

The main characteristics of the proposal are summarised in Table 1 below.

Table 1: Summary of key proposal characteristics

Characteristic	Description
Project Life	6 months for clearing and earthworks
Area of disturbance	1.0 ha (refer to Figure 3)
Conservation area	2.3 ha (refer to Figure 3)
Rehabilitation	• Full rehabilitation of 0.18 ha of TEC claypan wetlands (Refere to Figure 2) • Partial rehabilitation of 0.66 ha of TEC claypan wetlands (Refer to Figure 2)
Drainage management	• Perimeter drain, flowing northwards to existing drain (refer to Figure 1) • Grading of playing areas • Stormwater recharge through soakwells close to source

The potential impacts of the proposal are discussed by the proponent in the referral document (BlueSands environmental, 2006).

3. Key environmental factors

It is the EPA's opinion that the following key environmental factors relevant to the proposal require evaluation in this report:
(a) Flora; and
(b) Wetlands

The key environmental factors are discussed in Sections 3.1 – 3.2. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Flora

Description

The potential area for extension of the existing school (Lots 107 and 105A) contains declared rare flora, priority listed flora, and threatened ecological communities.

Flora and vegetation surveys of the area were conducted in September 2003 and February 2004 to map the distribution of flora and vegetation and to assess the condition of the vegetation. In general, the condition of vegetation on Lot 107 was rated to be "Good to Excellent" except in localised small patches in which it has been heavily degraded. The vegetation of Lot 105A was rated lower, "from Degraded to Very Good".

The area contains:

- A population of the declared rare flora *Lepidosperma rostratum*.

  This species is gazetted under the State *Wildlife Conservation Act 1950 and is also listed as "Threatened"* under the Commonwealth *Environment Protection*

and Biodiversity Conservation Act 1999. There are a total of 82 plants of this species on Lot 107.

- Two Threatened Ecological Communities (TECs) ranked as 'vulnerable'.

  These are TEC 8 ('herb-rich shrublands in clay pans') and TEC 7 ('herb-rich saline shrublands in clay pans'). A ranking of vulnerable is the lowest of four rankings for TECs and applies to,

  "An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range."

- Three priority flora species, *Aponogeton hexatepalus* (P4), *Hydrocotyle lemnoides* (P4) and *Villarsia submersa* (P4).

The distribution of declared rare flora, priority listed flora, and threatened ecological communities is shown in Figure 2.

Assessment

The EPA's environmental objective for this factor is to maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

The EPA notes that the proponent has revised its proposal to reduce impacts on vegetation and flora and has proposed environmental offsets for its residual impacts. Originally the proponent wished to extend the school only on Lot 107, which it owned. After becoming aware of the environmental values on the property, it has entered into negotiations to purchase Lot 105A and has shifted most of it development onto this land, on the basis that it has lesser environmental values than most of Lot 107. As a result, the impacts of the current proposal on vegetation and flora will be limited to the loss of 0.6 ha of TEC 7 and 1-2 individuals of a Priority 4 flora species. In order to offset this impact (and to address impacts on wetlands values) the proponent will:

- secure for conservation purposes the remainder of the Lot 107 (a 2.3 ha area, refer to Figure 3) through a conservation covenant;
- rehabilitate degraded areas in the proposed conservation area (full rehabilitation of 0.18 ha of highly degraded vegetation and partial rehabilitation of another 0.66 ha that is in better condition); and
- develop and implement a Wetland Management Plan to maintain the wetland and vegetation values of the conservation area.

The proponent's revised proposal (including offsets) has been considered by the Species and Communities Branch of the former Department of Conservation and Land Management, which is the key advising agency in relation to impacts on Threatened Ecological Communities and declared rare flora. The advice from the Department (refer to Appendix 3) was that it had no objection to the proposal provided that: the area was properly secured for conservation; the Department is involved in the development of the management plan; and any drainage onto the conservation area is properly managed.

Summary

Having particular regard to the:

- the extent to which the proponent has revised its proposal to avoid and reduce impacts on vegetation and flora;
- proposed environmental offsets (securing for conservation, rehabilitation, and continuing environmental management); and
- the advice of the former Department of Conservation and Land Management,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that the proponent's undertakings are formalised as environmental conditions on the proposal. The recommended environmental conditions (Conditions 6, 7, & 8) are set out in Appendix 2.

3.2 Wetlands

Description

All of the nearby undeveloped land on Lots 107 and 105A has been categorised as "Conservation Category Wetland". The EPA has previously estimated that some 80% of wetlands on the Swan Coastal Plain have been lost and most of the remainder have been heavily modified. Of the remainder, an estimated 15% of the wetland area has retained high ecological values, these are conservation category wetlands.

The area of proposed development is a 'palusplain' wetland, which is defined as a flat area subject to seasonal waterlogging. The proposal would therefore remove 1.0 ha of palusplain from the existing wetland system.

It should be noted that values of the wetland are also linked to the vegetation and flora values of the wetland. These values have been separately assessed in the preceding section.

Assessment

The EPA's environmental objective for this factor is to maintain the integrity, ecological functions and environmental values of wetlands.

The direct impact of this proposal would be to remove 1.0 ha of palusplain from the existing wetland system. Given that there is no way to extend the school at this site without affecting some wetland area, the proponent has undertaken to offset some of the impacts through securing for conservation, rehabilitating, and providing future environmental management of, the remaining area. The hydrology of the remaining wetland is to maintained by the construction of a perimeter drain to replace the existing drainage.

Based on the above, the EPA considers that the long-term effect of this proposal would be to secure the core values of the local wetland and improve its conservation values through rehabilitation and continuing management, at the expense of a small reduction in size of the wetland. Hence the proposal would meet the EPA's environmental objective.

In relation to the proposed rehabilitation of the wetland, the EPA considers that such work should be undertaken by professionals in this area, rather than students under supervision. The proponent has agreed to this and a requirement for this work to be

carried out by qualified staff is included in the recommended conditions. It is also the EPA's view that the installation and maintenance of fencing capable of preventing general access to the conservation area is an important component of the rehabilitation work and long-term management of the area.

Summary

Having particular regard to the:

- preservation and enhancement of the core values of the wetland; and
- the limited loss of wetland area,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for this factor provided that that the proponent's undertakings are formalised as environmental conditions on the proposal.

The recommended environmental conditions (Conditions 6, 7, 8) are set out in Appendix 2.

4. Conditions and Commitments

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and, following discussion with the proponent, the EPA may seek additional commitments.

The EPA recognises that not all of the commitments are written in a form which makes them readily enforceable, but they do provide a clear statement of the action to be taken as part of the proponent's responsibility for, and commitment to, continuous improvement in environmental performance. The commitments, modified if necessary to ensure enforceability, then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Proponent's commitments

The proponent's commitments as set out in the proponent's referral documentation and subsequently modified, as shown in Appendix 2, should be made enforceable.

4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by the Christian Education Association Inc. to expand the Rehoboth Christian School in Kenwick is approved for implementation. These conditions are presented in Appendix 2.

5. Other Advice

The EPA observes that the wetland on Lots 107 and 105A also extends into adjacent properties to the west (including Lots 4687 and 4688). It would therefore be preferable if the wetlands on these lots and in the proposed conservation area on Lot 107 were managed together as an entire conservation unit. As the proprietor for both these lots is

the Department for Planning and Infrastructure, the EPA will write to the Department to provide it with a copy of this advice. A copy will also be provided directly to the East Kenwick Primary School which is sited on Lot 4687.

6. Conclusions

The EPA has considered the proposal by the Christian Education Association Inc. to expand the Rehoboth Christian School in Kenwick.

The EPA notes that while the proposal has the potential to affect small areas of high value environmental assets (flora, vegetation, and wetlands) the proponent has modified its proposal to reduce the impacts on these assets and has provided environmental offsets for its residual impacts.

The EPA has therefore concluded that the proposal can be managed to meet the EPA's environmental objectives, provided there is satisfactory implementation by the proponent of their commitments and the recommended conditions set out in Appendix 2.

7. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is to expand the Rehoboth Christian School in Kenwick onto Lots 107 and 105A;
2. That the Minister considers the report on the key environmental factors as set out in Section 3;
3. That the Minister notes that the EPA has concluded that the proposal can be managed to meet the EPA's environmental objectives, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 2, including the proponent's commitments; and
4. That the Minister imposes the conditions and procedures recommended in Appendix 2 of this report.

Appendix 1

References

BlueSands environmental (2006). *Rehoboth Christian School: Extension of Rehoboth Christian School Pt Lot 107 (No. 92) Kenwick Road and adjoining Lot 105A Brixton Street, Kenwick*. (Unpubl). Perth, WA.

Appendix 2

Recommended Environmental Conditions and Proponent's Consolidated Commitments

Statement No.

RECOMMENDED ENVIRONMENTAL CONDITIONS

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

EXTENSION OF REHOBOTH CHRISTIAN SCHOOL, 92 KENWICK ROAD, KENWICK

Proposal: To expand the Rehoboth Christian School in Kenwick on part of Lot 107 and Lot 105A to allow for additional education facilities to accommodate a primary school (refer to Schedule 1 attached).

Proponent: Association for Christian Education Inc.

Proponent Address: 92 Kenwick Road

Assessment Number: 1670

Report of the Environmental Protection Authority: Bulletin 1249

The proposal referred to in the above report of the Environmental Protection Authority may be implemented. The implementation of that proposal is subject to the following conditions and procedures:

1 Proposal Implementation

1-1 The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.

2 Proponent Environmental Management Commitments

2-1 The proponent shall fulfill the environmental management commitments contained in schedule 2 of this statement.

3 Proponent Nomination and Contact Details

3-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or 38(7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal.

3-2 The proponent shall notify the Chief Executive Officer of the Department of Environment and Conservation (CEO) of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.

4 Time Limit of Authorisation

4-1 The authorisation to implement the proposal provided for in this statement shall lapse and be void within five years after the date of this statement if the proposal to which this statement refers is not substantially commenced.

4-2 The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.

5 Compliance Reporting

5-1 The proponent shall submit to the CEO environmental compliance reports annually reporting on the previous twelve-month period, unless required by the CEO to report more frequently.

5-2 The environmental compliance reports shall address each element of an audit program approved by the CEO and shall be prepared and submitted in a format acceptable to the CEO.

5-3 The environmental compliance reports shall:

1. be endorsed by signature of the proponent's chief executive officer or a person, approved in writing by the CEO, delegated to sign on behalf of the proponent's chief executive officer;

2. state whether the proponent has complied with each condition and procedure contained in this statement;

3. provide verifiable evidence of compliance with each condition and procedure contained in this statement;

4. state whether the proponent has complied with each key action contained in any environmental management plan or program required by this statement;

5. provide verifiable evidence of conformance with each key action contained in any environmental management plan or program required by this statement;

6. identify all non-compliances and non-conformances and describe the corrective and preventative actions taken in relation to each non-compliance or non-conformance;

7. review the effectiveness of all corrective and preventative actions taken; and

8. describe the state of implementation of the proposal.

5-4 The proponent shall make the environmental compliance reports required by condition 5-1 publicly available in a manner approved by the CEO.

6 Wetland Rehabilitation

6-1 Within six months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Wetland Rehabilitation Plan, to the requirements of the Minister for the Environment.

The objectives of this Plan are to provide for:

- full rehabilitation of not less than 0.18 hectares of Threatened Ecological Community claypan wetlands (refer to area delineated on Figure 2); and
- partial rehabilitation of not less than 0.66 hectares of Threatened Ecological Community claypan wetlands (refer to area delineated on Figure 2),

This Plan shall address the following:

1. removal of weeds;
2. installation of fencing prior to site works;
3. planting of appropriate local species; and
4. implementation of the rehabilitation works by people with demonstrated expertise in rehabilitating wetlands.

6-2 The proponent shall implement the Wetland Management Plan required by condition 6-1.

7 Conservation Covenant

7-1 Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent will enter into a Conservation Covenant with a suitable covenant agency for the "Conservation Area" delineated in Figure 3 (attached), to the requirements of the Minister for the Environment.

The covenant shall:

1. ensure conservation of the declared rare flora and Threatened Ecological Communities on site;
2. conserve the Conservation Category Wetland values and valuable linkages to other remnant vegetation and the Greater Brixton Street Wetlands; and
3. prohibit future development of the remaining undeveloped portion of Lot 107.

8 Wetland Management

8-1 Within six months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent shall prepare a Wetland Management Plan addressing management of the conservation area and the developed site (post-construction), to the requirements of the Minister for the Environment.

This Plan shall address the following:

1. provision and management of buffers;
2. the maintenance of fencing;

3. ongoing weeding;
4. ongoing planting of appropriate local species; and
5. the maintenance of paths and access areas.

8-2 The proponent shall implement the Wetland Management Plan required by condition 8-1.

Notes

1. The CEO may seek the advice of the Environmental Protection Authority, government agencies and relevant parties, as necessary, for the preparation of written notice to the proponent.

2. The proponent shall relinquish the nomination following the procedure under section 38(6a) of the *Environmental Protection Act 1986*.

Schedule 1

The Proposal (Assessment No. 1670)

The proposal is the expansion of the Rehoboth Christian School in Kenwick on part of lot 107 and Lot 105A. (Refer to Figure 1)

The proposal involves:

- development on 1.0 ha of currently undeveloped land most of which is categorised as a Conservation Category Wetland and which includes 0.60 ha of a Threatened Ecological Community (TEC); and
- conservation management of 2.3 ha of two TECs in the remainder of the school lot, including:
  - full rehabilitation of 0.18 ha of TEC claypan wetlands;
  - partial rehabilitation of 0.66 ha TEC claypan wetlands; and
  - development of a series of management plans for the area, including;
    - Wetland Rehabilitation Plan
    - Wetland Management Plan
    - Drainage and Nutrient Management Plan

The main characteristics of the proposal are summarised in Table 1 below.

Table 1 - Key Proposal Characteristics (Assessment No. xxx)

Characteristic	Description
Project Life	approximately 6 months for clearing and earthworks
Area of disturbance	not more than 1.0 ha (refer to Figure 3)
Conservation area	not less than 2.3 ha (refer to Figure 3)
Rehabilitation	• Full rehabilitation of not less than 0.18 ha of TEC claypan wetlands (refer to Figure 2) Partial rehabilitation of not less than 0.66 he of TEC claypan wetlands (refer to Figure 2)
Drainage management	• Perimeter drain, flowing northwards to existing drain (refere to Figure 1) • Grading of playing areas • Stormwater recharge through soakwells close to source

Abbreviations:

ha – hectares

Figures

1 Proposal area
2 Vegetation mapping and proposed rehabilitation areas
3 Proposed conservation area

Figure 1: Proposal area

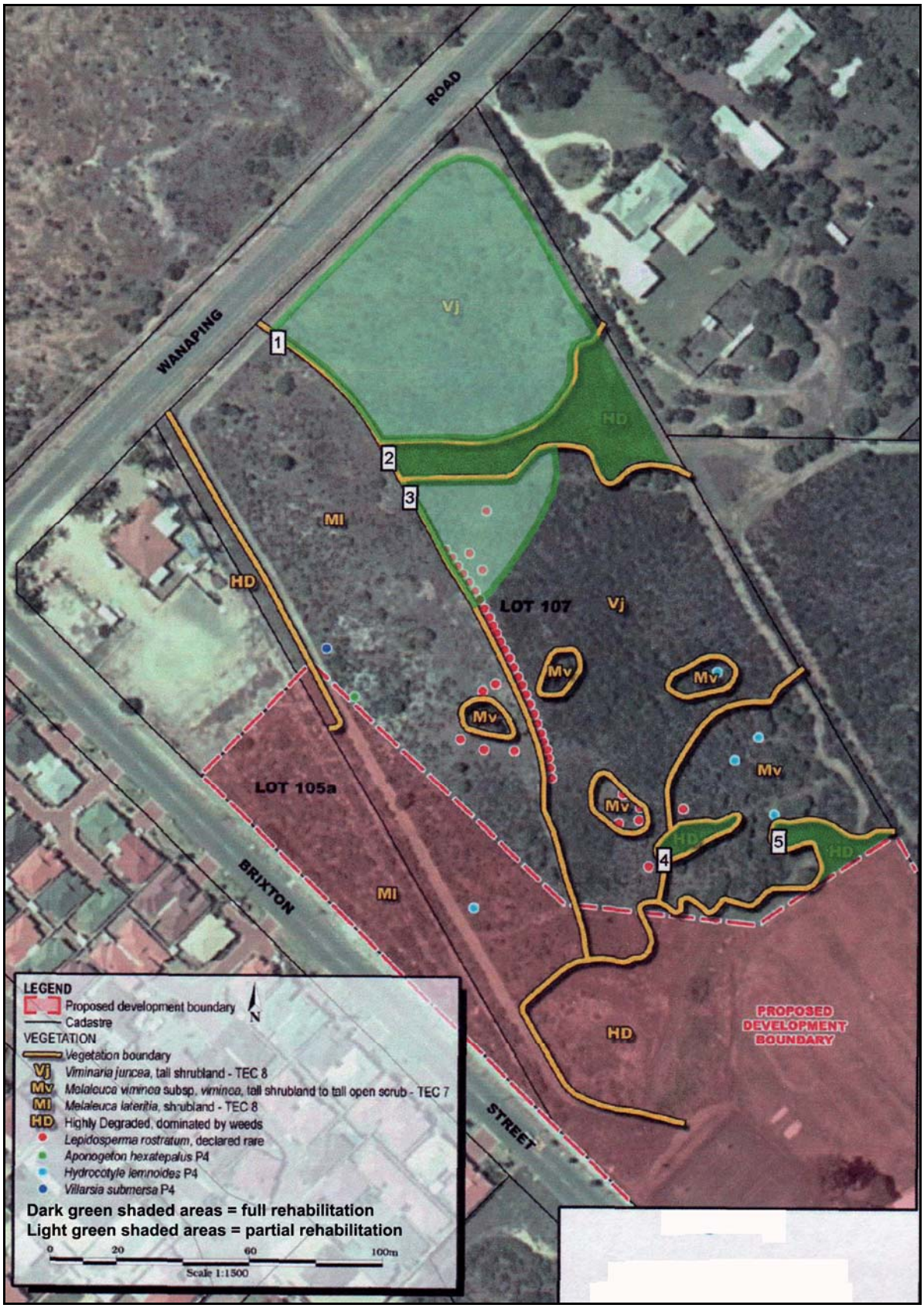


Figure 2: Vegetation mapping and proposed rehabilitation areas

Figure 3: Proposed conservation area

Schedule 2

Proponent
Environmental Management Commitments

August 2006

Extension of Rehoboth Christian School, 92 Kenwick Road, Kenwick
(Assessment No. 1670)

Association for Christian Education Inc.

PROPONENT ENVIRONMENTAL MANAGEMENT COMMITMENTS – Proposal xxx (Assessment No. XXX) Date 2006

No.	*Topic*	*Commitment*	*Objective*	*Advice*
1	Drainage and Nutrient Management	The proponent will not commence ground disturbance except in accordance with a Drainage and Nutrient Management Plan approved by the Department of Environment and Conservation addressing: 1. Construction of a shallow open drain along the perimeter of the development area (as shown in Figure 13) at the same level as the existing drain; 2. Building and hardstand areas drainage recharge to groundwater close to the source through the installation of appropriately designed soakwells (as approved by the Department of Environment and Conservation); 3. Grading of playing areas towards the perimeter drain; 4. Drainage and stormwater management, including installation of drains, post development discharge rates; and 5. Nutrient and irrigation management.	Maintain the hydrological regime of the conserved wetland, and prevent changes to the nutrient inputs into the conserved wetland.	DEC • Environmental Services Divisions
2	Acid Sulphate Soils	The proponent will not commence ground disturbance prior to conducting an Acid Sulphate Soil investigation that outlines the potential for acid sulphate soils relating to the installation of the perimeter drain and subsequent recommendations in the event that ASS be present.	To protect the environmental values of the wetland and adjacent wetlands and waterways.	DEC • Environmental Services Divisions

Abbreviations

DEC	Department of Environment and Conservation
TEC	Threatened Ecological Community
CCW	Conservation Catergory Wetlands
ASS	Acid Sulphate Soils

Appendix 3

Advice from the former Department of Conservation and Land Management
1 April 2005

Department of Conservation and Land Management

Conserving the nature of WA

Your ref: M04172
Our ref:
Enquiries: Val English
Phone: 9405 5169
Fax: 9306 1641
Email: vale@calm.wa.gov.au

Ms Kathy Choo
Senior Environmental Scientist
Bowman Bishaw Gorham
PO Box 465
SUBIACO WA 6904

Dear Ms Choo

PROPOSED DEVELOPMENT FOR REHOBOTH CHRISTIAN SCHOOL, LOTS 107 AND 105A KENWICK ROAD AND BRIXTON STREET, KENWICK

Thank you for your letters of 7 December 2004 and 15 March 2005 regarding the proposed development to extend the Rehoboth Christian School.

The proposal is for the proponent to purchase Lot 105A from the City of Gosnells and to include this, and the south-western edge of Lot 107, as part of the development area. The vegetation in this area is considered to be a Threatened Ecological Community ('TEC 8 – herb rich shrublands in clay pans'). However, the vegetation in the proposed development area is generally significantly more degraded than in the area proposed for conservation. On Bush Forever vegetation condition scales, the area now proposed for development would be mostly in 'good condition', whereas the area proposed for conservation would be considered in 'very good' to 'excellent' condition. The land proposed to be purchased (Lot 105A) will apparently cost in the vicinity of $150,000. Lot 105A also includes a drain and quite a wide firebreak. These areas have already been cleared.

The proponent proposes to fence the conservation area, and to rehabilitate the degraded areas that occur within the conservation area. The area proposed for 'full rehabilitation' (of totally degraded areas) is 1,775 m^2, and the area proposed for 'limited rehabilitation' (ie weed control etc) is 6,575 m^2. The proponent also has a commitment to involvement in the management of the nearby Brixton Street wetlands, and to include environmental education utilising the new conservation area in future curricula. The proponent has also agreed to maintain the current hydrology within the proposed conservation area by implementing recommendations made by their hydrological consultant with regard to drainage.

In summary, the proposed development package therefore includes:

- clearing of 6,010 m^2 of TEC 8 (herb rich shrublands in clay pans - ranked vulnerable);
- conservation management of 620 m^2 of TEC 7 ('herb-rich saline shrublands in clay pans' – ranked vulnerable);
- conservation management of 22,070 m^2 of TEC 8;

- development of 2,540 m^2 of highly degraded areas.

The mitigation/offset package consists of:

- purchase of TEC 8 area in poorer condition than area proposed for conservation (~$150,000) for the purpose of development;
- full rehabilitation of 1,775 m^2 of TEC claypan wetlands;
- partial rehabilitation of 6,575 m^2 of TEC claypan wetlands;
- commitment by the proponent to develop and implement a management plan in consultation with CALM and the Department of Environment, for proposed conservation areas (including fencing), and to include conservation management in the school environmental education curriculum;
- commitment by the proponent to continue active involvement in management of the Brixton Street wetlands in their curriculum.

CALM has considered the proposed offset/mitigation package, taking into account the Environmental Protection Authority's Preliminary Position Statement of July 2004 on Environmental Offsets.

CALM does not object to the proposal proceeding, on the basis of the proposed offset/mitigation package and that (1) the proposed conservation area is either vested for conservation or protected under a permanent conservation covenant; (2) a management plan for the proposed conservation area is developed in consultation with, and endorsed by, CALM and the Department of Environment, and a commitment is made to implement the management plan; and (3) a commitment is made to manage drainage on the development site so that the conservation area is not adversely impacted.

Yours sincerely

Keiran McNamara
EXECUTIVE DIRECTOR

1 April 2005

cc Kathryn Schell, Department of Environment

Appendix 4

Proponent's referral information

Rehoboth Christian School

Extension of Rehoboth Christian School Pt Lot 107 (No. 92) Kenwick Road and adjoining Lot 105A Brixton Street, Kenwick

Referral Documentation

BlueSands environmental

Disclaimer

This document has been prepared for the Client (Rehoboth Christian School) on behalf of BlueSands Environmental in accordance with an agreement between the Client and BlueSands Environmental.

Blue Sands accepts no liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be suffered as a consequence of relying on this document for any purpose other than that agreed with the Client.

Contents

1 Introduction

1.1 Proposal Overview

The purpose of this document is to allow the Environmental Protection Authority with sufficient information to set the level of assessment for the proposal by Rehoboth Christian School to extend its Kenwick Campus.

Rehoboth Christian School is seeking approval to extend its Kenwick Campus by adding additional education facilities to accommodate a primary school. At the time of initially submitting the development application to the City of Gosnells, Rehoboth was not aware of the full environmental significance of the land – namely, that the land contained a Conservation Category Wetland, declared rare flora and Threatened Ecological Communities.

Having recognised the environmental significance of the subject land there have been various exchanges of correspondence between State and local government agencies and Rehoboth. This has resulted in further investigation and studies on the environmental significance of the land, resulting in redefinition of the proposal.

1.2 Proponents Details

The proponent for this proposal is the **Association for Christian Education Inc.** also referred to in this document as **Rehoboth Christian School.**

Contact

Organisation:	Rehoboth Christian School
Contact:	Ray Dallin
Position:	Chief Executive Officer
Address:	92 Kenwick Road Kenwick WA
Telephone:	08 9452 1833
Fax:	08 9452 1944
Email:	rayd@rehoboth.edwa.net.au

1.3 Site Location and Existing Land Use

The subject land is located approximately fourteen (14) kilometres south-east of the Perth Central Business District and three (3) kilometres east of the Cannington Regional Centre.

Refer to Figure 1 – Location Plan.

The land is described as Lot 107 Kenwick Road and adjoining Lot 105A Brixton Street, Kenwick. Lot 107 has an area of 5.97 hectares and Lot 105A is 0.244 hectares, both are irregular in shape.

The land has frontage to Kenwick and Wanaping Roads, and Brixton Street. Each of the roads is constructed to a sealed urban standard.

Refer to Figure 2 – Subject Land.

The south-eastern third of the site is presently developed with a primary school and high school which is principally situated the eastern portion of the site. The developed portion of the site includes classrooms, administration centre, carparks and playing fields.

The north-western portion of the site is presently undeveloped. The land is characterised by *Melaleuca* and *Vimiaria* scrubland of varying densities and condition and a Conservation Category wetland.

Refer to Figure 3 – Aerial photography

1.4 Approvals

An initial enquiry to extend Rehoboth School was received by the City of Gosnells in May 2003. A number of environmental constraints were identified by the Environmental Coordinator at the City. The proponent considered these environmental constraints and prepared a Development Application which was submitted to the City in April 2004. The proposal still posed potential impacts to some environmental values and was subsequently referred to the Department of Environment and Department of Conservation and Land Management.

Due to the presence of a Conservation Category Wetland, Threatened Ecological Communities and declared rare flora, the proposal was then referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986.* The EPA is seeking additional information on the proposal to assist it in setting the level of assessment, being the purpose of this document.

Due to the presence of Declared Rare Flora (DRF), *Lepidosperma rostratum* on the site Rehoboth may be required to seek approval from the Commonwealth Environment Minister as the species is listed as 'Threatened' under the *Environmental Protection and Biodiversity Conservation Act (1999)*. However, Rehoboth will delay in seeking this approval from Environment Australia until it receives approval from the EPA.

The Threatened Ecological Communities found on Lot 107 and Lot 105A are not listed under the *Environmental Protection and Biodiversity Conservation Act (1999)* and do not require Commonwealth approval.

2 Description of Proposal

2.1 Initial Proposal

In April 2004, Rehoboth formally submitted a Development Application to the City of Gosnells, although there had been a number of exchanges of correspondence between the City and Rehoboth prior to this formal application. The plans sought to:

Develop a new primary school facility within Lot 107 at the northern end of the existing school. The initial proposal included;

- Multi Purpose Hall;
- Classrooms;
- Administration rooms;
- Play area; and
- Extension to the current school oval.

The proposed buildings were generally located within the central portion of Lot 107 generally adjacent to Brixton Street (Refer to Figure 4 – initial proposal).

Given that the proposal was located within close proximity to the Brixton Street wetlands and contained priority flora species, the City of Gosnells referred the Development Application to the Department of Environment and Department of Conservation and Land Management (CALM).

A number of environmental constraints were identified through this process, including:

- the proposal was located on and adjacent to a Conservation Category (palusplain) Wetland;
- there are two Threatened Ecological Communties (TECs) ranked as 'Vulnerable' in the immediate vicinity of the proposal (being TEC 8 – herb-rich shrublands in claypans and TEC 7 – herb-rich saline shrublands in claypans);
- the presence of Declared Rare Flora (DRF), namely *Lepidosperma rostratum* occurs in the immediate vicinity of the proposal; and
- the proposal interrupted linkage between Bush Forever sites (being site 422 and site 387 in the Greater Brixton Street Wetlands).

Once Rehoboth became aware of these environmental constraints it engaged the services of various consultants to produce the following reports;

- Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick, September 2003 (Refer to Attachment 1);

- Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick: Reassessment of Declared Rare Flora *Lepidosperma rostratum*, February 2004 (Refer to Attachment 2); and

- Water Impacts Related to the Development of the New Junior School, April 2004 (Refer to Attachment 3).

Figure 5 highlights the ecological values of the site against the initial proposal.

2.2 Current Proposal

Aware of the potential environmental impacts posed by the proposal, Rehoboth has utilised the information from these studies to redefine its proposal (Figure 6). As part of ensuring the environmental acceptability of the current proposal, Rehoboth has entered into negotiations to acquire additional land.

This additional area of land, Lot 105A Brixton Street is owned by the City of Gosnells and contains vegetation in poorer condition. The aim of the current proposal is to contain the development in this area as much as possible to minimise the impacts on the sites ecological values.

The current proposal will result in development on approximately 1.0 hectare of undeveloped land, concentrated towards Brixton Street and Lot 105A, and avoids all identified declared rare flora. The current proposal will impact upon approximately 0.6 hectares of Conservation Category Wetland and Threatened Ecological Community (TEC 8 – *Melaleuca lateritia*). Refer to Photos 1 & 2 for views of the area to be developed.

Rehoboth is committed to achieving a net environmental benefit for the site by proposing rehabilitation works and management for the remaining 2.3 hectares of Conservation Category Wetland and Threatened Ecological Communities. Rehoboth's commitment to this is demonstrated by Figure 7, which outlines the current proposal area against the sites ecological values.

The current proposal has been referred to CALM who has no in-principle objection to the proposal, with respect to declared rare flora and Threatened Ecological Communities, subject to a number of conditions (Refer to Attachment 4). These conditions are addressed in more detail in Section 4.

3 Description of Existing Environment

3.1 Wetlands

A significant portion of Lot 107 and all of Lot 105A are classified as Conservation Category Wetlands (CCW). There is a general presumption against clearing these wetlands as they are the highest priority wetlands as classified by the Water and Rivers Commission Position Statement on Wetlands (2001).

Lot 107 also contains a Resource Enhancement wetland, some of which has been developed for some time but the available wetland mapping has not been updated to reflect this condition.

The wetlands present are linked to the Greater Brixton Street Wetlands, which are on the register of the National Estate. The wetlands on Lot 105A and Lot 107 are not classified as RAMSAR wetlands but do fall within the catchment of the Forrestdale and Thomsons Lake RAMSAR.

3.2 Vegetation/Flora

A flora and vegetation survey was conducted on Lot 107 and 105A in September 2003 and again in February 2004. The vegetation communities identified included *Viminaria juncea* Tall Shrubland, *Melaleuca viminea* subsp. *viminea* Tall Shrubland to Tall Open Scrub (Refer to Photo 3) and *Melaleuca lateritia* Shrubland (Refer to Photo 4). Most of the vegetation on Lot 107 was rated in 'Good' to 'Excellent' condition (Keighery's Condition Scale, 1994), except where it had been degraded by firebreaks and proximity to the school oval which is unfenced.

The vegetation on Lot 105A was rated 'Degraded' to 'Very Good' as it has considerably greater pressures and no buffer from urban development.

Lot 107 contains declared rare flora, *Lepidosperma rostratum*. A survey in February 2004 revealed a total of 82 plants in Lot 107 and none in Lot 105A. This species is gazetted under the *Wildlife Conservation Act 1950* and anyone wanting to remove or 'take' this plant requires approval from the Minister for Environment.

Two Threatened Ecological Communities (TECs) exist on the site. These include TEC 7, herb-rich saline shrublands in claypans (*Melaleuca viminea* subsp. v*iminea* tall shrubland to tall open scrub) and TEC 8, herb-rich shrublands in claypans (*Melaleuca lateritia* shrubland). These communities are classified as 'Vulnerable' and although no Ministerial approval is required for their removal, there is a general presumption against clearing these areas.

Three priority flora species were recorded on the site during a site survey in September 2003. These species included *Aponogeton hexatepalus* (P4), *Hydrocotyle lemnoides* (P4) and *Villarsia submersa* (P4). These species have been priority listed by the Department of Conservation and Land Management and best practice would recognise the importance of avoiding the removal of these species.

Bush Forever site No 422 exists to the south of the subject land and another site (No. 387) exists within the Greater Brixton Street Wetlands. The wetland in Lot 107 provides an ecological corridor between these two sites, although it is somewhat interrupted due to the presence of Brixton Street and an area highly degraded by weeds at the southern tip of the wetland on Lot 107.

A detailed description of the vegetation significance of the land is provided in the following attachments:

- Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick, September 2003 (Refer to Attachment 1); and

- Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick: Reassessment of Declared Rare Flora *Lepidosperma rostratum*, February 2004 (Refer to Attachment 2).

3.3 Hydrology

In April 2004, a water impacts study was commissioned by Rehoboth to identify hydrological factors of the site. It was found that the soils present are predominately silts and clays and thus have low permeability. Surface water runoff drains towards the western portion of the land where there is a shallow drain present (Refer to Photo 5).

This drain appears to be an old drainage path that flows northwards towards an open drain along Wanaping Road. It is believed to enter an underground piped system along Brixton Street that discharges into Yule Brook.

A detailed description of the hydrology of the land is provided in the following attachment:

- Water Impacts Related to the Development of the New Junior School, April 2004 (Refer to Attachment 3)

4 Environmental Issues and Management

4.1 Wetlands

4.1.1 Potential Environmental Impacts

The current proposal will require removal and infilling of approximately 1.0 hectare of Conservation Category palusplain Wetland (CCW), mostly towards Brixton Street and Lot 105A. Some of this area of CCW has been degraded due to its proximity to urban development, namely weed infestation.

Due to low lying nature of the site, infilling is required for the proposal. This may lead to changes in water levels and or water quality within the existing wetland on Lot 107. Infilling will block the existing drain and cause ponding along the edge of the infill, during high or prolonged rainfall events. This, in turn may alter the natural water levels in the wetland.

The proposal includes additional grassed areas and playing fields to accommodate a greater population of students. These grassed areas will require additional irrigation and maintenance, which may increase the total water volume and nutrient input into the environment.

4.1.2 Environmental Management and Mitigation

To minimise the above impacts on the wetland and to ensure long term protection of the existing wetland, Rehoboth proposes the following management:

- **Perimeter Drain & Acid Sulphate Soils**
  A shallow open drain shall be constructed along the perimeter of the development. This drain would discharge collected surface water to the existing open drain to the north west of the site (Refer to Figure 8). It is expected that installation of this drain will ensure additional ponding due to the infill does not occur and the overall hydrological regime of the subject land will be maintained.

  There have been some concerns expressed by the Wetlands Program, Department of Environment and Conservation as to the feasibility of this drain. There are concerns that this new perimeter drain will drain the wetland and transport nutrients, weed seed and pollutants to the wetland. There are also some concerns that construction of the drain may expose wetland sediments which may result in acid sulphate soil conditions.

  It is proposed that the perimeter drain shall be constructed at the same level of the existing drain to minimise any potential draining of the wetland. It is expected that concerns relating to nutrient and pollutant export will be addressed by the Drainage and Nutrient Management Plan (Refer to Section 4.3.2).

  Further investigations into the potential for acid sulphate soil conditions will be conducted prior to site works. Should disturbance and construction of the perimeter drain create acid sulphate soil conditions then appropriate management measures will be undertaken.

- **Conservation Covenant**
  Rehoboth will enter into a Conservation Covenant with a suitable covenant organisation within 6 months of obtaining EPA approval. The purpose of the covenant is to;

  - Ø Demonstrate Rehoboth's commitment to conserving the ecological significance of the subject land;
  - Ø Ensure conservation of the declared rare flora and Threatened Ecological Communities on the subject land;
  - Ø Conserve Conservation Category Wetland values and valuable linkages to other remnant vegetation and the Greater Brixton Street Wetlands; and
  - Ø Prohibit future development of the remaining undeveloped portion of Lot 107.

- **Wetland Rehabilitation Plan**
  A number of areas within the existing wetland are degraded and dominated by weeds. To offset any impacts caused by removing the proposed portion of Conservation Category Wetland & Threatened Ecological Community No. 8, Rehoboth will prepare a Wetland Rehabilitation Plan. This will aim towards achieving a net environmental benefit for the subject land.

  The Rehabilitation Plan will be prepared in consultation with the Department of Environment and Conservation and local community groups. It is expected that the Rehabilitation Plan will include detail on;

  - Ø Rehabilitation works;
  - Ø Installation of perimeter fencing around the conservation area; and
  - Ø Planting of appropriate local species.

  Rehabilitation works are to be undertaken by people with demonstrated knowledge and expertise in rehabilitating wetlands. Rehabilitation works are expected to be concentrated in areas mapped as highly degraded (Refer to Figure 9) with the objective of removing weeds and restoring flora to a condition that previously existed in these areas.

  The overall aim of rehabilitation is to link areas currently separated by highly degraded patches and improve the overall condition of the wetland. More specifically rehabilitation will consist of:

  - Ø Full rehabilitation of 0.18 hectares (Refer to dark green areas of Figure 10) of Threatened Ecological Community claypan wetlands to a condition that previously existed in these areas. This will involve weed removal, planting of appropriate local species and ongoing maintenance to ensure a sufficient rehabilitation standard is achieved; and
  - Ø Partial rehabilitation of 0.66 hectares (Refer to light green areas of Figure 10) Threatened Ecological Community claypan wetlands. This will involve mostly weeding and some planting of appropriate local species.

  The fencing will be typically post and wire with a vermin-proof base and top wire. The fence will seek to:

  - Ø Prevent trespassers (and therefore limit risk of fire and vandalism);
  - Ø Limit vermin entering the floristic and fauna community; and
  - Ø Define the area of significance.

- **Wetland Management Plan**
  To ensure the long term maintenance of the wetland's existing values and rehabilitated areas, Rehoboth will prepare a Wetland Management Plan. This plan will be developed in consultation with the Department of Environment and Conservation and will address:

  - Ø How perimeter fences will be maintained;
  - Ø Outline the location of paths and access areas and how these will be maintained;
  - Ø Ongoing weed management and removal; and
  - Ø Ongoing planting of appropriate local species.

  It is expected that management of the wetland will form part of the school's environmental management curriculum. However, this will involve very limited access to the fenced wetland by small groups of well supervised students. Potential activities performed by small groups may involve biological surveys and planting and could possibly be led by members of local community groups or staff with relevant expertise from the Community Involvement/Education Section of Department of Environment and Conservation.

- **Drainage and Nutrient Management Plan**
  To minimise the impact of the development on ground and surface water quality, a Drainage and Nutrient Management Plan will be developed. This plan will outline management of irrigation and fertiliser usage of grassed areas on the subject land (See Section 4.3.2 for further detail).

4.2 Vegetation/Flora

4.2.1 Potential Environmental Impacts

There is approximately 3.2 hectares of Threatened Ecological Communities (TEC) on Lots 107 & 105A. The current proposal will require removal of approximately 0.6 hectares of Threatened Ecological Community 8, herb-rich shrublands in claypans (*Melaleuca lateritia* shrubland).

Lot 107 contains declared rare flora, *Lepidosperma rostratum*. However, the current proposal has been modified to avoid all known occurrences of this species.

Lot 107 also contains three priority listed species, as outlined in Section 3.2. The current development will impact upon one individual of these priority flora, *Hydrocotyle lemnoides*, which occurs along the western boundary of Lot 107.

The wetland in Lot 107 provides a relatively weak link between Bush Forever sites (Numbers 422 and 387). This link has been weakened by the presence of Brixton Street and an area highly degraded by weeds at the southern tip of the wetland on Lot 107. It is not expected that the proposed development will have a significant impact on this linkage.

4.2.2 Environmental Management and Mitigation

In a regional context, TEC, No. 8, to be impacted upon has other such communities present in the Greater Brixton Street Wetlands. The proposal will directly impact upon approximately 0.6 hectares of this community. A further 2.6 hectares will be retained within the proposed conservation area and its condition improved with the full rehabilitation of 0.18 hectares and partial rehabilitation of 0.16 hectares of this TEC.

Although the proposal will result in the removal of 0.6 hectares of TEC No. 8, the proposed rehabilitation and management will ensure overall long term gain for the existing 2.6 hectares of TEC and wetland. This is due to Rehoboth's commitment to rehabilitation and management of an area that could otherwise be gradually degraded by weed infestation and other urban impacts.

The Wetland Rehabilitation Plan and Wetland Management Plan as described in Section 4.1.2 are expected to provide adequate protection to the Threatened Ecological Communities, declared rare flora and priority species that exist within the proposed conservation area.

The one individual of *Hydrocotyle lemnoides*, which would be removed by this proposal, may potentially be moved to the existing wetland. This should be investigated further in the Wetland Rehabilitation Plan.

4.3 Hydrology

4.3.1 Potential Environmental Impacts

Due to the low lying nature of the site, the proposed development will require infill. This infill will block much of the existing drain that transects the site. This would result in ponding of surface water runoff against the edge of the infill that would otherwise flow into this drain.

Buildings and hardstand areas, such as the proposed carpark, will concentrate stormwater runoff. This water should be recharged to the groundwater as close to the source as possible to minimise impacts.

Additional grassed areas are proposed as part of the development. Maintenance of these areas will require watering and use of fertilisers. Over use of fertilisers may result in nutrients entering the wetland or into nearby drains and ultimately Yule Brook.

The proposal is not expected to have an effect on local or regional groundwater levels (Aquaterra, 2004). High water levels are expected to be drained by the construction of a new perimeter drain (Refer to Section 4.2.3) which would have occurred with the existing drain. The proposal is not expected to cause a lowering of groundwater levels.

4.3.2 Environmental Management and Mitigation

To minimise the impacts on surface and ground water levels and quality, the following measures will be undertaken:

- **Perimeter Drain**
  A shallow open drain shall be constructed along the perimeter of the development at the same level as the existing drain. This drain would discharge collected surface water to the existing open drain to the north west of the site (Refer to Figure 8). It is expected that installation of this drain will ensure additional ponding due to the infill does not occur and the overall hydrological regime of the subject land will be maintained.

  There have been some concerns expressed by the Wetlands Program, Department of Environment and Conservation as to the feasibility of this drain. There are concerns that this new perimeter drain will drain the wetland and transport nutrients, weed seed and pollutants to the wetland. There are also some concerns that construction of the drain may expose wetland sediments which may result in acid sulphate soil conditions.

It is proposed that the perimeter drain shall be constructed at the same level of the existing drain to minimise any potential draining of the wetland. It is expected that concerns relating to nutrient and pollutant export will be addressed by the Drainage and Nutrient Management Plan.

Further investigations into the potential for acid sulphate soil conditions will be conducted prior to site works. Should disturbance and construction of the perimeter drain create acid sulphate soil conditions then appropriate management measures will be undertaken.

- **Stormwater recharge**
  Building and hardstand areas drainage recharge to groundwater close to the source through the installation of appropriately designed soakwells (as approved by the Department of Environment and Conservation)

- **Grading of playing areas towards the perimeter drain**
  Grading playing areas will ensure a reduction in water logging and will drain excess surface water from the site

- **Drainage and Nutrient Management Plan**
  To minimise the impact of the development on ground and surface water quality, a Drainage and Nutrient Management Plan will be developed.

  This plan will include information on, but not be limited to:

  - Topography
  - Runoff and infiltration factors
  - Soil types and Phosphorus Retention Index (PRI)
  - Drainage management, including installation of drains (with particular regard to the perimeter drain), investigations into post development discharge volume and peak flow rates and management of stormwater (including hardstand areas, buildings and grassed areas)
  - Nutrient management, including types of fertilisers, areas to be fertilised, frequency of use and timing of application
  - Irrigation management, including areas to be irrigated, type of irrigation system, frequency of irrigation, water source for irrigation
  - Monitoring system to be utilised (i.e. soil testing, leaf tissue analysis)

5 Environmental Commitments

Schedule 1

The Proposal (Assessment No. XXX)

The expansion of the Rehoboth Christian School in Kenwick on part of lot 107 and Lot 105A. (Refer to Figure 8)

The proposal involves:

- development on 1.0 ha of currently undeveloped land most of which is categorised as a Conservation Category Wetland and which includes 0.60 ha of a Threatened Ecological Community (TEC); and
- conservation management of 2.3 ha of two TECs in the remainder of the school lot, including:
- full rehabilitation of 0.18 ha of TEC claypan wetlands;
- partial rehabilitation of 0.66 ha TEC claypan wetlands; and
- development of a series of management plans for the area, including;
    - Ø Wetland Rehabilitation Plan
    - Ø Wetland Management Plan
    - Ø Drainage and Nutrient Management Plan

The main characteristics of the proposal are summarised in Table 1 below.

Table 1 - Key Proposal Characteristics (Assessment No. xxx)

Characteristic	Description
Project Life	6 months for clearing and earthworks
Area of disturbance	1.0 ha (reference to Figure 11)
Conservation area	2.3 ha (reference to Figure 11)
Rehabilitation	• Full rehabilitation of 0.18 ha of TEC claypan wetlands (Reference to Figure 10) • Partial rehabilitation of 0.66 he of TEC claypan wetlands (Reference to Figure 10)
Drainage management	• Perimeter drain, flowing northwards to existing drain (reference to Figure 8) • Grading of playing areas • Stormwater recharge through soakwells close to source

Abbreviations:

ha – hectares

Figures (attached)

1 Site location,
8 Proposed Drainage Plan
11 Proposed Area of Development and Conservation

PROPONENT ENVIRONMENTAL MANAGEMENT COMMITMENTS – Proposal xxx (Assessment No. XXX) Date 2006

No.	*Topic*	*Commitment*	*Objective*	*Advice*
1	Drainage Management	The proponent will not commence ground disturbance except in accordance with an approved Drainage and Nutrient Management Plan addressing: 1. Construction of a shallow open drain along the perimeter of the development area (as shown in Figure 13) at the same level as the existing drain; 2. Building and hardstand areas drainage recharge to groundwater close to the source through the installation of appropriately designed soakwells (as approved by the Department of Environment and Conservation); 3. Grading of playing areas towards the perimeter drain; 4. Drainage and stormwater management, including installation of drains, post development discharge rates; and 5. Nutrient and irrigation management.	Maintain the hydrological regime of the conserved wetland.	DEC • Environmental Services Divisions
2	Nutrient management	The proponent will not commence ground disturbance except in accordance with a Drainage and Nutrient Management Plan approved by the Department of Environment and Conservation.	To prevent changes to the nutrient inputs into the conserved wetland.	DEC • Environmental Services Divisions
3	Wetland rehabilitation	Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*. The proponent prepare a Wetland Rehabilitation Plan for the: § full rehabilitation of 0.18 hectares of TEC claypan wetlands (Note: Reference appropriate are on Figure); and § partial rehabilitation of .66 hectares of TEC claypan wetlands (Note: Reference appropriate are on Figure), and which will address the: 1. removal of weeds; 2. installation of fencing prior to site works; 3. planting of appropriate local species; and implementation of the rehabilitation works by people with demonstrated expertise in rehabilitating wetlands.	To enhance the environmental values of the conserved wetland.	DEC • Parks and Conservation Services

No.	*Topic*	*Commitment*	*Objective*	*Advice*
No.	*Topic*	*Commitment*	*Objective*	*Advice*
4	Acid Sulphate Soils	The proponent will not commence ground disturbance prior to conducting an Acid Sulphate Soil investigation that outlines the potential for acid sulphate soils relating to the installation of the perimeter drain and subsequent recommendations should ASS be present	To protect the environmental values of the wetland and adjacent wetlands and waterways	DEC • Environmental Services Divisions
5	Wetland rehabilitation	The proponent will implement the approved Wetland Rehabilitation Plan.	To enhance the environmental values of the conserved wetland.	DEC • Parks and Conservation Services
6	Conservation covenant	Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent will enter into a Conservation Covenant with a suitable covenant organisation that aims to: 1. Ensure conservation of the declared rare flora and TECs on site 2. Conserve CCW values and valuable linkages to other remnant vegetation and the Greater Brixton Street Wetlands 3. Prohibit future development of the remaining undeveloped portion of Lot 107	To protect the environmental values of the conserved wetland.	DEC
7	Management of conserved wetland	Within 6 months following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, the proponent will prepare a Wetland Management Plan addressing management of the proposed conservation area and developed site (post construction), including: 1. provision and management of buffers; 2. the maintenance of fencing; 3. ongoing weeding; and 4. ongoing planting of appropriate local species; and 5. the maintenance of paths and access areas.	To maintain and enhance the environmental values of the conserved wetland.	DEC • Parks and Conservation Services City of Gosnells
8	Management of conserved wetland	The proponent will implement the approved Wetland Management Plan.		DEC • Parks and Conservation Services City of Gosnells

Abbreviations

DEC	Department of Environment and Conservation
TEC	Threatened Ecological Community
CCW	Conservation Catergory Wetlands
ASS	Acid Sulphate Soils

6 References

Aquaterra Consulting Pty Ltd. (2004) Rehoboth Christian School: Water Impacts Related to the Development of the New Junior School. Unpublished report prepared for Rehoboth Christian School, April 2004.

Koch, B. (2003). *Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick.* Unpublished report prepared for Rehoboth Christian School, September 2003

Koch, B. (2003). *Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick :Reassessment of Declared Rare Flora Lepidosperma rostratum* Unpublished report prepared for Rehoboth Christian School, February 2004

RPS Bowman Bishaw Gorham. (2004) *Proposed Development for Rehoboth Christian School, Lots 107 and 105A Kenwick Road and Brixton Street, Kenwick.* Letter sent to Department of Conservation and Land Management for Rehoboth Christian School, dated 7th December 2004

Water & Rivers Commission (2001). *Water and Rivers Commission Position Statement: Wetlands.*

Van Lieven, W. (2003) *Lot 107 Kenwick Road: Rehoboth Christian School, Environmental Analysis of Site.* Unpublished report prepared by Wayne van Lieven, Environmental Coordinator, City of Gosnells outlining environmental values of the site.

7 Figures & Photographs

List of Figures

List of Photographs

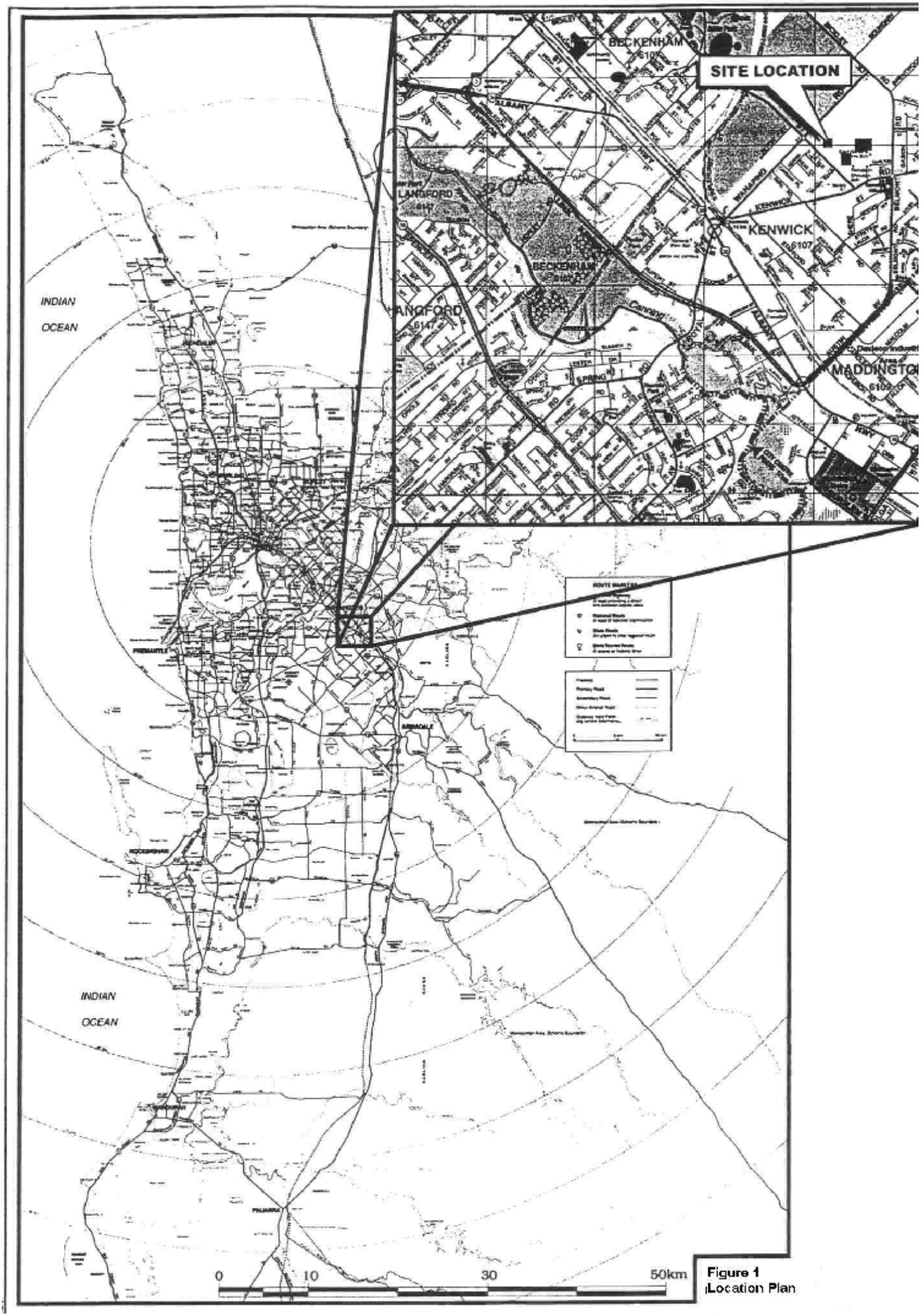


Figure 1
Location Plan

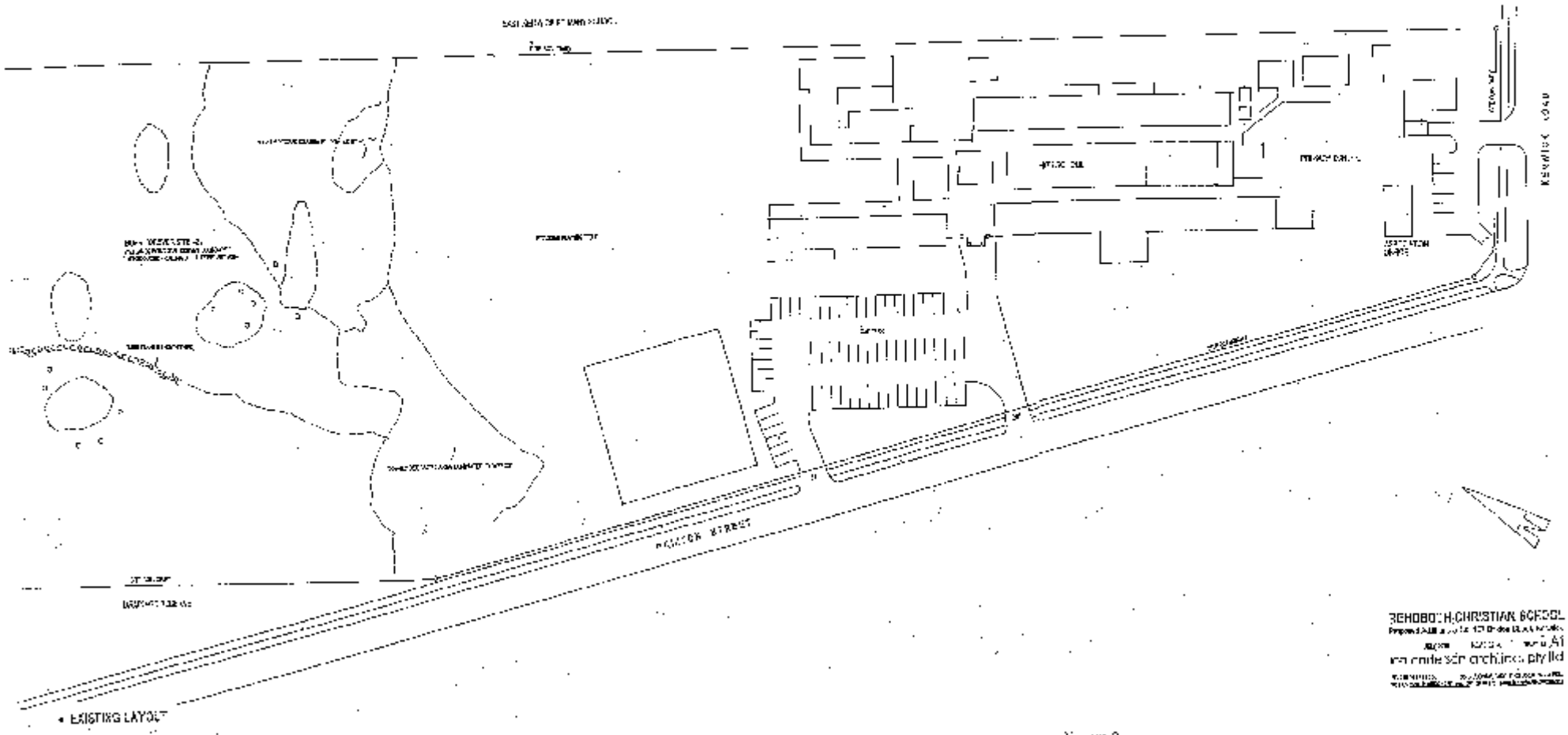


Figure 2
Subject Land
Lot 107 Renwick Road and Lot 105A Brighton Street, Renwick

Figure 3
Aerial Photography
Lot 107 Kenwick Road & 105a Brixton Street, Kenwick

Source: Department of Land Information, 2006

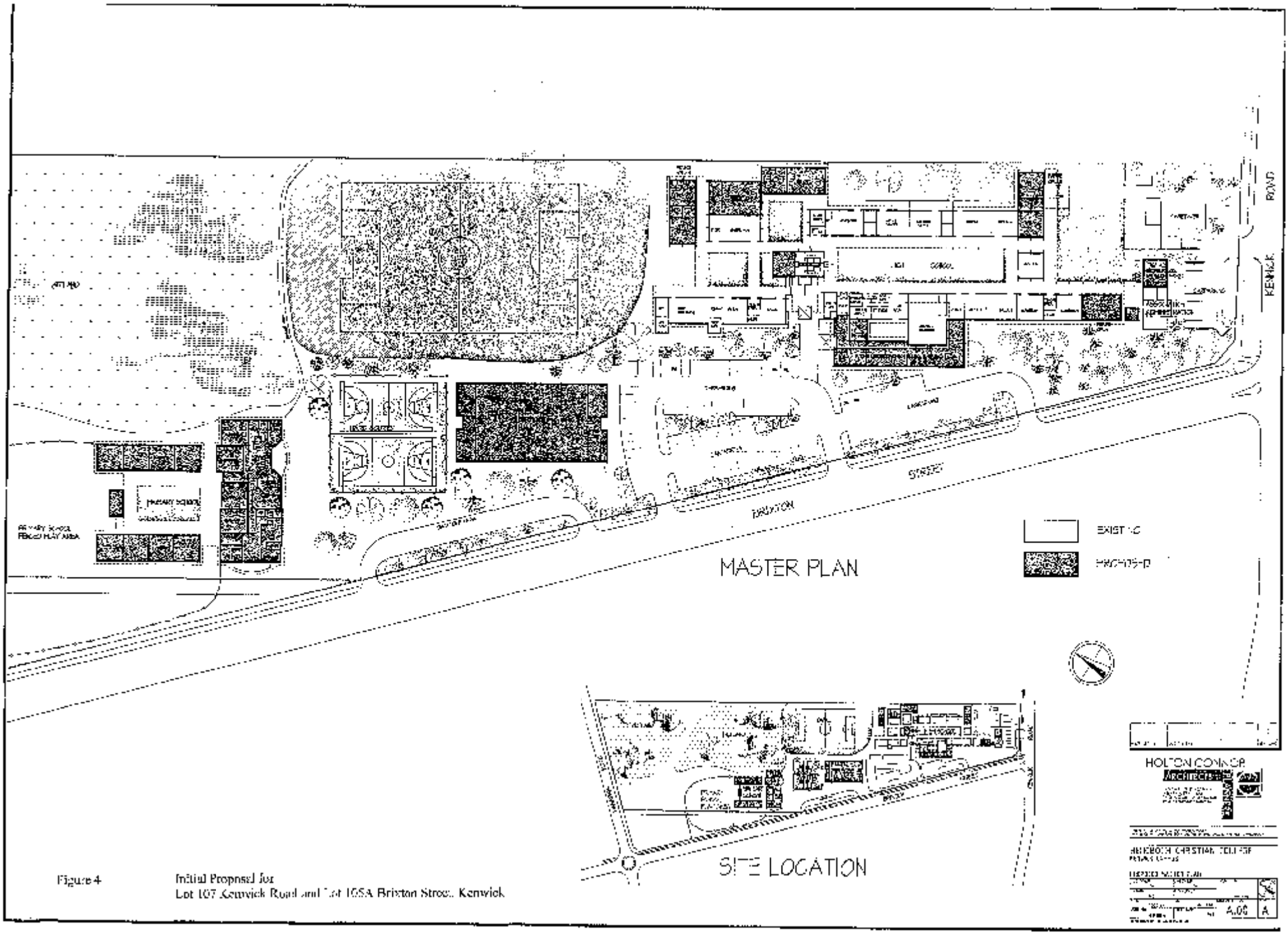


Figure 4 Initial Proposal for
Lot 107 Kenwick Road and Lot 105A Brixton Street, Kenwick

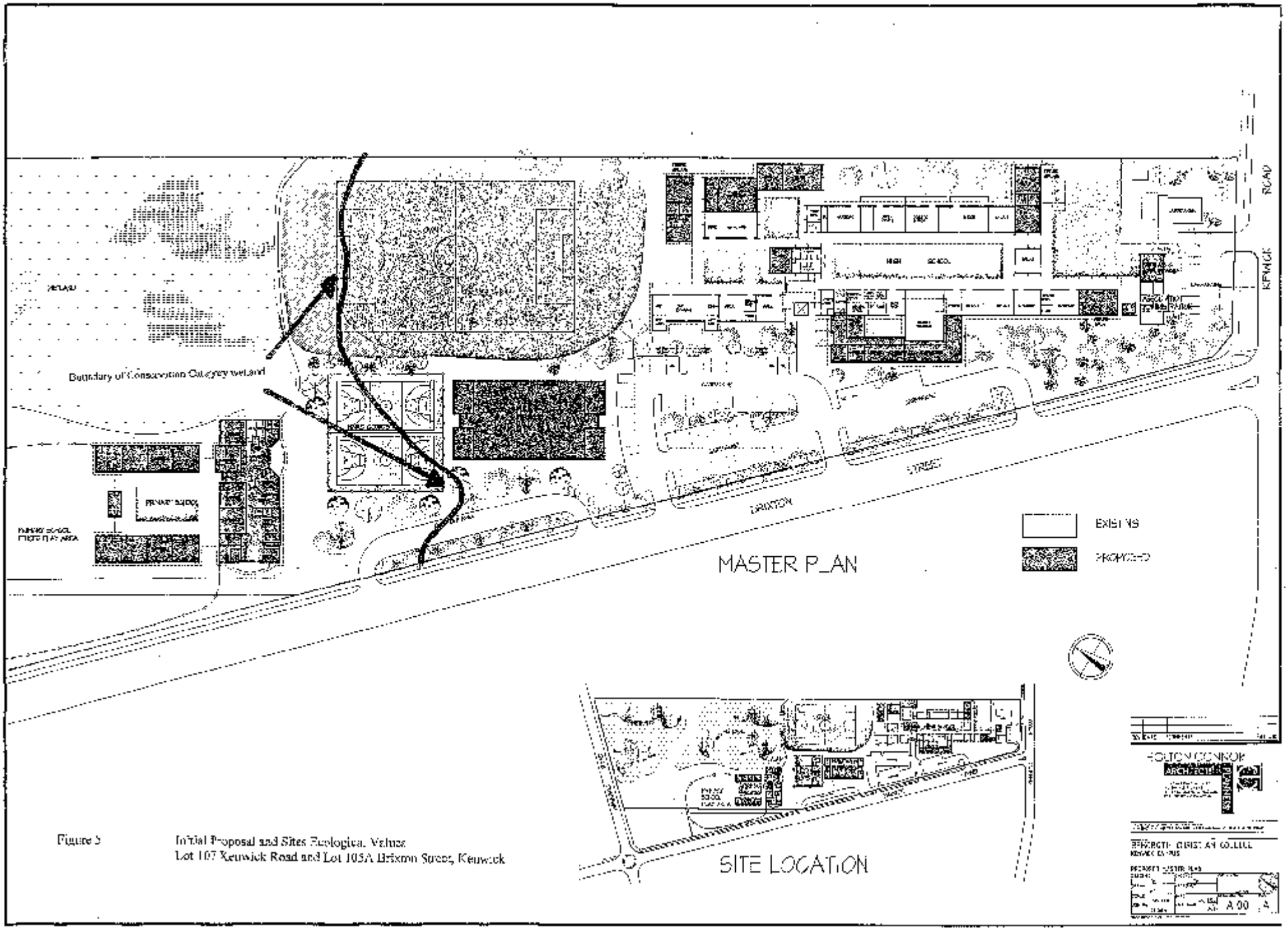


Figure 5 Initial Proposal and Sites Ecological Values
Lot 107 Keswick Road and Lot 105A Brixton Street, Keswick

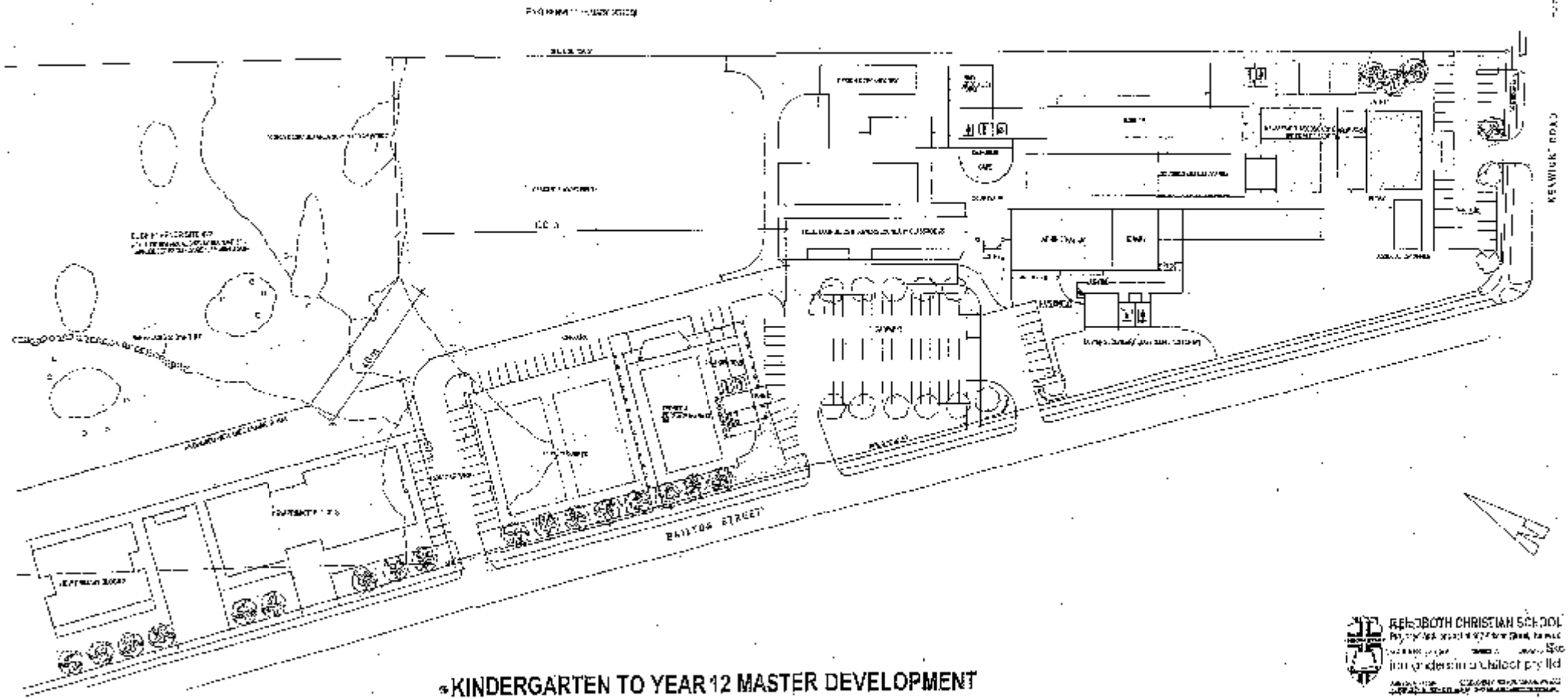


Figure 6
Current Proposal
Lot 107 Kenwick Road & Lot 105A Brixton Street, Kenwick

Scale 1:10

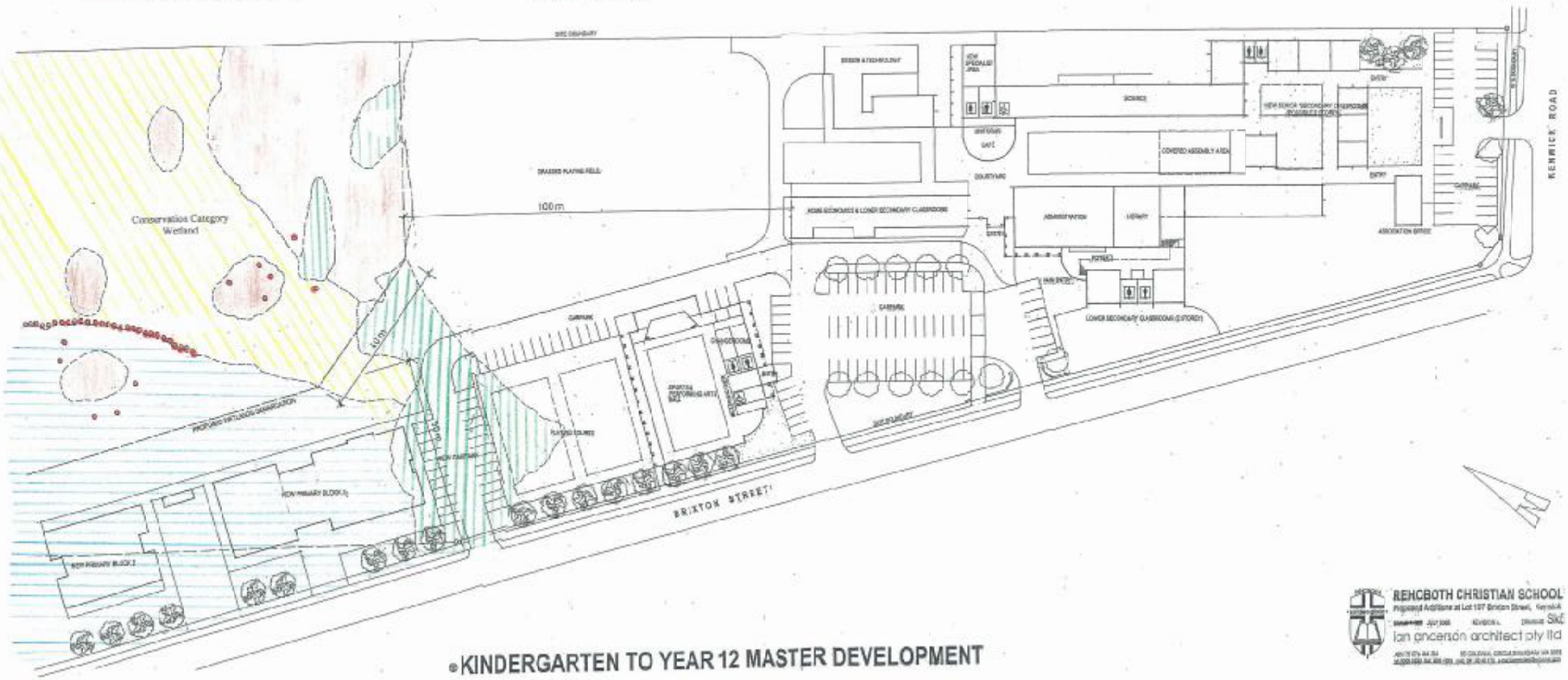
TEC 7 - herb-rich saline shrublands in claypans (*Melaleuca viminea* subsp. *viminea* tall shrubland to tall open scrub)

TEC 8 - herb-rich shrublands in claypans (*Melaleuca lateritia* shrubland)

Viminaria juncea Tall Shrubland

Degraded area

Declared Rare Flora, *Lepidosperma rostratum*



KINDERGARTEN TO YEAR 12 MASTER DEVELOPMENT

REHOBOTH CHRISTIAN SCHOOL
Proposed Additions at Lot 107 Brixton Street, Kenwick
ian anderson architect pty ltd

Figure 7
Current Proposal and Ecological Values of
Lot 107 Kenwick Road & Lot 105A Brixton Street, Kenwick

Scale 1:10

Figure 8

Proposed Drainage Plan

Source: RPS Bowman Bishaw Gorham & Aquaterra 2004 Date: 2004

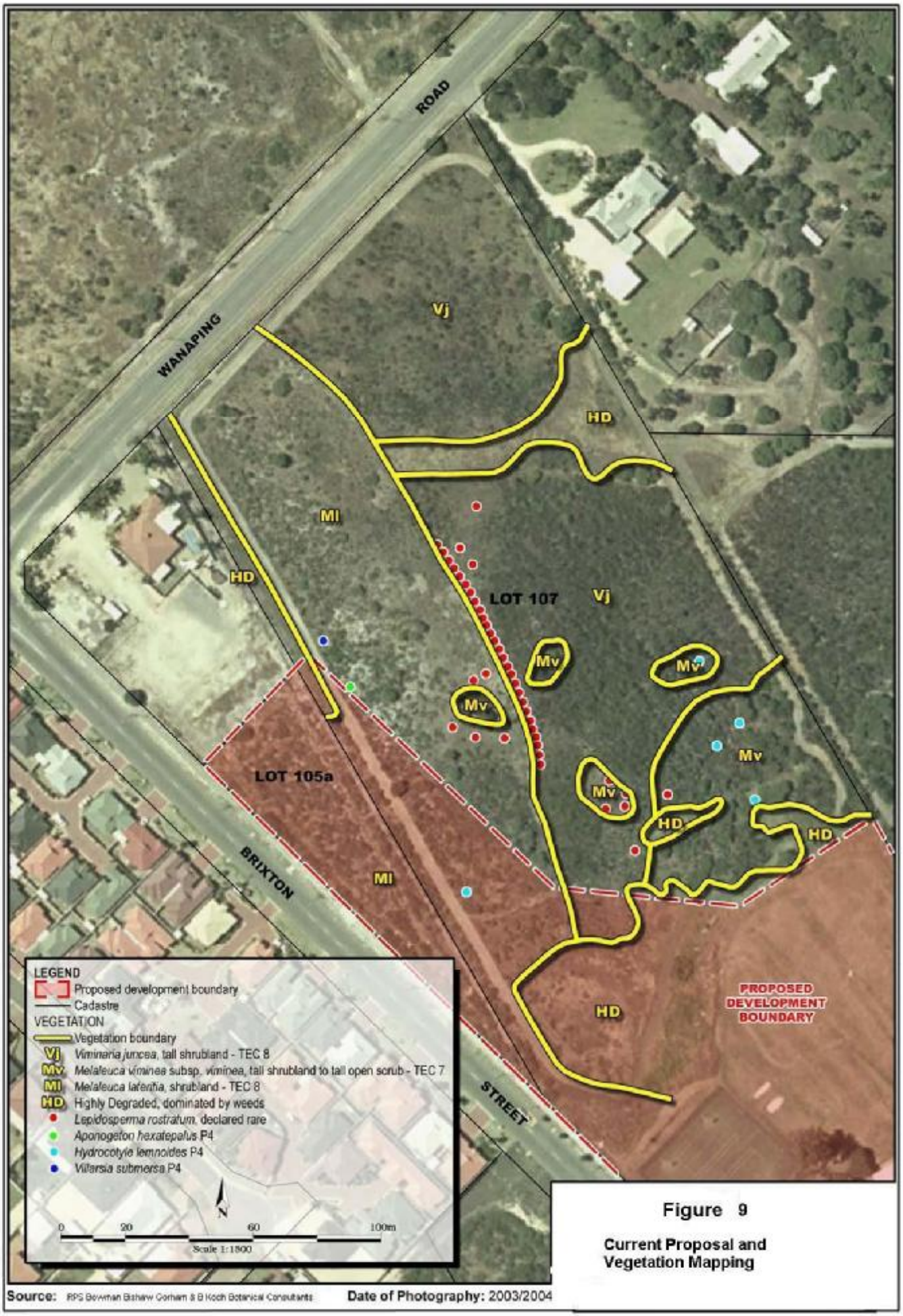


Figure 9

Current Proposal and Vegetation Mapping

Source: RPS Bowman Bishaw Gorham & B Koch Botanical Consultants **Date of Photography:** 2003/2004

Figure 10

Rehabilitation Plan

Source: B, Koch Botanical Consultant & RPS Bowman Bishaw Gorham **Date of Photography:** 2003/2004

Proposed Conservation Area – 2.3 hectares
Proposed Development Area – 1.0 hectares

Figure 11
Proposed Development and Conservation Area
Lot 107 Kenwick Road & Lot 105A Brixton Street, Kenwick

Photo 1: View from northern end of existing oval facing WSW towards existing basketball courts

Photo 2: View from northern end of existing oval facing NW towards proposed area to be cleared for development

Photo 3: View facing East of *Melaleuca viminea* subsp. *viminea* Tall Shrubland to Tall Open Scrub

Photo 4: View facing NW of *Melaleuca lateritia* Shrubland

Photo 5: View of existing open drain, facing NW

Attachments

1. Aquaterra Consulting Pty Ltd. (2004) *Rehoboth Christian School: Water Impacts Related to the Development of the New Junior School.* Unpublished report prepared for Rehoboth Christian School, April 2004.

2. Koch, B. (2003). *Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick.* Unpublished report prepared for Rehoboth Christian School, September 2003

3. Koch, B. (2003). *Flora and Vegetation Survey of Lot 107 Kenwick Road and Adjoining Lot 105A Brixton Street, Kenwick :Reassessment of Declared Rare Flora Lepidosperma rostratum* Unpublished report prepared for Rehoboth Christian School, February 2004

FLORA AND VEGETATION SURVEY OF LOT 107 KENWICK ROAD AND ADJOINING LOT 105A BRIXTON STREET, KENWICK

Prepared for: **Rehoboth Christian School**

Prepared by: **B. Koch Botanical Consultant**

September 2003

B. Koch Botanical Consultant,
10 Beresford Place
LEEMING, WA 6149.

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COVER PHOTOGRAPH

Viminaria juncea Tall Shrubland Community in Lot 107, Kenwick Road.

FIGURES

APPENDICES

FLORA AND VEGETATION SURVEY OF LOT 107 KENWICK ROAD AND ADJOINING LOT 105A BRIXTON STREET, KENWICK

1. SUMMARY

Rehoboth Christian School proposes to build a Primary School on the remnant vegetation on the northern section of Lot 107 Kenwick Road, Kenwick. The adjoining triangle of land with remnant vegetation is owned by City of Gosnells and will be referred to as Lot 105A Brixton Street in this report. Lot 105A and the drainage corridor were also surveyed during this study. Adjacent to Rehoboth School on its western boundary is Bush Forever Site 422 and on its northern boundary is the Greater Brixton Street Wetlands

One Declared Rare Flora, *Lepidosperma rostratum*, was recorded in Lot 107, but not in Lot 105A. This species is gazetted under the Wildlife Conservation Act (1950). The proponent will have to submit an application to seek approval from the State Minister for the Environment to "take" 1 plant of a rare flora. *Lepidosperma rostratum* is also listed as Threatened under the Federal Environmental Protection and Biodiversity Conservation Act, 1999. There is currently no bilateral agreement between the State and Commonwealth. The proponent will, therefore, have to submit an application seeking approval from the Commonwealth Environment Minister if the action will have or is likely to have a significant impact on a threatened species, in this case *Lepidosperma rostratum*.

A total of three Priority Flora species as defined by the Department of Conservation and Land Management (2003) were located in Lot 107 during the current survey; *Aponogeton hexatepalus*, *Hydrocotyle lemnoides* and *Villarsia submersa*. All are ranked as Priority Four Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years. It is not a legal offence "to take" flora classified as being Priority Flora and no Ministerial approval is required. However, it is encouraged that caution still be exercised and every effort should be made to avoid disturbing populations of these species wherever possible.

Two Threatened Ecological Communities (TEC's) were recorded in the study area, Floristic Community Types 7 and 8 (Gibson *et al.* 1994, English and Blyth 1997, Department of Conservation And Land Management 2003). These communities are classified as Vulnerable on the TEC list. Currently there is no Ministerial approval required. There is, however, a general presumption against clearing bushland containing TEC's or representation of vegetation complexes of which less than 10 per cent remains on the Swan Coastal Plain portion of the Perth Metropolitan Region (eg vegetation complexes of the eastern side of the Swan Coastal Plain) (Bush Forever 2000). The TEC's recorded in the study area are not listed on the EPBC Act and, therefore, do not require Commonwealth approval.

A large proportion of Lot 107 and all of Lot 105A have been designated as conservation category wetlands by the Waters and Rivers Commission. The Commission's position is that conservation category wetlands are accorded the highest priority for protection and conservation (Water and Rivers Commission Position Statement: Wetlands 2001). The remnant vegetation at the rear of East Kenwick Primary School has also been designated as conservation category wetlands. The remnant vegetation on Lots 107 and 105A will therefore provide some flora and fauna linkages between Bush Forever Site 422, East Kenwick Primary School and Greater Brixton Street Wetlands.

The State and Federal requirements and procedures for Declared Rare and Priority Flora, Threatened Ecological Communities and Conservation Wetlands have been summarized. It is recommended that the proponent seek further advice and recommendations from the relevant State and Federal Departments.

2. INTRODUCTION

B. Koch Botanical Consultant was commissioned to undertake a flora and vegetation survey of the remnant vegetation of the northern section of Lot 107 Kenwick Road, Kenwick. Rehoboth Christian School proposes to build a Primary School on this northern section. The adjoining triangle of land with remnant vegetation is owned by City of Gosnells and will be referred to as Lot 105A Brixton Street in this report. Lot 105A and the drainage corridor were also surveyed during this study. The area of vegetated land surveyed is approximately 4 hectares and the boundaries of the study area are shown on Figure 1. The study area is flat and seasonally waterlogged. Adjacent to Rehoboth School on its western boundary is Bush Forever Site 422 and on its northern boundary is the Greater Brixton Street Wetlands (Figure 1).

2.1 Geology, Landform and Soils

The study area occurs within the Guildford Formation, in the Pinjarra Plain (Churchward and McArthur 1980). It consists of sandy clays and clayey sands with other alluvium and colluvium. The Guildford Formation is generally of fluvial origin but does exhibit estuarine and shallow-marine deposits near the base.

This wetland is included in the Mungala Suite (Semeniuk 1987). Geomorphically it is the transition between the Bassendean Dunes and Pinjarra Plain. The underlying stratigraphy is a complex of sands, clays, calcrete and laterite. These wetlands lie along the depressions at the distributary ends of the creeks or adjacent to the intermittent disconnected drainage channels.

2.2 Vegetation

The study area is included in the Guildford Vegetation Complex of the Swan Coastal Plain (Heddle *et al.* 1980) described as being dominated by an open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) – *Eucalyptus marginata* (Jarrah) and a woodland of *Eucalyptus wandoo* (Wandoo), with minor components including the fringing woodland of *Eucalyptus rudis* (Flooded Gum) *Melaleuca rhaphiophylla* (Paperbark).

Keighery and Trudgen (1992) mapped the remnant vegetation of the eastern side of the Swan Coastal Plain They mapped the claypans, wet flats and dry flats as a 'Wetland Mosaic' to convey the complexity of vegetation communities within the area.

2.3 Declared Rare, Priority and Threatened Species

Species of flora and fauna are defined as Declared Rare or Priority Conservation status where their populations are restricted geographically or threatened by local processes. The Department of Conservation and Land Management recognises these threats of extinction and consequently applies regulations towards population and species protection. Rare Flora are gazetted under subsection 2 of section 23F of the Wildlife Conservation Act (1950) and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 23F of the Wildlife Conservation Act (1950 - 1980) defines "to take" as ".... to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means".

Unlike Declared Rare Flora, however, it is not a legal offence "to take" flora classified as being Priority Taxa. However, it is encouraged that caution still be exercised, given that Priority Flora are under consideration for declaration as 'rare flora', but are in need of further survey (Priority One to Three) or require monitoring every 5-10 years (Priority Four). Appendix A presents the definitions of Declared Rare and Priority Flora (Department of Conservation and Land Management 2003).

Threats of extinction of species are also recognised at a Federal level and categorised according to the Environmental Protection and Biodiversity Conservation (EPBC) Act, 1999. Categories of threatened species are summarised in Appendix B. A person must not take an action that has, will have or is likely to have a significant impact on a threatened species which are listed under the EPBC Act without approval from the Commonwealth Environment Minister. There are penalties for taking such an action without approval.

2.4 Threatened Ecological Communities

Communities are described as Threatened Ecological Communities (TEC's) if they have been defined by the Western Australian Threatened Ecological Communities Scientific Committee and found to be Presumed Totally Destroyed, Critically Endangered, Endangered or Vulnerable. The definitions of these categories are summarised in Appendix C. In Western Australia 69 TEC's have been endorsed by the Minister for Environment (correct to May 2003) (current list available at www.calm.wa.gov.au). The Department of Conservation and Land Management has prepared a draft Biodiversity Conservation Act which in the future will protect Rare Flora and TEC's.

Selected vegetation communities have also been listed as Threatened Ecological Communities under the Federal Environmental Protection and Biodiversity Conservation Act, 1999. Three categories have been defined, Critically Endangered, Endangered and Vulnerable (Appendix D) and a current list is available at www.ea.gov.au/epbc. A person must not take an action that has, will have or is likely to have a significant impact on a threatened ecological community listed under the EPBC Act without approval from the Commonwealth Environment Minister. There are penalties for taking such an action without approval.

2.5 Conservation Wetlands

Wetlands not only include lakes with open water but areas of seasonally, intermittently or permanently waterlogged soil. Most wetlands have been either cleared, filled or developed over, leaving only 20% of all wetlands that were present on the Swan Coastal Plain prior to European settlement. Of these, an estimated 15% of all wetland area has retained high ecological values. These areas have been designated as conservation category wetlands by the Waters and Rivers Commission. The Commission's position is that conservation category wetlands are accorded the highest priority for protection and conservation (Water and Rivers Commission Position Statement: Wetlands 2001).

The Convention on Wetlands, signed in Ramsar, Iran in 1971 (more commonly known as the Ramsar Convention) is an intergovernmental treaty dedicated to the conservation and "wise use" of wetlands. The Convention encourages the designation of sites containing representative, rare or unique wetland types, or that are important for conserving biological diversity to the List of Wetlands of International Importance (Ramsar sites). These sites need to be managed to ensure their special ecological values are maintained or improved.

An action will require approval from the Commonwealth Environment Minister if the action has, will have, or is likely to have a significant impact on the ecological character of a declared Ramsar wetland.

3. OBJECTIVES

The objectives of the current flora and vegetation survey were:

1) To identify and map the location of Declared Rare and Priority Flora, and Threatened Ecological Communities, within the Study Area;
4) To advise all State and Federal statutory requirements and procedures with regard to Declared Rare and Priority Flora, Threatened Ecological Communities, Conservation Category Wetlands and Ramsar sites;
6) To present the results in a report, which will include a map showing locations of the above species, Threatened Ecological Communities, and other important environmental issues.

4. METHODS

The flora and vegetation survey of the study area was conducted on the 18th and 20th August 2003. All Declared Rare and Priority Flora were mapped and numbers of individual plants counted. Notes were made on the vegetation communities observed and their boundaries mapped. The general condition of the vegetation was recorded using the scale of Keighery (1994). All plant specimens collected were compared with collections at the W.A. Herbarium and nomenclature of the species follows the W.A Herbarium (2003a,b).

5. RESULTS AND DISCUSSION

5.1 Flora

5.1.1 Taxa Recorded

A combined total of 38 vascular plant families, 79 genera and 94 taxa were recorded for the study area (Appendix E). Of these 27 taxa were introduced (weed) species.

5.1.2 Declared Rare and Priority Flora

One Declared Rare Flora, *Lepidosperma rostratum*, gazetted under the Wildlife Conservation Act (1950) was located in Lot 107 during the current survey. This species is also listed as Threatened under the Federal Environmental Protection and Biodiversity Conservation Act, 1999 and has been classified as Endangered - Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.

A total of three Priority Flora species as defined by the Department of Conservation and Land Management (2003) were located in Lot 107 during the current survey; *Aponogeton hexatepalus*, *Hydrocotyle lemnoides* and *Villarsia submersa*. All are ranked as Priority Four – Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Lepidosperma rostratum **Declared Rare (WC Act) and Endangered (EPBC Act)**
This species is subject to protection under State and Federal laws. Rhizomatous, tufted perennial sedge, 0.5m high, flowers brown. There are only 4 collections in the W.A. Herbarium, all from Yule Brook or nearby.

Within Lot 107 only one plant was recorded (Figure 1), none were recorded in the adjoining Lot 105A. This species was not recorded in the adjacent Bush Forever Site 422 (Bennett Environmental Consulting Pty Ltd 2002).

Aponogeton hexatepalus **Priority 4**
This species is not protected under State law, however, it is encouraged that caution still be exercised and every effort should be made to avoid disturbing populations of these species wherever possible. Rhizomatous or cormous, aquatic perennial herb, leaves floating, flowers green, white, flowers July-October. There are 21 collections in the W.A. Herbarium. Recorded from Kenwick to south of Capel.

Only recorded from one location within Lot 107 (Figure 1) and not recorded in Lot 105A. The rhizomes extended to occupy an approximate area of 3m x3m.

Hydrocotyle lemnoides **Priority 4**
This species is not protected under State law, however, it is encouraged that caution still be exercised and every effort should be made to avoid disturbing populations of these species wherever possible. Aquatic, floating annual herb, flowers purple, flowers August-October. There are 19 collections in the W.A. Herbarium. This species occurs from Encabba south to Collie and east to Beverley.

Recorded from five locations within Lot 107 (Figure 1) and not recorded in Lot 105A.

Villarsia submersa **Priority 4**
This species is not protected under State law, however, it is encouraged that caution still be exercised and every effort should be made to avoid disturbing populations of these species wherever possible. Aquatic, extremely slender perennial herb, flowers white, flowers August-November. There are 39 collections in the W.A. Herbarium. Recorded from Wannamal south to Mt Barker.

Only recorded from one location within Lot 107 (Figure 1) and not recorded in Lot 105A.

In addition one taxon, *Pimelea imbricata* var. *major* is listed as a Significant Species in Bush Forever (2000). Approximately 30 plants were located in Lot 107.

A Declared Rare plant, *Eleocharis keigheryi*, was recorded in the nearby Bush Forever Site 422 (Bennett Environmental Consulting Pty Ltd 2002) and in the Brixton Street Wetlands (Keighery 1995). Although an intensive search was carried out in Lots 107 and 105A, no plants were found.

5.1.3 Weeds

A total of 27 weeds (introduced species) were recorded for the study area (Appendix F). All have been determined as weeds by the Department of Conservation and Land Management (1999) and the Western Australian Herbarium (2003a,b) and their rating is given in Appendix F. The most common weed species present were **Romulea rosea*, **Sparaxis bulbifera* and **Watsonia meriana* var. *bulbillifera*.

The rating allocated to each weed species by Department of Conservation and Land Management (1999) is based on three criteria:

- Distribution – wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.
- Invasiveness – ability to invade bushland in good to excellent condition or ability to invade waterways.
- Environmental impacts – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community

Ratings indicate the following:

- High - indicates this weed is prioritised for control and/or research.
- Moderate - indicates control or research effort should be directed to it if funds are available, however it should be monitored.
- Mild – indicates monitoring of the weed and control where appropriate
- Low - indicates that this species would require a low level of monitoring.

Nine weeds recorded from the study area were rated as High, indicating these are species for prioritised control. As most of the study area has few weeds, eradication could be considered as a management issue depending on the future objective for the site. However, information on weed removal in wetlands must be obtained from the Waters and Rivers Commission.

5.2 Vegetation

5.2.1 Vegetation Communities

The vegetation communities identified in the study area are described using the vegetation layers of Keighery (1994). Three vegetation communities were identified and their boundaries are mapped on Figure 1. There are also areas that have been heavily degraded and are now nearly completely dominated by weed species. These have also been mapped on Figure 1.

1) *Viminaria juncea* Tall Shrubland
Occasional emergent of *Melaleuca rhaphiophylla*. These are wet flats and the soils are shallow loams and clays over ironstone. The understorey includes *Acanthocarpus canaliculatus, Acacia lasiocarpa* var. *lasiocarpa, Hypocalymma angustifolium, Petersonia occidentalis, Schoenus rigens,* and *Verticordia densiflora* var. *densiflora*

Based on the Floristic Community Types described by Gibson *et al.* (1994) this vegetation would be included in Floristic Community Type 8 - Herb rich shrublands in clay pans

2) *Melaleuca viminea* subsp. *viminea* Tall Shrubland to Tall Open Scrub
These are claypans with poor drainage. The understorey includes *Chaetanthus aristatus, Hydrocotyle lemnoides, Hypocalymma angustifolium, Meeboldina cana, Tribonanthes australis* and *Villarsia* sp.

Based on the Floristic Community Types described by Gibson *et al.* (1994) this vegetation would be included in Floristic Community Type 7 – Herb rich saline shrublands in clay pans

3) *Melaleuca laterita* Shrubland
Occasional emergent of *Melaleuca rhaphiophylla*. These are claypans with poor drainage. The understorey is dominated by *Burchardia multiflora, Meeboldina cana, Meeboldina coangustata, Sarcocornia quinqueflora, Tribonanthes australis* and *Triglochin linearis*.

Based on the Floristic Community Types described by Gibson *et al.* (1994) this vegetation would be included in Floristic Community Type 8 – Herb rich shrublands in clay pans

5.2.2 Threatened Ecological Communities

Both Floristic Community Types 7 and 8 recorded for the study area are listed as Threatened Ecological Communities by the Western Australian Threatened Ecological Communities Scientific Committee and classified as Vulnerable (Appendix C). Vulnerable ecological communities "have been adequately surveyed and found to be declining and/or have declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range".

Floristic Community Types 7 and 8 are not listed as Threatened Ecological Communities under the Federal Environmental Protection and Biodiversity Conservation Act, 1999.

5.2.3 Vegetation Condition

The condition of the vegetation was rated according to Keighery's Condition Scale (1994). Most of Lot 107 is in Good to Excellent condition except where it has been heavily degraded (as shown on Figure 1), disturbed along firebreaks and disturbed near the school oval. The vegetation condition of Lot 105A was rated lower, from Degraded to Very Good. This is probably because of its proximity to the road, housing and drain.

5.3 Wetlands

A large proportion of Lot 107 and all of Lot 105A have been designated as conservation category wetlands by the Waters and Rivers Commission (Figure 2). A proportion of the north-eastern section of Lot 107 was not included in the initial assessment. The results from this study recommend that the boundary be re-evaluated to include this section as it contains wetland dependent vegetation in good condition. Also the private property located on the corner of Brixton Street and Wanaping Road will need to be reclassed as resource enhancement. The remnant vegetation at the rear of East Kenwick Primary School has also been designated as conservation category wetlands (Figure 2). The wetland vegetation on Lots 107 and 105A will therefore provide some flora and fauna linkages between Bush Forever Site 422, East Kenwick Primary School and Greater Brixton Street Wetlands.

Buffers are designed to protect wetlands from potential deleterious impacts while helping safeguard and maintain ecological processes and functions within the wetland and, where possible, in the buffer. Buffer distances are measured from the outside extent of wetland dependent vegetation to the outside edge of any proposed development or activity. The required buffer distances for wetlands depend on the land use, 50 metres being the minimum buffer distance applied (Water Rivers Commission Position Statement: Wetlands 2001). The minimum buffer boundary would intersect the Rehoboth Christian School oval.

A classification system developed by the Semeniuk Research Group was employed for wetland classification on the Swan Coastal Plain (Hill *et al.* 1996). This system classifies wetlands based on landform and water permanence. Most of Lot 107 has been classified as a palusplain - a seasonally waterlogged flat (Figure 2). The central core has been classified as a sumpland – seasonally inundated basin.

Lots 107 and 105A are not listed as Ramsar sites but do fall within the catchment of the Forrestdale and Thomsons Lakes Ramsar site.

6. STATE AND FEDERAL REQUIREMENTS AND PROCEDURES

The State and Federal requirements and procedures are listed below. However, it is recommended that the proponent seek further advice from the relevant State and Federal Departments.

6.1 Declared Rare Flora

The Declared Rare Flora, *Lepidosperma rostratum*, is gazetted under the Wildlife Conservation Act (1950). The proponent will have to submit an application to seek approval from the State Minister for the Environment to "take" rare flora. In this submission the proponent will have to state the number of plants they wish to "take". Within Lot 107 only one plant was recorded.

This species is also listed as Threatened under the Federal Environmental Protection and Biodiversity Conservation Act, 1999. There is currently no bilateral agreement between the State and Commonwealth. The proponent will, therefore, have to submit an application seeking approval from the Commonwealth Environment Minister if the action will have or is likely to have a significant impact on a threatened species. *Lepidosperma rostratum* has been categorised as Endangered under the EPBC Act. There are administrative guidelines to decide if an action will have or is likely to have a significant impact on an Endangered species and these are listed below (also available on website, www.ea.gov.epbc *Administrative Guidelines on Significance*).

An action has, will have, or is likely to have a significant impact on an Endangered species if it does, will, or is likely to:

- lead to a long-term decrease in the size of a population, or
- reduce the area of occupancy of the species, or
- fragment an existing population into two or more populations, or
- adversely affect habitat critical to the survival of a species, or
- disrupt the breeding cycle of a 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 an endangered species becoming established in the endangered species habitat, or
- interferes with the recovery of the species.

If you are unsure whether your action is significant, you can still refer it and the Commonwealth Environment Minister will decide within 20 business days whether approval is needed. A guide and form for making a referral are available from Environment Australia's website

The applications for State and Commonwealth approval could be submitted concurrently. However, it is recommended that the State application be submitted first as it is likely that the Commonwealth would consult this before making its decision.

6.2 Priority Flora

Unlike Declared Rare Flora, it is not a legal offence "to take" flora classified as being Priority Flora and no Ministerial approval is required. However, it is encouraged that caution still be exercised, given that Priority Flora are under consideration for declaration as 'rare flora', but are in need of further survey. Every effort should be made to avoid disturbing populations of these species wherever possible.

6.3 Threatened Ecological Communities

Communities are described as Threatened Ecological Communities (TEC's) if they have been defined by the Western Australian Threatened Ecological Communities Scientific Committee and found to be Presumed Totally Destroyed, Critically Endangered, Endangered or Vulnerable (Appendix C) (English and Blyth 1997). Two TEC communities were recorded in the study area, Floristic Community Types 7 and 8, and both are classified as Vulnerable on the TEC list.

In Western Australia 69 TEC's have been endorsed by the Minister for Environment (correct to May 2003) (current list available at www.calm.wa.gov.au). Currently there is no Ministerial approval required. There is, however, a general presumption against clearing bushland containing TEC's or representation of vegetation complexes of which less than 10 per cent remains on the Swan Coastal Plain portion of the Perth Metropolitan Region (eg vegetation complexes of the eastern side of the Swan Coastal Plain) (Bush Forever 2000). The future Biodiversity Conservation Act will provide protection for Rare Flora and TEC's.

Selected vegetation communities have also been listed as Threatened Ecological Communities under the Federal Environmental Protection and Biodiversity Conservation Act, 1999. (current list is available at www.ea.gov.au/epbc). A person must not take an action that has, will have or is likely to have a significant impact (see on website, www.ea.gov.epbc *Administrative Guidelines on Significance*) on a threatened ecological community listed under the EPBC Act without approval from the Commonwealth Environment Minister. The two TEC communities recorded in the study area are not listed on the EPBC Act and, therefore, do not require Commonwealth approval.

6.4 Conservation Wetlands

A large proportion of Lot 107 and all of Lot 105A have been designated as conservation category wetlands by the Waters and Rivers Commission. The Commission's position is that conservation category wetlands are accorded the highest priority for protection and conservation (Water and Rivers Commission Position Statement: Wetlands 2001).

6.5 Metropolitan Region Scheme

Under the Metropolitan Region Scheme the proponent will need to submit a Development Application (DA) to seek approval to clear remnant vegetation. The proponent will need to submit a DA to the local council (i.e. City of Gosnells). The local council will then refer this to W.A. Planning Commission, who will subsequently refer it to other relevant government departments. The W.A. Planning Commission may place development conditions on the DA.

8. REFERENCES

Department of Conservation and Land Management (2003). *Declared Rare and Priority Flora List.* List published by the Department of Conservation and Land Management, Perth.

Bennett Environmental Consulting Pty Ltd (2002). *Flora, Vegetation and Fauna of Bush Forever Site 422 Kenwick.* Report Prepared for City of Gosnells.

Bush Forever (2000). *Volume 1 Policies, Principles and Processes.* Western Australian Planning Commission, Perth.
Volume 2 Directory of Bush Forever Sites. Department of Environmental Protection, Perth.

Churchward HM and McArthur WM (1980). *Landforms and Soils of the Darling System.* In: *Atlas of Natural Resources, Darling System, Western Australia.* Department of Conservation and Environment, Western Australia.

Department of Conservation and Land Management (1999). *Environmental Weed Strategy for Western Australia.* Department of Conservation and Land Management, Perth.

English VJ and Blyth J (1997). *Identifying and Conserving Threatened Ecological Communities in the South West Botanical Province.* Project Number N702, Final Report to Environment Australia. Department of Conservation and Land Management, Perth, Western Australia.

Gibson N, Keighery BJ, Keighery GJ, Burbidge AH and Lyons MN (1994). *A Floristic Survey of the Southern Swan Coastal Plain.* Unpublished report for the Australian Heritage Commission, prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.).

Huddle EM, Loneragan OL and Havel JJ (1980). Vegetation of the Darling System. In: *Atlas of Natural Resources, Darling System, Western Australia.* Department of Conservation and Environment, Western Australia.

Hill AL, Semeniuk CA, Semeniuk V and Del Marco A (1996). *Wetlands of the Swan Coastal Plain.* Volume 2A. Water and Rivers Commission, Perth.

Keighery BJ (1994). *Bushland Plant Survey. A Guide to Plant Community Survey for the Community.* Wildflower Society of WA (Inc.), Nedlands, Western Australia.

Keighery BJ and Trudgen ME (1992). *The Remnant Vegetation of the Eastern Side of the Swan Coastal Plain.* Unpublished Report to the Department of Conservation and Land Management for the National Estates Grants Programme.

Semeniuk CA (1987). *Wetlands of the Darling System - consanguineous wetlands and their distribution in the Darling System, South Western Australia.* Journal of the Royal Society of Western Australia 70: 69-87.

Western Australian Herbarium (2003a). *Florabase.* Department of Conservation and Land Management, Perth. www.calm.wa/gov.au

Western Australian Herbarium (2003b). *Max.* Department of Conservation and Land Management, Perth.

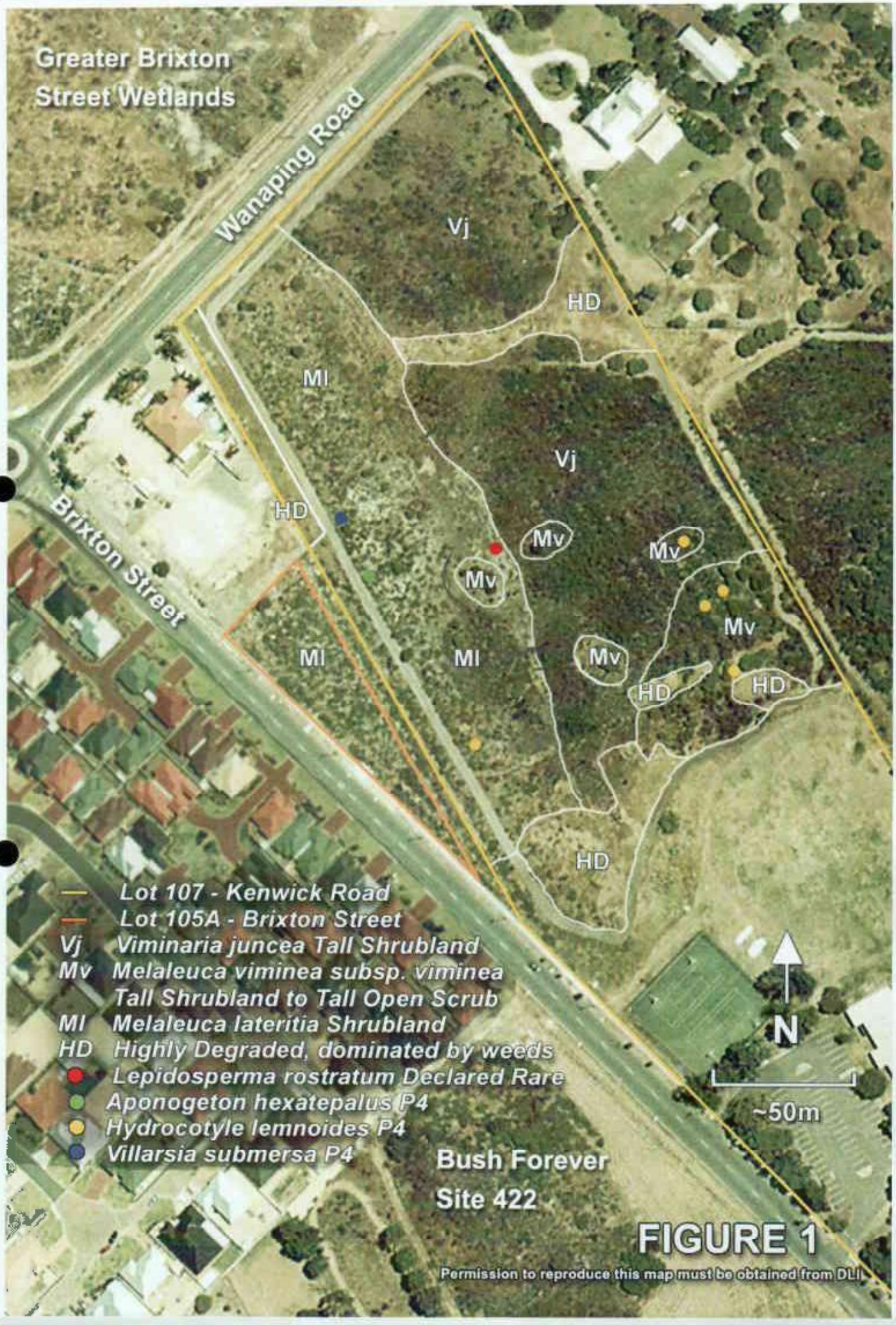

FIGURE 1

LEGEND

- Cadastre - DOLA 1/9/02
- Sealed & other roads
- Conservation
- Resource Enhancement

Swan Coastal Plain North 1m Orthomosaic - DOLA 01/00

N

Geocentric Datum of Australia 1994

Department of Environmental Protection
Water and Rivers Commission

FIGURE 2: Geomorphic Wetlands Lot 107 Kenwick Road.

APPENDIX A: Conservation Codes For Declared Rare and Priority Flora (Department of Conservation and Land Management 2000)

Declared Rare Flora – Extant Taxa

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

Declared Rare Flora – Presumed Extinct Taxa

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.

Priority One – Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, or the plants are under threat. May include taxa with threatened populations on protected lands. Such taxa under consideration for declaration as 'rare flora', but are in urgent need of further survey.

Priority Two – Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

Priority Three – Poorly Known Taxa

Taxa which are known from several populations, and the taxa are not believed to be under immediate threat, either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

Priority Four – Rare Taxa

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

APPENDIX B: Categories of Threatened Species (Environmental Protection and Biodiversity Conservation Act, 1999)

Category Code Ex – Extinct

Taxa which at a particular time if , at that time, there is no reasonable doubt that the last member of the species has died.

Category Code ExW – Extinct in the Wild

Taxa which is known only to survive in cultivation, in captivity or as a naturalized population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

Category Code CE – Critically Endangered

Taxa which at a particular time if, at that time, it is facing an extreme high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

Category Code E - Endangered

Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.

Category Code V - Vulnerable

Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Category Code CD – Conservation Dependent

Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

APPENDIX C: Categories of State Threatened Ecological Communities (Department of Conservation and Land Management 2003)

Presumed Totally Destroyed (PD)

An ecological community which has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

APPENDIX D: Categories of Federal Threatened Ecological Communities (Environment Australia 2003)

Critically Endangered (CR) – if it is facing an extremely high risk of extinction in the wild in the immediate future.

Endangered (EN) – if it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.

Vulnerable (VU) – if it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Appendix E: **Combined Vascular Plant Species List For Lot 107 Kenwick Road and Lot 105a Brixton Street In Family Order**
* Plant introduced (weed)

FAMILY	SPECIES
TYPHACEAE	**Typha orientalis* (Bulrush)
APONOGETONACEAE	*Aponogeton hexatepalus* **Priority 4**
JUNCAGINACEAE	*Triglochin linearis*
	Triglochin striata
POACEAE	**Avena barbata* (Bearded Oats)
	**Briza minor* (Shivery Grass, Lesser Quaking Grass)
	**Cynodon dactylon* (Couch)
	**Ehrharta calycina* (Perennial Veldt Grass)
	**Eragrostis curvula* (African Lovegrass)
	**Hyparrhenia hirta* (Tambookie Grass)
	**Lolium rigidum* (Annual Ryegrass)
	**Pennisetum clandestinum* (Kikuyu)
	**Vulpia myuros* (Silver Grass, Rat's Tail Fescue)
CYPERACEAE	*Chorizandra enodis*
	Gahnia trifida
	Lepidosperma longitudinale
	Lepidosperma ?pubisquameum
	Lepidosperma rostratum **Declared Rare**
	Schoenus rigens
ARACEAE	**Zantedeschia aethiopica* (Arum Lily)
RESTIONACEAE	*Chaetanthus aristatus*
	Lepyrodia glauca
	Meeboldina cana
	Meeboldina coangustata
	Tremulina tremula
JUNCACEAE	*Juncus ?holoschoenus*
	Juncus pallidus
DASYPOGONACEAE	*Acanthocarpus canaliculatus*
	Lomandra micrantha
	Lomandra suaveolens

Appendix E: **Combined Vascular Plant Species List For Lot 107 Kenwick Road and Lot 105a Brixton Street In Family Order**
* Plant introduced (weed)

FAMILY	SPECIES
XANTHORRHOEACEAE	*Xanthorrhoea preissii*
ANTHERICACEAE	*Borya scirpoidea* *Sowerbaea laxiflora* *Thysanotus ?patersonii*
COLCHICACEAE	*Burchardia multiflora*
HAEMODORACEAE	*Conostylis festucacea* subsp. *festucacea* *Tribonanthes australis*
IRIDACEAE	**Moraea flaccida* (Cape Tulip) *Patersonia occidentalis* **Romulea rosea* (Guildford Grass) **Sparaxis bulbifera* (Harlequin Flower) **Watsonia meriana* var *bulbillifera* (Bulbil Watsonia)
ORCHIDACEAE	*Diuris* aff. *laxiflora* (A. Brown pers. com.)
CASUARINACEAE	*Allocasuarina ?lehmanniana*
PROTEACEAE	*Hakea trifurcata* *Hakea varia*
POLYGONACEAE	**Rumex crispus* (Curled Dock)
CHENOPODIACEAE	*Halosarcia indica* subsp. *bidens* *Sarcocornia quinqueflora*
CARYOPHYLLACEAE	**Spergula arvensis* (Corn Spurrey)
LAURACEAE	*Cassytha racemosa*
BRASSICACEAE	**Brassica tournefortii* (Wild Turnip)
DROSERACEAE	*Drosera heterophylla* *Drosera ?rosulata*
CRASSULACEAE	**Crassula natans*

Appendix E: **Combined Vascular Plant Species List For Lot 107 Kenwick Road and Lot 105a Brixton Street In Family Order**
* Plant introduced (weed)

FAMILY	SPECIES
MIMOSACEAE	*Acacia lasiocarpa* var. *lasiocarpa*
	Acacia saligna
PAPILIONACEAE	*Eutaxia virgata*
	Jacksonia sternbergiana
	**Lotus sp.*
	**Vicia sativa* (Common Vetch)
	Viminaria juncea
OXALIDACEAE	**Oxalis glabra* (Finger Leaf Oxalis)
	**Oxalis pes-caprae* (Sour Grass)
THYMELAEACEAE	*Pimelea imbricata* var. *major*
MYRTACEAE	*Asturtea affinis* ms
	Hypocalymma angustifolium
	Kunzea micrantha subsp. *micrantha*
	Melaleuca lateriflora subsp. *acutifolia*
	Melaleuca lateritia
	Melaleuca rhaphiophylla
	Melaleuca viminea subsp. *viminea*
	Verticordia acerosa var. *preissii*
	Verticordia densiflora var. *densiflora*
HALORAGACEAE	*Gonocarpus nodulosus*
APIACEAE	*Hydrocotyle lemnoides* **Priority 4**
	Schoenolaena juncea
PRIMULACEAE	*Samolus junceus*
MENYANTHACEAE	*Villarsia ?albiflora*
	Villarsia submersa **Priority 4**
BORAGINACEAE	**Echium plantagineum* (Paterson's Curse, Salvation Jane)
LENTIBULARIACEAE	*Utricularia multifida*
RUBIACEAE	*Opercularia vaginata*

Appendix E: **Combined Vascular Plant Species List For Lot 107 Kenwick Road and Lot 105a Brixton Street In Family Order**
* Plant introduced (weed)

FAMILY	SPECIES
GOODENIACEAE	*Dampiera linearis*
	Scaevola lanceolata
	Velleia trinervis
ASTERACEAE	**Arctotheca calendula* (Capeweed)
	Brachyscome bellidioides
	Cotula coronopifolia
	**Dittrichia graveolens* (Stinkwort)
	**Hypochaeris glabra* (Flat Weed)
	Podolepis gracilis
	Pogonolepis stricta
	Senecio lautus subsp. *maritimus* (Perth Region Form)

APPENDIX F: List of Weed Taxa Recorded From Lot 107 and Lot 105A

Scientific Name	Common Name	Rating	Invasiveness	Impacts
**Brassica tournefortii*	Wild Turnip	High	–	.
**Ehrharta calycina*	Perennial Veldt Grass	High	+	+
**Eragrostis curvula*	African Lovegrass	High	+	+
**Moraea flaccida*	Cape Tulip	High	+	+
**Romulea rosea*	Guildford Grass	High	–	–
**Sparaxis bulbifera*	Harlequin Flower	High	+	+
**Typha orientalis*	Bulrush	High	+	+
**Watsonia meriana var. bulbillifera*	Bulbil Watsonia	High	+	+
**Zantedeschia aethiopica*	Arum Lily	High	+	–
**Arctotheca calendula*	Cape Weed	Moderate	+	
**Avena barbata*	Bearded Oats	Moderate	+	
**Briza minor*	Lesser Quaking Grass	Moderate	–	
**Crassula natans*		Moderate	+	
**Cynodon dactylon*	Couch	Moderate	+	
**Hyparrhenia hirta*	Tambookie Grass	Moderate	+	
**Hypochaeris glabra*	Flatweed	Moderate	+	
**Lolium rigidum*	Annual Ryegrass	Moderate	+	
**Pennisetum clandestinum*	Kikuyu	Moderate	+	
**Vicia sativa*	Common Vetch	Moderate	–	
**Vulpia myuros*	Rat's Tail Fescue	Moderate	+	
**Dittrichia graveolens*	Stinkwort	Mild		
**Oxalis glabra*	Finger Leaf Oxalis	Mild		
**Oxalis pes-caprae*	Sour Grass	Mild		
**Rumex crispus*	Curled Dock	Mild		
**Lotus* sp.		Low		
**Spergula arvensis*	Corn Spurrey	Low		
**Echium plantagineum*	Paterson's Curse	To Be Advised		+

The rating allocated to each weed species by CALM (1999) is based on three criteria:

Distribution - wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.

Invasiveness – ability to invade bushland in good to excellent condition or ability to invade waterways.

Environmental impacts – ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

Ratings indicate the following:

High - indicates this weed is prioritised for control and/or research.

Moderate – indicates control or research effort should be directed to it if funds are available, however it should be monitored.

Mild – indicates monitoring of the weed and control where appropriate.

Low – indicates that this species would require a low level of monitoring.

FLORA AND VEGETATION SURVEY OF LOT 107 KENWICK ROAD AND ADJOINING LOT 105A BRIXTON STREET, KENWICK

Brief Note: Reassessment of Declared Rare Flora *Lepidosperma rostratum*, February 2004

Prepared for: **Reboboth Christian School**

Prepared by: **B. Koch Botanical Consultant**

February 2004

B. Koch Botanical Consultant,
10 Beresford Place
LEEMING, WA 6149.

FLORA AND VEGETATION SURVEY OF LOT 107 KENWICK ROAD AND ADJOINING LOT 105A BRIXTON STREET, KENWICK

Brief Note: Reassessment of Declared Rare Flora *Lepidosperma rostratum*, February 2004

Rehoboth Christian School proposes to build a Primary School on the remnant vegetation on the northern section of Lot 107 Kenwick Road, Kenwick. The adjoining triangle of land with remnant vegetation is owned by City of Gosnells and will be referred to as Lot 105A Brixton Street in this report. A flora and vegetation survey of Lots 107 and 105A was carried out in August, 2003 and the results presented in a report (B. Koch Botanical Consultant, 2003). This survey was carried out in August because at this time of the year aquatic plants and other ephemeral species are present and flowering. In August 2003 a single plant of the Declared Rare Flora, *Lepidosperma rostratum*, was recorded in Lot 107.

On the 11th February, 2004 a site meeting was held with two CALM representatives. Following this meeting it was decided to re-survey the Declared Rare Flora *Lepidosperma rostratum* population as the wetland was now dry and many more plants were visible. Most plants of this species appeared "stressed" as the stems were now an orange-yellow colour instead of green. Also this species now had fertile parts visible (eg. flowers or fruiting stage) and therefore, allowing a more accurate count of the population size. The timing of the original survey was not optimal for locating and identifying this Declared Rare species.

After the resurvey a total of 82 plants were found in Lot 107 and none in the adjoining Lot 105 A (Figure 1, Revised Version). Most plants were recorded near the western border of the *Viminaria juncea* Tall Shrubland Community. The concentration of the plants in this zone suggests that specific soil moisture and water conditions are required for growth. Individual plants are generally well spaced from each other.

Depending on the final plans for the Primary School site, the proponent may or may not have to submit an application to seek approval from the State and Commonwealth Ministers for the Environment to "take" a Declared Rare flora. Before any future development is commenced, the actual boundary of the Declared Rare plants should be marked in the field to prevent accidental damage to the plants. A temporary fence could be built on this boundary to prevent access during the construction phase.


Greater Brixton Street Wetlands
Wanaping Road
Brixton Street
Vj
HD
Ml
Mv
Lot 107 - Kenwick Road
Lot 105A - Brixton Street
Vj Viminaria juncea Tall Shrubland
Mv Melaleuca viminea subsp. viminea Tall Shrubland to Tall Open Scrub
Ml Melaleuca lateritia Shrubland
HD Highly Degraded, dominated by weeds
Lepidosperma rostratum Declared Rare
Aponogeton hexatepalus P4
Hydrocotyle lemnoides P4
Villarsia submersa P4
N
~50m
Bush Forever Site 422
FIGURE 1
Revised Version, February 2004
Permission to reproduce this map must be obtained from DLI

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REHOBOTH CHRISTIAN SCHOOL

WATER IMPACTS RELATED TO THE DEVELOPMENT OF THE NEW JUNIOR SCHOOL

APRIL 2004

Paul Davies
Senior Water Resources Engineer

Jeff Jolly
Principal Hydrogeologist

Prepared by:

Aquaterra Consulting Pty Ltd

ABN 49 082 286 708

Suite 4, 125 Melville Parade
Como, Western Australia, 6152

Tel: (08) 9368 4044
Fax: (08) 9368 4055

21 April 2004

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FIGURES

SECTION 1 - BACKGROUND

The Reboboth Christian School in Kenwick is currently a senior school only, but there is a proposal to develop a junior school adjacent to the current school. This new development will require some changes to the landform, which could potentially effect surface and groundwater conditions.

Aquaterra were commissioned by Mr Matthew Bambach (Chief Executive Officer) to undertake a preliminary assessment of these potential impacts. The Aquaterra study is based on a desktop study of available data, and a site inspection of the property and surroundings.

1.1 TOPOGRAPHY

The regional elevation (as shown in the Perth Groundwater Atlas, Figure 1) indicates a relatively flat area, with a gradual gradient from the east – west. The local scale survey data (Ross McLoughlin Consulting Surveyor, 2004) shows a similar east – west gradient. The survey data indicate a low point on the property, which corresponds to the drain which runs from Wanaping Road to Brixton Street. Notwithstanding the presence of this drain at the low point on the property, the majority of the central part of the proposed development area floods during winter.

1.2 GEOLOGY

The surface geology consists of silts and clays of the Guildford Formation (Davidson, 1995), underlain at depths of approximately 12m by sands of the Leederville Formation.

1.3 HYDROGEOLOGY

The silts and clays of the Guildford Formation are part of the Superficial Aquifer system, although these Guildford Formation sediments have generally low permeability and poor groundwater supply potential.

1.3.1 Water Levels

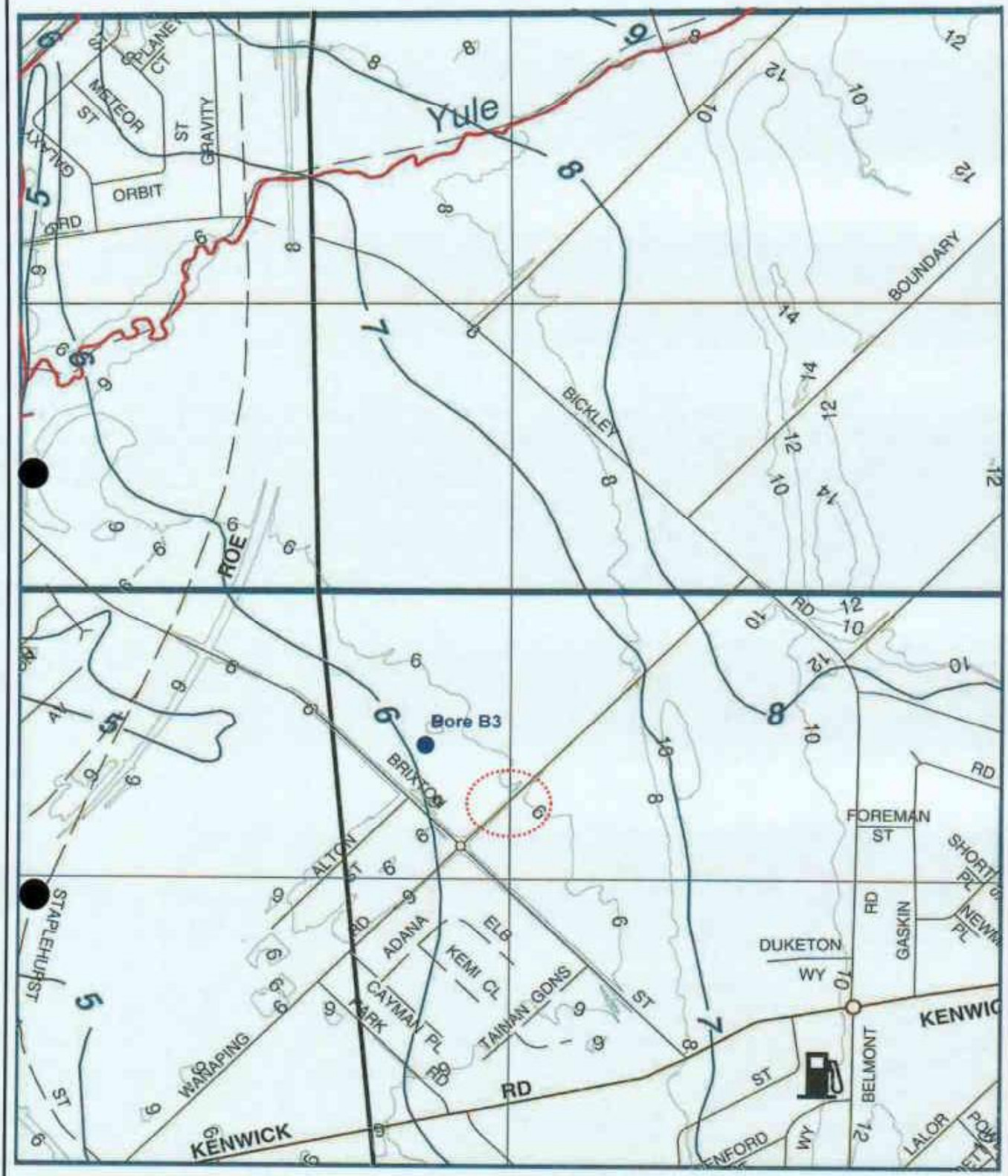
A monitoring bore installed at the corner of Brixton and Wanaping in October 1995 (Bore B3, Figure1), had a static water level of 1.9m below surface as measured when installed. The Perth Groundwater Atlas (Figure 1) suggests that maximum water levels (ie highest winter levels) are between 3 and 0 metres below surface in the general area. During the site inspection, the drain area (the lowest lying area on the site) was dry, but it is known that the whole of the lower lying area becomes flooded during winter rains.

1.3.2 Groundwater Flow Direction

Groundwater flow around the site, based on the water level contours in the Perth Groundwater Atlas is from ENE – WSW.

1.3.3 Water Quality

The water quality in the Guildford Formation clays is brackish. The water quality indicated for the Superficial Aquifer in the Perth Groundwater Atlas (Figure 2), which shows the Kenwick area to have a salinity (TDS) of over 2000 mg/l. The sampling of bore B3 (Jim Davis and Associates, 1995) shows a salinity of 9790 mg/l (TDS). This poor water quality is probably a reflection of the low lying nature of the area, the shallow water table and the opportunity for evaporative concentration of salts.



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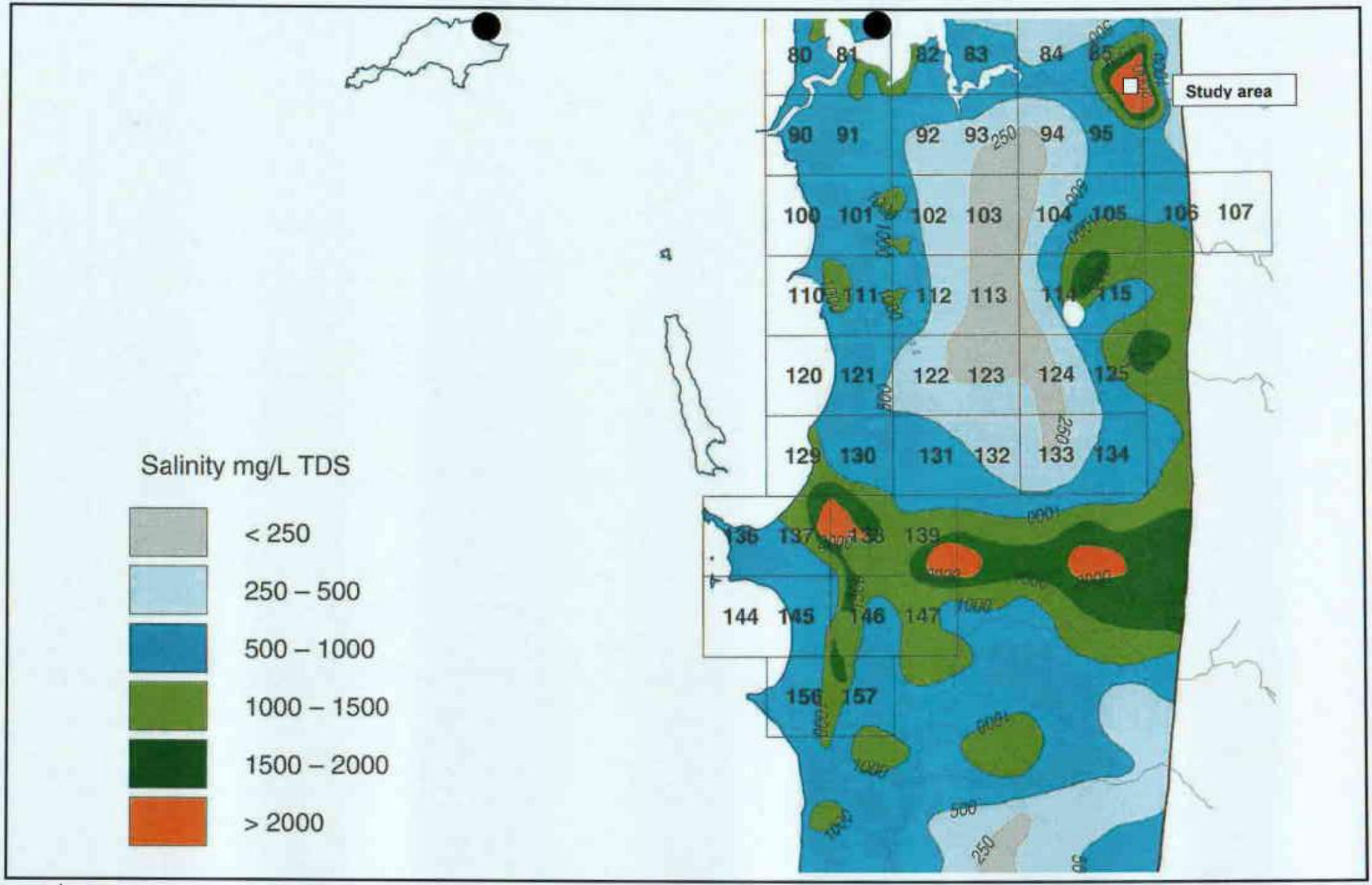
F:\jobs\511\Figure 1.doc

Rehoboth Primary School - Location
Figure 1



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F:\obs\511\Figure 2.doc

Salinity – Study Area and Surroundings
Figure 2

1.4 SURFACE HYDROLOGY

The topography of the proposed development site falls gradually from east to west, generally towards the intersection of Brixton Street and Wanaping Road. Hence, any surface water flows across the site would follow the natural topography as shown in Figure 3. Anecdotal evidence suggests ponding of surface water occurs within the site following rainfall, due to the low permeability and infiltration capacity of the surface soils and the natural occurrence of topographical depressions within the site. This ponded water would infiltrate gradually to the water table, be lost as evaporation or discharge via the shallow open drain to an open drain within the Wanaping Road Reserve.

The shallow drain referred to above is located in the western portion of the site and truncates the corner between Brixton Street and Wanaping Road. This drain, which is just over half a metre deep and a metre wide, appears to be an old drainage path that was intersected when Brixton Street was constructed. The levels in the base of this drain do not vary significantly along its length. However, the topography of the surrounding land suggests that it previously flowed northwards towards Wanaping Road.

The Brixton Street end of the drain ends at the edge of the road verge. Underground piped drains with side entry inlet pits on the road pavement have been installed as part of the Brixton Street road construction. As such, the open drain in the development site ends at Brixton Street, with no connection to the piped road drainage system. The Wanaping Road end of the drain joins into an open drain in the Wanaping Road Reserve. This road reserve drain falls towards Brixton Street and is believed to enter the underground piped road drainage system in Brixton Street. This piped system falls generally eastwards towards its outlet at Yule Brook.

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F:\jobs\511\Figure 3.doc

Existing Surface Water Drainage
Figure 3

SECTION 2 - IMPACT ASSESSMENT

2.1 DEVELOPMENT PROPOSAL

The school plans to develop the area between the current netball courts and the house 160m to the northwest. To facilitate the development of a primary school building, grassed playing fields and some new tennis courts, an area approximately 160m long and 60m wide will have to be in-filled by between 0.5 – 1.5m. This infilling will obviously alter the current surface topography.

2.2 EFFECT ON SURFACE HYDROLOGY

Potential effects related to the development could include changes to drainage flow paths and the site water balance.

2.2.1 Drainage Flow Paths

The earth fill associated with the proposed development will block just over half of the Brixton Street end of the existing open drain on the site. This will result in surface water runoff, which previously flowed into this drain, ponding against the edge of the new in-filled zone. To alleviate this ponding, a shallow open drain should be constructed along the perimeter of the development. This drain would discharge the collected surface water to the existing open drain to the north west as shown on Figure 4. Ponding of surface water will still occur in natural depressions in the undeveloped part of the site as before, but additional ponding due to the earth fill will be discharged off the site (via the proposed perimeter drain), such that the overall hydrological regime is not impacted.

2.2.2 Water Balance

The hydrological water balance of the site will potentially be impacted by the development. Buildings and hardstand areas will tend to concentrate surface runoff. This water should be recharged to the groundwater as close to its source as possible to minimise the impact of the development. In addition, irrigation of the proposed playing field during summer would not have occurred pre-development, so will increase the total water input to the environment. To manage this increased water volume, the field should be graded towards perimeter drains to reduce water logging and drain excess surface water from the site. To control the potential for excessive watering a nutrient and water management plan should be implemented.

2.3 EFFECT ON HYDROGEOLOGY

Potential effects related to the development could include changes to water levels, or water quality.

2.3.1 Water Level Changes

The development is not expected to effect local or regional groundwater levels. Historically water levels in the wetland have risen, as a result of a natural seasonal rise in groundwater levels and due to surface water and rainfall entering the wetland. Once the water in the wetland (and the drain) reaches a certain elevation (approximately 6m AHD), the water drains off the site. The natural rise in water levels during winter will still take place after the development exists, although the winter rainfall which would have fallen directly onto the wetland, will now fall onto buildings or grassed school yards. Some of this water will infiltrate through the grass areas to the underlying groundwater (thus contributing to the water in the

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F:\obs\511Figure 4.doc

Proposed Surface Water Drainage Plan
Figure 4

wetlands during the wet winter periods), so the loss of water to the wetlands in winter will be limited. The level of water in the wetland should be the same as before the development, because the recommended new drain along the eastern edge of the in-filled zone, would link up to the same old drain flowing to Wanaping Road in the north. Maximum water levels in the wetland should remain unchanged.

The rise in water levels during winter, together with the surface inflow into the wetland areas, will result in water levels rising into the fill material introduced into the area. This rise may need to be controlled and can be drained from the fill using vertical drains (linked to the stormwater system on Brixton Street).

2.3.2 Water Quality Changes

To minimise the impact of the development on groundwater and surface water quality, a water and nutrient management plan should be developed. This management plan should control the application of fertilisers and the incidence of excessive irrigation. Over-use of fertilisers on the school's grassed areas could result in increased nutrients entering the environment. In conjunction with excessive watering, fertiliser over-use is likely to result in nutrients being flushed into the groundwater which can discharge into the wetland, or into drains which can discharge further downstream via the surface drainage system into receiving waters.

SECTION 3 – CONCLUSIONS AND RECOMMENDATIONS

With the management items described above, the impacts of the development on the prevailing surface water and groundwater conditions are expected to be limited. The proposed new perimeter drain system will maintain the hydrological regime by ensuring that surface water can be drained and water levels in the wetland system will still reach the same winter levels, before the new drain system discharges water from the site. Potential impacts on groundwater chemistry can be minimised by making certain that judicious use of fertilisers on the new grassed area takes place.

The potential impacts of the development on surface and groundwater resources should be managed as follows:

1. A shallow open drain should be constructed along the perimeter of the development to discharge collected surface water off the site.
2. Surface water runoff from buildings and hardstand areas should be recharged to the wetland, and thus the groundwater system, groundwater as close to its source as possible.
3. Playing fields should be graded towards perimeter drains to reduce water logging and drain excess surface water from the site.
4. A nutrient and water management plan should be developed to control fertiliser usage and excessive watering, thus reducing the potential increase of nutrient levels in the wetland or in the underlying groundwater and to downstream receiving waters.
5. Groundwater levels in the wetland during winter should be maintained at current levels by making certain that the new drain system installed is at the same AHD level as the existing drain in the area.

SECTION 4 - REFERENCES

Davidson, W.A. 1995. Hydrogeology and Groundwater Resources of the Perth Region, Western Australia, Bulletin 142, Geological Survey of Western Australia.

Jim Davies & Associates, 1995. Hydro-Plan, Lot 48 Part Lot 35 and Part Lot 106, Brixton Street. Kenwick. City of Gosnells, Evaluation of Stormwater Drainage Management Options.

Water and Rivers Commission, 1997. Perth Groundwater Atlas, Perth.