



s47F

General Manager, Residential
Developments
Burnside North Pty. Ltd.
211 Waverley Road
EAST MALVERN VIC 3145

Date: 7 September 2011
EPBC Ref: 2011/6063
EPBC contact:

s47F

Dear Mr Farrell

**Request for additional information
Burnside Residential Development - The Point**

On 1 September 2011 it was decided that the proposed action to develop the second stage of "The Point" – a 1486-lot housing development in the Melbourne suburb of Burnside – required assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It was decided that the proposed action would be assessed by Preliminary Documentation.

As noted in the previous letter to you, dated 1 September 2011, the department has significant concerns regarding the potential impacts of the project on a range of listed threatened species and the Natural Temperate Grassland of the Victorian Volcanic Plain ecological community.

We are seeking additional information to ensure a thorough and transparent assessment of the acceptability of potential impacts of this project, and to determine if appropriate action can be taken to avoid, mitigate or, compensate for these. A number of public comments received on your referral questioned the adequacy and accuracy of flora and fauna studies conducted for this proposal. Where relevant to this assessment, the issues raised have been included below. Please note that further targeted surveys during appropriate ecological times are likely to be required if sufficient confidence cannot be obtained in the existing information.

Please provide further information as follows:

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Striped Legless Lizard (*Delma impar*) (SLL)

1. Targeted surveys for the SLL were undertaken only partially in accordance with the department's referral guidelines for this species (<http://www.environment.gov.au/epbc/publications/pubs/striped-legless-lizard-referral-guidelines.pdf>). For example, only 8 tile grids were used, as opposed to the recommended 10 grids for areas larger than 30 hectares; and tiles were checked fortnightly for two months, as opposed to "ideally once a week" during early September to December. These guidelines also state that, in Victoria, the Department of Sustainability and Environment recommends surveys be undertaken for at least six months. Please provide a justification for the survey techniques used, including the rationale for the selection of the location of tile grids.
2. Please clarify when and where records were made, and provide further information to justify why existing information and survey effort is adequate. Table 7 in the flora and fauna report states that SLL individuals were recorded only at grids 6, 7 and 8, whilst the text in the report states that SLL were recorded at grids 2, 3 and 4. Furthermore, page 9 of the report states that each grid was checked six times; whilst Table 7 only reports on four visits.
3. Further outline the importance of the site in terms of habitat or population connectivity, opportunities for dispersal, breeding and gene flow between SLL on-site and known SLL habitat or populations nearby.
4. The department considers that, given the size of the site, habitat availability and connectivity offered by Kororoit Creek, the site is likely to contain a key breeding population of this species. Provide further information on how potential impacts to this species can be avoided or mitigated.
5. Outline proposed compensation measures for any residual impacts on this species, noting that salvage and translocation is not considered to be a compensatory measure.

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Information provided should primarily focus on the matters of National Environmental Significance and should contain sufficient information to avoid the need to search out previous or supplementary reports. This document should be in a format that is objective, clear, and succinct and, where appropriate, be supported by relevant maps, plans, diagrams, tables, surveys, references or other descriptive detail, so it may be easily understood by the general public.

In any correspondence with the department please quote the title of the action and EPBC reference, as shown on the beginning of this letter. You can send information to us:

by post Victoria and Tasmania Section
 Environment Assessment Branch
 Department of Sustainability, Environment, Water, Population and Communities
 GPO Box 787
 CANBERRA ACT 2601

by email s47F
by fax 02 6274 2256

Once we have received information that satisfies the request above, you will be provided with instructions on the public consultation requirements to progress assessment of the project. If you have any questions about the process please contact the EPBC project manager and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

s47F



**DENNIS
FAMILY**
CORPORATION

FOI 180613
Document 2

Wednesday, 28 March 2012

s47F

Environment Assessment Branch
Approvals and Wildlife Division
Department of Sustainability, Environment, Water, Population and Communities,
GPO Box 787
Canberra City, ACT, 2601

Dear s47F

**RE: EPBC ACT REFERRAL NO. 2011/6063:
BURNSIDE NORTH RESIDENTIAL DEVELOPMENT**

Thank you for meeting with s47F and myself last month in Canberra to discuss the assessment of the Burnside North residential development under the Environment Protection and Biodiversity Conservation Act. I apologise for not having responded sooner.

As discussed at our meeting we seek clarification of the Department's policy position in relation to our proposed approach to offsets, and in particular two issues.

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2. A company related to North Burnside Pty Ltd owns a large property at Quandong, northwest of Werribee that was recently included under a Public Acquisition Overlay in the planning scheme as part of the proposed Western Grassland Reserves, which are an offset for removal of native vegetation in Melbourne's future growth areas under a Part 10 EPBC Act Strategic Assessment. This unexpected recent development has effectively quarantined the property for use by us as an offset for Burnside North and we therefore seek an exception to the usual requirement that Part 9 EPBC Act approvals cannot offset into Melbourne's Western Grassland Reserves.

The basis for this exception is as follows:

- It has always been intended to offset removal at Burnside North into Quandong, where there is appropriate Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) and a confirmed population of the Striped Legless Lizard. Exclusion of this possibility leaves North Burnside Pty Ltd at a competitive disadvantage compared with other landowners and developers around Melbourne, given that it has already made significant investment in Quandong.
- Quandong also has the other characteristics required for the proposed Spiny Rice-Flower propagation trials (remnant grassland without Spiny Rice-Flower and ploughed land in suitable soils) and would form a significant part of the Spiny Rice-Flower offset approach.
- North Burnside Pty Ltd does not have any other development sites in Melbourne's west or north outside the Strategic Impact Assessment area that would require further offsetting at Quandong so this request for an exception is in recognition of the unique position in which the company finds itself.

As you are aware, finding offsets for the removal of native vegetation is a time-consuming and expensive process with inherent risk of delays to development commencement if the right combination of offsets is not found. We believe that cost effectively meeting the three key offset requirements, namely NTGVVP, Striped Legless Lizard and Spiny Rice-Flower, will depend on a pragmatic approach on the part of the Minister for the Environment to the company's unique circumstances. North Burnside is committed to meeting its offset requirements but seeks the Minister's cooperation in ensuring that this can be done in an efficient and cost-effective manner.

I hope the foregoing assists you in finalising your advice to us of the Minister's position in relation to offsetting. If you have any questions please don't hesitate to contact me on s47F

s47F or s47F on s47F

Yours sincerely,

s47F

General Manager – Residential Developments



From: s47F
To: s47F @denniscorp.com.au
Cc: s47F
Subject: FW: EPBC ACT REFERRAL NO. 2011/6063: BURNSIDE NORTH RESIDENTIAL DEVELOPMENT [SEC=UNCLASSIFIED]
Date: Thursday, 12 April 2012 5:22:58 PM
Attachments: [Letter from DFC regarding offsetting in WGR.pdf](#)

Dear s47F

Thank you for your letter dated 28 March 2012 regarding the Burnside North Residential Development (EPBC 2011/6063). We have reviewed your letter and acknowledge that there are two issues in relation to proposed offsets for which you seek clarification and advice. A response to each issue is set out below:

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2. 'Quandong' – Proposed offset site within the Western Grassland Reserve for Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) and Striped Legless Lizard, and for Spiny Rice-Flower propagation trials

The purpose of the Western Grassland Reserve is to provide offsets for the clearing of NTGVVP and related species habitat associated with development impacts within Melbourne's Urban Growth Areas, as endorsed by the Minister under the EPBC Act strategic impact assessment for this area. Although the department has previously indicated that it would be willing to consider offsets within the Western Grassland Reserve for some developments outside Melbourne's Urban Growth Areas, this policy approach remains in development and any such requests are considered only in limited and defined circumstances.

The department acknowledges that the Burnside North Residential Development is in close proximity to the Urban Growth Areas and that Burnside North Pty Ltd holds investment in 'Quandong', a large property located within the Western Grassland Reserve. However, primarily because of the scale and nature of the impacts the proposed Burnside North Residential Development will have on protected matters, the department is unwilling to consider this approach in this instance. Therefore, the department does not accept 'Quandong' as an appropriate offset site for the Burnside North Residential Development (that is, we would not recommend this as a suitable offset to our Minister or delegate).

We note that the 'Quandong' property may be suitable as a propagation trial recipient site, with appropriate conservation management mechanisms in place and with DSE support. However, this land use is considered a separate purpose than a direct offset.

As advised previously, the complete offset package will need to provide a certain, measurable and substantial environmental gain for all relevant impacts, given the scale of the proposed impacts, the conservation status of the species and community in question and the cumulative impacts that they face. In this regard, there may be value in you working more closely towards a collaborative approach with the neighbouring Burnside Shopping proposal, but we recognise that this is a commercial matter best worked out between the relevant parts of your company.

We remain available to provide feedback on any such proposals that you may wish to put forward.

Please note that the above does not constitute legal advice nor pre-empt any statutory decision of our Minister or delegate.

If you have any questions or would like to discuss any of the above, please do not hesitate to contact myself or Alison.

Kind Regards,

s47F

A/g Director
Victoria and Tasmania Section
Environment Assessment Branch
Environment Assessment and Compliance Division
Department of Sustainability, Environment, Water, Population and Communities

s47F

From: s47F
Sent: Wednesday, 11 April 2012 3:24 PM
To: s47F
Cc:
Subject: EPBC ACT REFERRAL NO. 2011/6063: BURNSIDE NORTH RESIDENTIAL DEVELOPMENT [SEC=UNCLASSIFIED]

-----Original Message-----

From: s47F [mailto:s47F@denniscorp.com.au]
Sent: Thursday, 5 April 2012 9:37 AM
To: s47F
Subject: RE: EPBC ACT REFERRAL NO. 2011/6063: BURNSIDE NORTH RESIDENTIAL DEVELOPMENT [SEC=UNCLASSIFIED]

Thanks Allison. Give me a call if you have any queries. Sorry for not being able to get the letter to you sooner.

Cheers,

s47F

General Manager
Residential Developments
Dennis Family Corporation
211 Waverley Road, East Malvern, 3145

s47F

From: s47F [mailto:s47F@environment.gov.au]
To: s47F [mailto:s47F@denniscorp.com.au]

Cc: s47F@environment.gov.au>
Date: 05/04/2012 09:23 AM
Subject: RE: EPBC ACT REFERRAL NO. 2011/6063: BURNSIDE NORTH RESIDENTIAL DEVELOPMENT [SEC=UNCLASSIFIED]

Hi s47F

I just wanted to let you know that the department has received both the email and hard copy of the letter regarding the Burnside North Residential Development. The department is currently preparing a response and I will be in contact if I have any questions.

Kind Regards,

s47F | Senior Assessment Officer | Victoria & Tasmania Section
Environment Assessment and Compliance Division Department of Sustainability,
Environment, Water, Population and Communities
Phone: s47F | Email: s47F@environment.gov.au P Please
consider our environment before printing this email.

-----Original Message-----

From: s47F@denniscorp.com.au]
Sent: Wednesday, 28 March 2012 5:10 PM
To: s47F
Cc: s47F@ecologicalresearch.com.au
Subject: EPBC ACT REFERRAL NO. 2011/6063: BURNSIDE NORTH RESIDENTIAL DEVELOPMENT

Hi s47F

Please find attached correspondence regarding this matter. Sorry I had not been able to respond earlier. Please give Brett or me a call if you have any queries.

Cheers,

s47F
General Manager
Residential Developments
Dennis Family Corporation
211 Waverley Road, East Malvern, 3145

s47F

(See attached file: PF1050.pdf)

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From: s47F [redacted]@environment.gov.au]

Sent: Friday, 7 September 2012 5:37 PM

To: s47F [redacted]

Cc: [redacted]

s47F [redacted]

Subject: RE: Burnside 'The Point' development [SEC=UNCLASSIFIED]

Dear s47F

In response to your email below to Tessa requesting feedback on Preliminary Documentation for 'The Point' Residential Development at Burnside (dated July 2012), the department has the following preliminary feedback:

1. Further to the department's email of 12 April 2012 and meeting of 8 May 2012, the department still has some concerns that do not appear to be addressed in the latest version of the Preliminary Documentation:

- As previously stated in the department's email dated 12 April 2012 and at the meeting in Canberra of 8 May 2012 between the department, Burnside North Pty Ltd and Brett Lane and Associates, the department will not accept 'Quandong' as an appropriate offset site to compensate for impacts on EPBC listed matters. The department notes that the revised Preliminary Documentation does not include details of any proposed direct offsets (other than 'Quandong') for potential impacts to the critically endangered Natural Temperate Grassland of the Victorian Volcanic Plain ecological community or the vulnerable Striped Legless Lizard. This matter needs to be substantially resolved prior to the draft Preliminary Documentation being acceptable for public consultation



Once the headline issues in point 1 are sufficiently resolved, the department will be able to provide further, detailed feedback on other aspects of the Preliminary Documentation.

Please do not hesitate to contact me to discuss, otherwise, look forward to speaking with you and state agencies on Monday.

Kind Regards,

s47F [redacted] | Senior Assessment Officer | Victoria & Tasmania Section Environment
Assessment and Compliance Division Department of Sustainability, Environment, Water,
Population and Communities
Phone: s47F [redacted] | Email: s47F [redacted]@environment.gov.au P Please consider our
environment before printing this email.

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From: [Tregurtha, James](#)
To: s47F
Cc: s47F; [Knudson, Dean](#); s47F
Subject: Burnside residential development [SEC=UNCLASSIFIED]
Date: Friday, 23 November 2012 4:27:25 PM
Attachments: [Dec 2011 Departmental Letter to DSE.pdf.pdf](#)

Hi s47F

As discussed earlier today, set out below is our assessment of the three areas of concern Burnside raised with you and I at our meeting with them in October. (It's rather dense I'm sorry but we wanted to ensure we covered off soundly on each point).

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Thanks
James

James Tregurtha
Assistant Secretary
South-Eastern Australia Environment Assessments
Department of Sustainability Environment Water Population and Communities

s47F

BURNSIDE RESIDENTIAL DEVELOPMENT, VICTORIA (EPBC 2011/6063)

Key Points:

1. On 12 October 2012, s47F met with s47F General Manager, Residential Developments, Dennis Family Corporation; s47F Brett Lane and Associates Pty Ltd (ecological consultant); and s47F s47F Hawker Britton Group Pty Ltd, to discuss the Dennis Family Corporation's proposed residential development at Burnside, Victoria. Mr James Tregurtha, Assistant Secretary, South-Eastern Australia Environment Assessment Branch attended as a departmental representative.
2. The Burnside Residential Development is being assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) via a Preliminary Documentation assessment process.

3. Three key issues were raised at this meeting by Dennis Family representatives, including the proposed use of a Dennis Family property, 'Quandong', as an offset for impacts of the action: s22

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Issue 1 – The use of 'Quandong' as an offset for impacts to the critically endangered ecological community – Natural Temperate Grassland of the Victorian Volcanic Plain

6. The proposed action will result in the removal of approximately 21 hectares of the critically endangered ecological community Natural Temperate Grassland of the Victorian Volcanic Plain, which also provides habitat for a number of listed species including an important population of vulnerable Striped Legless Lizards.
7. The Dennis Family Corporation (the proponent) has proposed to offset impacts to these matters at 'Quandong', a 3000 hectare property owned by the proponent within the proposed 15 000 hectare Western Grassland Reserve. The proponent has stated but not confirmed that the proposed offset site supports Natural Temperate Grassland of the Victorian Volcanic Plain and a population of Striped Legless Lizards.
8. On 5 January 2011, the Victorian Department of Sustainability and Environment (DSE) wrote to the department to request that it allow actions outside of Melbourne's Urban Growth Area to be offset within the Western Grassland Reserve. On 16 December 2011, the department advised DSE that it would be willing to consider offsets within the Western Grassland Reserve for actions outside Melbourne's Urban Growth Area in limited and defined circumstances (see attached letter), including but not limited to where the proponent owns land within the Western Grassland Reserve. The proponent specifically raised this matter during the meeting on 12 October 2012 and proposed the use of their property 'Quandong' as an offset site.
9. The department notes the information and policy position outlined in this letter to DSE, and acknowledges that the proponent owns land within the Western Grassland Reserve. However, the release of the *Melbourne Urban Development – Policy Statement for EPBC Act referrals* (<http://www.environment.gov.au/epbc/publications/melbourne-urban-development.html>) in July 2012 superseded the approach set out in this letter which was subject to review and refinement in mid-2012, and resulted in the final policy development and release. Therefore, policy guidance for the use of lands within the WGR as offsets for Part 9 Approvals no longer provides that ownership of land within the WGR of itself warrants departmental consideration.
10. Currently, because of its location and scale of impact, the Burnside Residential Development does not meet the necessary policy criteria for offsetting in the WGR, as prescribed in the published policy document (*Melbourne Urban Development – Policy Statement for EPBC Act referrals*).

11. Further, the use of 'Quandong' is inconsistent with the current broader policy guidance for approval decisions, including but not limited to, outcomes of the *Strategic Assessment of Melbourne's Urban Growth Boundary* (the Program) and the department's *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (October 2012).
12. In summary, while the department has carefully considered the Dennis Family's views, and as set out above notes the fact that the proponent owns land within the Western Grassland Reserve ('Quandong'), the department considers that the Burnside proposal does not meet the public policy criteria for offsetting within the Western Grassland Reserve. The department has discussed this with the Dennis Family on several occasions and is of the view that an alternative grassland offset site would be more appropriate and not be significantly expensive or onerous for the proponent to obtain.
13. Detailed advice regarding acceptable offsets for this proposal will be provided to the Minister or delegate, as part of departmental recommendations on an approval decision.

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EPBC Ref: 2011/6063

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General Manager
Residential Developments
Dennis Family Corporation
211 Waverley Road
EAST MALVERN VIC 3145

Dear s47F

I am writing to you following your meeting in Canberra on 12 October 2012 with representatives of the office of the Hon Tony Burke MP, Minister for Sustainability, Environment, Water, Population and Communities and of the Department of Sustainability, Environment, Water, Population and Communities (the department), to discuss the Dennis Family Corporation's proposed residential development at Burnside, Victoria.

I understand that you raised three key concerns at this meeting. These include the proposed use of 'Quandong' as an offset for impacts to matters of national environmental significance: s22

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I would like to take the opportunity to respond to these concerns in order to assist you in finalising your Preliminary Documentation and to progress the assessment of the proposed development under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

With regards to the use of 'Quandong' as an offset site, I understand that this property lies within the Western Grassland Reserve, and that the department has carefully considered your proposal to offset impacts at 'Quandong'. However, as previously advised in May 2012, the department considers that for this specific proposal, the use of 'Quandong' as an offset would be inconsistent with the Government's broader legislative and policy considerations regarding offsets and the Western Grassland Reserve. The department does not consider that 'Quandong' represents a suitable environmental outcome, in relation to the impacts of the action and in light of the *EPBC Act Environmental Offsets Policy (October 2012)* principles and methodologies. Therefore, the department would not recommend to the Minister or his delegate the use of 'Quandong' as an offset for impacts to matters of national environmental significance. Consistent with previous advice, to progress the assessment of this proposal the department recommends you propose an alternate grassland offset site to offset impacts on matters of national environmental significance.

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I trust that this advice will assist you to finalise adequate Preliminary Documentation and consequently for all relevant parties to progress the assessment of this development. Please do not hesitate to contact s47F [redacted] Acting Director, Victoria Section on s47F [redacted] or via email at s47F [redacted] @environment.gov.au should you wish to discuss any of the matters discussed above or to arrange a suitable time for further discussions.

Finally, please note that this advice is intended to be for your information only, and does not constitute legal advice. You should further note that this advice must not be construed in any way as Commonwealth endorsement or otherwise of your proposed development or a formal decision about its EPBC Act status. The Commonwealth will not accept liability for any loss or damage that you may suffer, either directly or indirectly, arising out of your use of the advice we are providing.

I look forward to continuing to work with you to progress this assessment.

Yours sincerely



Tessa Bird
Acting Assistant Secretary
South-Eastern Australia Environment Assessment Branch

6 December 2012

cc. Mr Trevor Blake, Chief Environment Assessment Officer, Victorian Department of Planning and Community Development.

To: Minister (for information)

MEETING WITH DENNIS FAMILY CORPORATION REGARDING BURNSIDE DEVELOPMENT IN VICTORIA

Timing: For meeting on Tuesday 17 December 2013.



Recommendation:

1. That you note the contents of this brief

Minister:

Comments:

Noted / Please discuss

Date: *17.12.2013*



Meeting with: representatives from the Dennis Family Corporation.

Prior meetings: On 12 October 2012, representatives from the former Minister's Office met with s47F General Manager, Residential Developments, Dennis Family Corporation; s47F Brett Lane and Associates Pty Ltd (ecological consultant); and s47F Hawker Britton Group Pty Ltd, to discuss the Dennis Family Corporation's proposed residential development at Burnside, Victoria.

Key Points:

1. The Department is currently assessing two proposals under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), from separate entities within the umbrella Dennis Family Corporation, at Burnside, 25 kilometres west of Melbourne central business district, Victoria. The proposals are the:
 - Burnside Residential Development – The Point, proposed by North Burnside Pty Ltd (EPBC 2011/6063); and
 - Expansion of the existing Burnside Shopping Centre, proposed by Dennis Family Retail & Commercial Developments Pty (EPBC 2011/6004).

Key issues:

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4. In addition to impacts on the Spiny Rice-flower, the proposed action will result in the removal of approximately 21 hectares of the critically endangered ecological community, Natural Temperate Grassland of the Victorian Volcanic Plain, which provides habitat for a number of listed species including an important population of vulnerable Striped Legless Lizards (*Delmar impar*).
5. The proponent has proposed to offset impacts to these additional matters within a property they own which is within the proposed 15 000 hectare Western Grassland Reserve. This reserve was established to compensate for impacts to nominated nationally protected matters as a result of the *Strategic Assessment of Melbourne's Urban Growth Boundary* (the Program). The Western Grassland Reserve will be acquired and managed by the Victorian Department of Environment and Primary Industries.
 - Development proposals outside of the Program's area may be offset into the Western Grassland Reserve in limited and defined circumstances and where an action meets certain criteria as set out publicly in the *Melbourne Urban Development – Policy Statement for EPBC Act referrals* (July 2012).
6. The Department has carefully considered the Dennis Family Corporation's proposal to offset the impacts from their proposal and does not consider the site proposed to be an appropriate offset for impacts associated with the proposed action as the proposal does not meet the public policy criteria for offsetting into the Western Grassland Reserve, specifically in relation to the quantum of the impact and the nationally protected matters impacted on.
7. The Dennis Family Corporation has previously advised of their concern regarding a collaborative assessment of the project between the Australian and Victorian governments as it may result in additional assessment documentation, requirements or delays for the proponent. Further details of this assessment approach are set out below.

Background:

8. On 1 September 2011, the proposed action was determined a controlled action under the EPBC Act due to likely significant impacts on listed threatened species and communities (sections 18 and 18A), to be assessed by preliminary documentation.
9. The proposal involves the development of a 1486-lot housing development in Burnside.
10. The Department has provided the proponent with advice on their proposal on numerous occasions, including providing comments on draft versions of the preliminary documentation.

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Key issues:

15. The proposal will impact on approximately s22
s22 6.44 hectares of the critically endangered Natural Temperate Grassland of the Victorian Volcanic Plain, which provides habitat for an important population of the vulnerable Striped Legless Lizard.

16. The Department has provided in-principle support for the translocation proposals for the Striped Legless Lizard s22 as long as the proposal meets State legislative requirements. s22

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17. In addition to translocating Striped Legless Lizard individuals from the impact site and securing a recipient site, the proponent has also proposed a direct offset site to compensate for the loss of habitat for the Striped Legless Lizard. The proponent and Department have in-principle agreed to an offset for Natural Temperate Grassland of the Victorian Volcanic Plain outside the Western Grassland Reserve.

Background:

18. On 20 July 2011, the Burnside Shopping Centre proposal was determined to be a controlled action, due to likely significant impacts on listed threatened species and communities (sections 18 and 18A), to be assessed by preliminary documentation.

19. The proposal involves the expansion of the existing Burnside Shopping Centre across a 14 hectare site on Westwood Drive in Burnside.

20. The Department has provided the proponent with advice on their proposal on numerous occasions, including providing comments on draft versions of the preliminary documentation. The Department is currently awaiting an updated version of the draft preliminary documentation to progress the assessment.

21. On 27 November 2013, the Department received a variation request from the proponent, to remove a portion of the land from the study area as defined in the referral. The Department is considering the variation request and the statutory timeframe for this decision is 27 December 2013.

Proposed note taker: none proposed as the meeting will occur in Melbourne.

James Tregurtha
Assistant Secretary
Environment Assessment and Compliance
Division

s47F

11 December 2013

Policy Officer: s47F

Victoria Section

s47F

ATTACHMENTS

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Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

FOI 180613
Document 8

7th February 2014

DFC (Project Management) Pty. Ltd.
211 Waverley Road
East Malvern VIC 3145

Attention: s47F (General Manager)
By Email – s47F@denniscorp.com.au (Phone 9573 1069)

Dear Peter,

RE: BURNSIDE RESIDENTIAL AND COMMERCIAL - OFFSET OBLIGATIONS
BL&A REPORT 7045 (24.2)

Summary

DFC (Project Management) Pty Ltd engaged Brett Lane and Associates Pty Ltd (BL&A) to determine the offset costs associated with the development of land at Burnside for both the proposed residential and commercial estates. A summary of estimated costs for each project site is provided below.

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Background

Information relevant to each the residential and commercial estates at Burnside was considered to determine an indicative offset cost obligation at each site. This has been undertaken based on two scenarios:

- Current scenario
 - Part 9 assessment under the EPBC Act for Commonwealth assessment process; and
 - Assessment under Victoria's native vegetation permitted clearing reforms
- Alternative scenario
 - Applying the implications of the Biodiversity Conservation Strategy (a joint Commonwealth and state assessment process)

The relevant processes are described in this section.

Commonwealth - Referral and assessment under Part 9 of the EPBC Act

Both the residential and commercial proposed estates at Burnside support matters of national environmental significance (MNES) and require assessment and approval under the EPBC Act.

The Commonwealth Offset Policy was finalised and released by the Commonwealth in 2012 (DSEWPC 2012). An Offset Assessment Guide (commonly referred to as the Offset Calculator) was also provided by the Commonwealth to assist in the determination of whether a proposed offset site would satisfy the Commonwealth offset requirements. The calculator, however, relies on subjective inputs including the percentage risk of the loss of the MNES with or without the offset, and the percentage confidence in the result. Such inputs are at least in part, estimation.

Importantly, the Commonwealth have communicated that the Offset Calculator is only to be used as a guide to assist consultants and proponents in determining offset suitability. In all cases, the Commonwealth Department of the Environment will make the final determination of whether a proposed offset meets the requirements.

Prior to the release of the Offset Policy in 2012 and based on experience dealing with EPBC Act referrals prior to this time, an offset ratio of four to one has on several occasions been considered acceptable (i.e. the protection of four Spiny Rice-flower for every one plant proposed to be removed). This ratio is considered to still provide a rough guide for Commonwealth offsets, though as noted above the Commonwealth will make the final determination on an appropriate offset.

This ratio has been utilised in this report to provide an indication of offset costs for impacts to MNES.

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Results**Burnside – Residential***Commonwealth - Referral and assessment under Part 9 of the EPBC Act*

BL&A have undertaken a large amount of survey work at the Burnside residential estate which has informed the assessment documentation that has been provided to the Commonwealth for Precincts 1, 1a and 2. Precinct 1 has since been approved and is not included in this investigation.

Development of the Burnside residential estate (Precincts 1a and 2) is likely to result in an offset requirement for the following matters of national environmental significance (MNES):

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- Striped Legless Lizard – 23.87 hectares of suitable habitat for the species

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Striped Legless Lizard

A similar area as required for the protection of NTGVPP would also be required for Striped Legless Lizard habitat. One offset area could be used to meet both these requirements assuming that the proposed offset comprised NTGVPP and habitat for the Striped Legless Lizard. Assuming that this offset could be sourced, there would be minimal additional costs to offset habitat for this MNES. However further costs would be required to undertake salvage and translocation of this species if it were required by the Commonwealth. This is considered to be likely given the previous recording of this species on site.

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Burnside - Commercial**Commonwealth - Referral and assessment under Part 9 of the EPBC Act**

BL&A have not undertaken any of the survey work at the Burnside commercial estate. Ecology Partners prepared a flora, fauna and net gain assessment report for the site in October 2009, and a subsequent targeted flora and fauna survey report in February 2011 (EP 2009; EHP 2011). A summary report was also provided (EHP 2013). These reports have been used to inform the Commonwealth offset requirements for the Burnside commercial estate.

Based on the summary provided in EHP (2013), development of the Burnside commercial estate is likely to result in an offset requirement for the following matters of national environmental significance (MNES):

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- Striped Legless Lizard - 6.51 hectares of Plains Grassland (considered to be the area of suitable habitat for the species)

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s22

Striped Legless Lizard

A similar area as required for the protection of NTGWPP would also be required for Striped Legless Lizard habitat. One offset area could be used to meet both these requirements assuming that the proposed offset comprised NTGVPP and habitat for the Striped Legless Lizard. Assuming that this offset could be sourced, there would be minimal additional costs to offset habitat for this MNES. However further costs would be required to undertake salvage and translocation of this species if it were required by the Commonwealth. This is considered to be likely given the previous recording of this species on site.

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Quick Issues Brief – Burnside development projects

Key Points:

1. The Department is currently assessing two proposals under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), from separate entities within the Dennis Family Corporation, at Burnside, 25 kilometres west of Melbourne’s central business district, Victoria. The proposals are:

- Burnside Residential Development – The Point (EPBC 2011/6063), proposed by North Burnside Pty Ltd – determined a controlled action to be assessed by preliminary documentation on 1 September 2011; and

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2. On 28 June 2012, the Victorian Minister for Planning determined that an assessment of the impacts of the proposed residential development is required under the *Environment Effects Act 1978* (Vic.).

Previous meetings

3. You met with representatives of the Dennis Family Corporation to discuss the development proposals and offsets on 17 December 2013 (refer MB13-000196) following your correspondence to Mr Grant Dennis of 14 November 2013 (refer MC13-001058).

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Issues / sensitivities

Impacts

5. The proposed actions will impact on a number of nationally protected matters including:

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- Striped Legless Lizards (*Delma impar*) – vulnerable; and
- Growling Grass Frogs (*Litoria raniformis*) – vulnerable.

s22

7. In addition, the residential development will result in the removal of approximately 21 hectares of Natural Temperate Grassland of the Victorian Volcanic Plain, and impacts on a population of vulnerable Striped Legless Lizards s22

s22

8. As currently designed, the proposed commercial development (EPBC 2011/6004) will impact on s22
s22 an important population of Striped Legless Lizards.

s22

Compensation for other matters of national environmental significance

15. The Dennis Family Corporation has provided a report on the Offset Obligations likely to result from their proposed developments in Burnside. The report provides a summary of the likely offset requirements but does not specifically address the EPBC Act Offsets Policy. Rather the proponent has indicated that it is difficult to apply this policy to these proposals and as such a four to one offset ratio has been applied to estimate the likely offset requirements and costs in relation to the Burnside proposals. Applying a four to one ratio may substantially overestimate the offset costs and requirements as offsetting takes into consideration a number of factors which can affect the magnitude of an offset required.
16. Further, the Offset Obligations Report estimates costs associated for offsetting impacts from the action if applying the Victorian Biodiversity Conservation Strategy principles, the agreed approach to compensate for impacts associated with *Strategic Assessment of Melbourne's Urban Growth Boundary* under Part 10 of the EPBC Act. The Burnside proposals do not fall within the Melbourne Urban Growth Boundary.
17. There is scope for some proposals outside the Melbourne Urban Growth Boundary to offset impacts using the Biodiversity Conservation Strategy approach as per the *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act* (Melbourne Urban Development policy) (available at http://www.environment.gov.au/system/files/resources/dc154fd1-d526-4e7d-9a8e-bd17f8ceac15/files/melbourne-urban-development_1.pdf). The Melbourne Urban Development policy applies to projects in defined geographic locations; specific types of projects (e.g. commercial and light industrial; smaller in scale (less than 50 hectares in size) and involve less than 1000 dwellings); and is limited to those projects with impacts, of no more than 10 hectares, on Natural Temperate Grassland of the Victorian Volcanic Plain and Golden Sun Moth. The policy cannot be applied to compensate impacts on other matters of national environmental significance, though the policy approach can be applied to compensate impacts on Natural Temperate Grassland of the Victorian Volcanic Plain and Golden Sun Moth where projects also impact on other nationally protected matters.

S22

19. The Residential Development (EPBC 2011/6063) does not meet the current Melbourne Urban Development policy as the impacts from the action are greater than 20 hectares in size and it involves the development of 1486 dwellings. Impacts from this proposal though may still be able to be offset in accordance with the Melbourne Urban Development policy due to potential surplus lands within the proposed Western Grassland Reserves where the offsets are located. The Department will investigate this possibility further with the Victorian Department of Environment and Primary Industries.

s22



The Hon Greg Hunt MP
Minister for the Environment

COPY

MC14-009045

Mr Grant Dennis
Executive Chairman
Dennis Family Holdings
211 Waverley Road
EAST MALVERN VIC 3145

24 APR 2014

Dear Mr Dennis

I refer to your and Peter Farrell's letters of 31 March 2014 concerning the Dennis Family Corporation's proposed commercial and residential developments at Burnside. Thank you for providing an update in relation to these developments and your investigations in relation to securing offsets to compensate for the likely impact to nationally protected matters at these sites.

I note your proposed approach to consider the Burnside developments under the Victorian Biodiversity Conservation Strategy or alternately to apply the costing mechanisms related to securing offsets under the Victorian Biodiversity Conservation Strategy in order to meet the offset requirements for residual impacts to matters of national environmental significance. Consistent with the *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act* this approach is applicable to the commercial development in relation to impacts on Natural Temperate Grassland of the Victorian Volcanic Plain. I am advised that the Department, in consultation with Victorian agencies, will also investigate the application of a similar approach in regard to meeting offset requirements for the proposed residential development. It is important to note that from the Commonwealth's perspective this policy only applies to impacts on Natural Temperate Grassland of the Victorian Volcanic Plain s22 [REDACTED]. The Department can also consider these sites as offsets for other relevant species where it can be demonstrated that individual species or habitat are present.

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I am very aware of the need for environmental approval decisions concerning developments such as this one to be made without delay and am committed to making timely decisions on environmental approvals. It is also critical that any approval decision I make on large development proposals is consistent with the requirements of national environmental law.

I have asked the Department to work closely with you to ensure preliminary documentation, addressing all matters of national environmental significance, is provided on both the commercial and residential projects to allow the assessment process to progress to the next stage. Once adequate preliminary documentation is completed you will be directed to make this information publicly available for comment. Following the public comment period, an approval decision can be considered.

Thank you for writing on this matter.

Yours sincerely



Greg Hunt

I am focussing closely on this as an eg of how we should be able to reach practical outcomes,



s47F

From: s47F @denniscorp.com.au]
Sent: Tuesday, 17 June 2014 3:20 PM
To: Tregurtha, James
Cc: s47F
Subject: Re: Burnside [SEC=UNCLASSIFIED]

s22

From: "Tregurtha, James" <James.Tregurtha@environment.gov.au>
To: s47F @denniscorp.com.au>
Cc: s47F
Date: 17/06/2014 02:38 PM
Subject: Burnside [SEC=UNCLASSIFIED]

Hi Peter

Further to our teleconference last week and in response to your emails, I can provide the following summary of our discussions.

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The Department notes the discussion concerning the Dennis Family Corporation's property Quandong within the Western Grassland Reserve to compensate for impacts on the Natural Temperate Grassland of the Victorian Volcanic Plain ecological community. Given the measures proposed to avoid impacts on the majority of the Spiny Rice-flower through the staged approach to the proposal, the Department considers that it may be a possibility to apply the *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act* (MUD policy) if the current residual impacts of proceeding in the manner described in the paragraph above, are less than 10 hectares and as such fall within the MUD policy parameters.

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EPBC 2011/6063 Burnside Residential Development
Adequacy review of draft preliminary documentation September 2014

Request for additional information dated 13
September 2011

Department review of information provided

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Striped Legless Lizard (*Delma impar*) (SLL)

1. Targeted surveys for the SLL were undertaken only partially in accordance with the Department's referral guidelines for this species (<http://www.environment.gov.au/epbc/publications/pubs/striped-legless-lizard-referral-guidelines.pdf>). For example, only 8 tile grids were used, as opposed to the recommended 10 grids for areas larger than 30 hectares; and tiles were checked fortnightly for two months, as opposed to "ideally once a week" during early September to December. These guidelines also state that, in Victoria, the Department of Sustainability and Environment recommends surveys be undertaken for at least six months. Please provide a justification for the survey techniques used, including the rationale for the selection of the location of tile grids.
2. Please clarify when and where records were made, and provide further information to justify why existing information and survey effort is adequate. Table 7 in the flora and fauna report states that SLL individuals were recorded only at grids 6, 7 and 8, whilst the text in the report states that SLL were recorded at grids 2, 3 and 4. Furthermore, page 9 of the report states that each grid was checked six times; whilst Table 7 only reports on four visits.
3. Further outline the importance of the site in terms of habitat or population connectivity, opportunities for dispersal, breeding and gene flow between SLL on-site and known SLL habitat or populations nearby.
4. The Department considers that, given the size of the site, habitat availability and connectivity offered by Kororoit Creek, the site is likely to contain a key breeding population of this species. Provide further information on how potential impacts to this species can be avoided or mitigated.
5. Outline proposed compensation measures

Addressed – Clarified in Preliminary Documentation version 6.11 (29 August 2014) as 24.24 ha on pg 23, 40, 41 and 95. Further information provided on page 15 of Preliminary Documentation version 6.10 defined SLL habitat as only occurring on 20.5 hectares in 2010, revised up to 24.24 hectares after further assessment in 2011. Pages 31 and 32 of Preliminary Documentation version 6.10 inconsistently stated that the proposed action will result in the loss of 20.86 hectares and 20.68 hectares of SLL habitat.

Adequate to inform assessment - Clarified in Preliminary Documentation version 6.11 (29 August 2014), however the table still does not include all results from surveys undertaken. There were still some inconsistencies on page 26 of Preliminary Documentation version 6.10 within the draft preliminary documentation specifically in relation to cross-referencing to other reports.

Adequate to inform assessment - The preliminary documentation offers some discussion on this matter and indicates that the population is unlikely to be viable into the future as there are a lack of linkages to surrounding habitat and other individuals or populations nearby (page 26 of Preliminary Documentation version 6.10).

Addressed - No avoidance proposed. Salvage and translocation proposed.

Addressed - Seeking to offset impacts on the SLL at

for any residual impacts on this species, noting that salvage and translocation is not considered to be a compensatory measure.

"Quandong" in the Western Grassland Reserves.

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20th November 2014

Environment Assessments and Compliance Division
Department of the Environment
GPO Box 787
Canberra ACT 2601

Attention: s47F (Assistant Director, South-eastern Australia Assessments Branch)

By email:

s47F @environment.gov.au

CC:

s47F @environment.gov.au

s47F @environment.gov.au

james.tregurtha@environment.gov.au

s47F @denniscorp.com.au

s47F@denniscorp.com.au

Dear s47F

**RE: MODEINA ESTATE PRECINCT 2
RESPONSE TO PUBLIC SUBMISSIONS TO PRELIMINARY DOCUMENTATION
BL&A REF. 7045.8
EPBC 2011/6063**

Please find on the following pages a response to issues raised in eight (8) public submissions to the public invitation to comment on the Preliminary Documentation under the EPBC Act assessment process for Modeina Estate Precinct 2 (EPBC 2011/6063).

This response contains information and clarification provided by Brett Lane and Associates Pty Ltd (BL&A), s47F (Victoria University) and the proponent, DFC (Project Management) Pty Ltd.

The eight submissions received are provided as Attachment 1 to this response document.

Yours sincerely,

for

Brett Lane & Associates Pty Ltd

General category	Particular issues raised	Number of submitters	Response
1. Fragmentation of populations/habitat (disagreement with response to significant impact criteria for NTGVVP)	SRF population on the site is not isolated	2	<p>One submitter argues that the removal of all Spiny Rice-flower and Matted Flax-lily from the site would make fragmentation of this population a moot point. It is reiterated that the Action is considered not to fragment the population recorded at Precinct 2 of the Modeina Estate (referred to herein as simply 'Precinct 2').</p> <p>Another submitter argues that the removal of up to 20 hectares of NTGVVP would fragment this community based on existing links with nearby reserves, including the 5-hectare Isabella Williams Memorial Reserve (approximately 3 hectares of which is native grassland) to the southeast across Kororoit Creek, the Bullum Bullum Reserve (assumed to be a parcel of land zoned Public Conservation and Resource Zone 650 metres south of Precinct 2) and 'Tenterfield Reserve' (assumed to mean the Burnside Heights Recreation Reserve to the north across the creek, zoned Public Park and Recreation Zone where sportsgrounds are under construction, and Urban Floodway Zone adjacent to the creek).</p> <p>Neither the Burnside Heights Recreation Reserve nor the parcel zoned PCRZ are listed as public land and their ongoing management status is unknown; the extent of NTGVVP on these parcels is also unknown and this information was not provided by the submitter. It therefore cannot be concluded that these reserves form part of contiguous NTGVVP habitat (the parcel zoned PCRZ is also separated from Precinct 2 by a 650 metre-long narrow reserve along Kororoit Creek, of unknown status).</p> <p>No information was provided by the submitter as to whether the Isabella Williams Memorial Reserve contains NTGVVP. It is believed that at least part of this reserve contains this community; however, it is not linked to the grasslands on the project site. Furthermore, it is understood that this reserve and the parcel zoned PCRZ to the south will be separated from Precinct 2 by the proposed extension to the east-west Rockbank Middle Road across Kororoit Creek and its upgrade to a 4 lane divided carriageway arterial road in accordance with the Melton East Strategy Plan (1997).</p> <p>In light of the above and the fact that this once-widespread grassland community has been subject to more than 20 years of development in this urban landscape and is now only represented by relatively small 'pocket' remnants, it is not considered reasonable to assert that the removal of NTGVVP from Precinct 2 represents fragmentation of the community. Based on the prevailing land use in the landscape it is also not considered reasonable to assert that this vegetation would be likely to play a role in the recovery of NTGVVP in the broader region as it is not linked to other remnants and of itself has no room to recover given pre-existing land use rights on surrounding land and almost continuous surrounding urban development. Recovery of this community is more effectively promoted in a rural landscape.</p>
	Object to fragmentation of SRF and MFL populations		
	The loss of NTGVVP WILL fragment the community – significant impact criterion		
	The loss of NTGVVP should be seen as interfering with the recovery of an ecological community – significant impact criterion		
2. An Environmental Impact Statement should be prepared	An Environmental Impact Statement should be prepared because of impacts on GGF, SRF, SLL & NTGVVP	2	The Commonwealth government decided that assessment through the Preliminary Documentation process was appropriate for the proposal. Furthermore, the State government has decided in response to an EES Referral that an EES is NOT required, subject to certain conditions being met. It is proposed that the EPBC Preliminary Documentation will be considered in addressing the 'No EES conditions'.

General category	Particular issues raised	Number of submitters	Response
3. Growling Grass Frog impacts	Growling Grass Frog (GGF) habitat along Kororoit Creek is strategically important	6	<p>The Sub-Regional Strategy for the Growling Grass Frog identifies this section of Kororoit Creek as 'potentially important habitat' based on pre-2000 records of the species in the waterway. More recently, BL&A recorded the species in the section of Kororoit Creek adjacent to Precinct 2. The proposal recognised the importance of this habitat by providing a 30-metre buffer zone from Kororoit Creek and the edges of wetland areas (including those where the records were identified and future stormwater treatment wetlands) in this precinct. This approach has been found to be acceptable for the provision of habitat under the Commonwealth EPBC Act assessment process for a number of property developments in Melbourne with past records of the species (e.g. 110 Cardinia Road, Officer, EPBC 2010/5729; Former Lalor Golf Course EPBC 2004/1605; North Burnside Precinct 1, EPBC 2003/1185). These distances refer to habitats and are proposed for buffers within the retained creek side corridor. In fact the development is set back from the creek, averages 50 metres and in places is up to 100 metres, to provide adequate space for recreational infrastructure. This distance is considerably greater than the minimum 35 metre creek setback required under the Commonwealth's approval of Precinct 1 and this is demonstrated in Figure 3 of the Preliminary documentation and Attachment & to this response. The proposed waterway separations are not dissimilar to those on nearby developments along Kororoit Creek.</p> <p>The Commonwealth significant impact guidelines for the species lists as significant the "Permanent removal or degradation of terrestrial habitat (for example between ponds, drainage lines or other temporary/permanent habitat) within 200 metres of a water body in temperate regions..." It is considered that in the absence of significant ponds or drainage lines outside the creek corridor, grassland habitat proposed for removal does not constitute dispersal habitat for the species as it does not provide connecting habitat between breeding habitats - i.e. it is considered that the species would be more likely to disperse along the creek corridor itself.</p> <p>The Sub-Regional Species Strategy (SRSS) for the Growling Grass Frog and guidelines contained within it do not apply to Precinct 2 as it is not within the Urban Growth Zone and is not covered by the Melbourne Strategic Assessment. This SRSS is based on guidelines for protecting frog habitat in new urban development areas. Precinct 2 is an infill development within the existing urban fabric and the frog is therefore not using space in the same way as in pre-urban rural landscapes. It is noteworthy that notwithstanding this, the frog persists along urban waterways even though the SRSS's setback requirements have not to date been applied.</p>
	Only impact on GGF considered in the document is sediment and erosion - this is inadequate and impacts need to be quantified		
	Removal of non-breeding habitat for GGF near creek unacceptable (dispersal, foraging, overwintering)		
	Distance between creek and development not in line with Commonwealth significant impact guidelines and compromises landscape scale habitat linkages for SRF, GGF and SLL		
	Wider zone should be retained along Kororoit Creek for the GGF to permit dispersal and foraging opportunities, similar to developments along the creek and in the new growth areas (i.e. 100 m setbacks)		
4. Native vegetation offsets not stated	No compensation for NV removal	1	Section 8.2 of the Preliminary Documentation outlines how offsets for the removal of NTGVVP will be achieved in the Western Grassland Reserve, consistent with the Commonwealth's policy <i>Melbourne Urban Development - Policy Statement for EPBC Act referrals</i> (July 2012).

General category	Particular issues raised	Number of submitters	Response
5. No 'avoid' or 'minimise' demonstrated	No attempt has been made to 'avoid' and 'minimise' impacts	5	<p>The proponent has advised that it has addressed the 3 step avoid, minimise, offset process in the development of the proposal as follows:</p> <ol style="list-style-type: none"> 1. Avoid. The staging of development has been configured to ensure no material impact of the critically endangered Spiny Rice-flower until the Propagation Project delivers sustainable results and offset sites are established. Design has carefully considered the location of services and infrastructure to ensure development can proceed in a holistic manner and be completed once sustainable results have been delivered. A fragmented development approach is not possible and would render the project unviable. 2. The staged development proposal minimises the impact on the Spiny Rice-flowers in accordance with agreed milestones until the last three stages. If necessary development of these three stages can also be deferred until the Propagation Project has been successfully concluded. 3. On successful completion of the Propagation Project all Spiny Rice-flowers will be deemed to have been offset. <p>The proponent has indicated that impacts will be further minimised through its focus on achieving broader conservation benefits, in particular for the Spiny Rice-flower through the Propagation Project and its offset program which is consistent with the Victorian offset approach to native vegetation removal proposals assessed under the high risk assessment pathway.</p> <p>The proponent commits to the retention of 175 Spiny Rice-flower plants in a Management Area corresponding to Stage 22 until such time as the Propagation Project proves its success. In the event the Propagation Project is successful it will underwrite the long term survival of the specie.</p>
6. Objection to removal of NTGVVP/SRF/SLL habitat	<p>Object to removal of grasslands and Spiny Rice-flower (SRF)</p> <p>The majority of the population on the site should be retained and protected in perpetuity</p> <p>Object to removal of a significant grassland ecosystem (NTGVVP)</p> <p>Too much habitat for the GGF, SLL and SRF is being destroyed by this development</p> <p>High quality NTGVVP should be preserved</p> <p>Propagation Trial has merit but not at expense of removing species</p>	7	<p>The proponent has indicated that it is focussed on achieving broader conservation benefits. The Spiny Rice-flower Propagation Project also involves the reinstatement of native grassland habitat, including the planting of a suite of graminoid and forb species, with considerable success achieved to date.</p>

General category	Particular issues raised	Number of submitters	Response
	Remove development from all or part of Stages 8 (assumed to mean Stage 18 – Primary School), 12, 14, 20, 21 and 22 and retain these areas for protection of the SRF, GGF and SLL		
7. Offsets inadequate generally	Any 'offset agreement' cannot adequately offset such an important community (NTGVVP)	2	The proponent has indicated that it is focussed on achieving broader conservation benefits, in particular for NTGVVP and the Spiny Rice-flower through the Propagation Project and its offset program. It considers this to be a substantially greater commitment to compensation and offset, with potentially lasting benefits for the threatened Spiny Rice-flower over and above just a usual offset approach. In the event that the Spiny Rice-flower Propagation Project is unsuccessful the proposal commits to the retention of 175 Spiny Rice-flower plants in a Management Area corresponding to Stage 22 until such time as sustainable success can be demonstrated.
8. Planning consideration – housing types	Development could include a greater variety of housing to achieve the same yield, thereby justifying the services investment AND retaining more of the significant biodiversity areas, as suggested in the VCAT decisions in 2006 and 2008 on the site	1	The proponent has provided the response below: The density of housing proposed for the development is consistent with State and local planning policy for the area, and home buyer expectations. Reference by VCAT to a different style of development was a hypothetical reflection in what was otherwise a lengthy and complex decision. The Responsible Planning Authority has subsequently approved development of Precinct 1 on the basis of similar densities applying over the balance area.
9. Planning consideration – open space	Current proposal does not have any significant open space and does not reflect current trends with developments incorporating wider buffers along waterways so vegetation/conservation and passive recreation can co-exist (without significant impacts on GGF)	6	The proponent has provided the response below: As described by VCAT the site represents the last piece of a jigsaw in development of the Melton East Growth Corridor. It is not an isolated ad hoc development proposal, but is consistent with long term planning policy and strategy for the area. From a planning perspective it is not appropriate that the site be considered in an isolated, stand alone context. The EPBC Act assessment of Precinct 1 in 2004 was the first time residential development in this growth area was captured by the Act, which came into force in July 2000, and after most of the Burnside area had been approved and developed. Planning for the area has proceeded in accordance with the Melton East Growth Area Strategy (1997). The provision of services, infrastructure, community facilities and open space have been delivered and are proposed to be delivered in accordance with that Strategy. With respect to open space and buffers along the creek for much of its length the edge of development is set back from the creek by 50 metres or more.
	Limited open space in the current development proposal puts pressure on remaining open space and conservation reserves in Brimbank - particularly the Isabella Williams Reserve		
	Alternatives to the proposed development layout that include more open space and wider creek buffers have not been adequately considered and it is inconsistent with developments elsewhere along the Kororoit Creek in this respect.		

General category	Particular issues raised	Number of submitters	Response
10. Striped Legless Lizard impacts	Little consideration of the Striped Legless Lizard (SLL)	7	<p>The following consideration was given to Striped Legless Lizard on the site of the proposed Action:</p> <ul style="list-style-type: none"> Targeted surveys involving 8 tile grids place throughout suitable habitat, undertaken to Commonwealth guidelines under the EPBC Act The recorded presence of the species at three of the eight tile grids led to the conclusion that a population of the species was present at the site Page 31 of the Preliminary Documentation states that: "Given the size and availability of suitable habitat on the Modeina site, it may be considered a key breeding site for [the] Striped Legless Lizard." Based on the above information it was considered that the Action will have a significant impact on the species under EPBC Act guidelines <p>Submitter Megan O'Shea (a researcher of Striped Legless Lizard in Victoria) raised a concern that non-native vegetation within the study area immediately adjacent to native grassland habitat may support populations of Striped Legless Lizard. It is inferred from this comment that O'Shea believes that gene flow within the site cannot be ruled out.</p> <p>None of the submissions presented any evidence to suggest that gene flow may occur between the population(s) on Precinct 2 and nearby sites separated from the impact site by Kororoit Creek and/or urban development.</p> <p>The non-native vegetation adjacent to the native grassland habitat on the site has been largely subject to repeated soil cultivation and grazing over time, and as such is not considered likely to support a population(s) of the species.</p> <p>It is conceded that gene flow may occur between any distinct populations occurring within the impact site, although any gene flow is not considered likely to be significant given the small home range of the species and its restriction to Precinct 2 due to surrounding development. Furthermore, it is considered that the Preliminary Documentation's analysis of connectivity between this site and nearby sites with SLL populations is adequate in support of the argument that gene flow in these scenarios is unlikely.</p> <p>Concerns raised by submitters about sub-optimal timing and weather conditions do not provide any detail as to why these conditions are considered to be sub-optimal. All surveys were undertaken in 2010 according to both State (then Department of Sustainability and Environment) and Commonwealth (then Department of Sustainability Environment Water Population and Communities) guidelines and were terminated when ambient temperatures exceeded 28°C (one exception to this rule is noted for Grid 8 on 26/10/2010; however, the species was recorded from this grid on 13/10/2010).</p>
	No attempt to confirm if the habitat for SLL represents significant breeding habitat		
	SLL habitat may not be isolated, as claimed		
	Gene flow between SLL populations on the site cannot be ruled out		
	Not enough is known about SLL to allow an impact of this size		
	Inadequate consideration of use by SLL of on-site and off-site non-native habitats		
	Timing and weather conditions during the SLL survey were sub-optimal for detecting the species		
The SLL Recovery plan recommends a 'cluster' approach to managing the SLL population and the Burnside site is one of a cluster of habitats that occurs in the region			
11. Striped Legless Lizard salvage and translocation	Salvage and translocation of SLL to the Western Grassland Reserves can only be done for developments in the growth areas, not this one.	1	It has always been the proponent's intention to translocate any Striped Legless Lizards found during the salvage operation to land owned by a related entity known as Quandong that forms part of the proposed Western Grassland Reserve. Discussions are continuing with the Department of Environment and Primary Industry to ensure that this long-standing proposal is in place prior to the development of the Western

General category	Particular issues raised	Number of submitters	Response
	<p>Some aspects of the translocation site for SLL still require resolution (in particular those mentioned on p. 14-15 of the DEPI Translocation Strategic Approach document)</p> <p>Salvage area mentioned as 1.1 ha when in fact over 20 ha of SLL habitat is being removed.</p> <p>Proposed salvage and translocation does not provide any significant conservation benefit or contribute to scientific research for the species (as per the National Recovery Plan and the DEPI Translocation Evaluation Panel)</p>		<p>Grassland Reserve and is acceptable to the Department.</p> <p>Assessments at Quandong show suitable and sufficient habitat used by a current population of the Striped Legless Lizard occurs in this part of the Western Grassland Reserve to allow translocation of Striped Legless Lizard to the Reserve. More detailed analysis of specific sites for translocation will be undertaken prior to any removal of identified habitat from Precinct 2 and documented in a Striped Legless Lizard Salvage and Translocation Plan, prepared to the satisfaction of the Department of the Environment (DotE) and DEPI.</p> <p>BL&A Report 7045 (2.6) dated January 2012 incorrectly stated that an area of 1.1 hectares in the north of the site will be salvaged for the species.</p> <p>Areas of Priority 1 habitat identified using the Striped Legless Lizard Salvage and Translocation Protocol documents (DSE 2011) will be salvaged for the species. It is expected that Priority 1 habitat will coincide with the areas of uncultivated land containing <i>Heavier-soils</i> Plains Grassland (up to 24.24 hectares); however, the precise area will be determined in a Salvage and Translocation Plan for the species, prepared to the satisfaction of DEPI and DotE. The Protocol identifies that no salvage is required for recently cultivated land – this applies to the balance of the land outside the <i>Heavier-soils</i> Plains Grassland patches.</p> <p>Proposed salvage and translocation of the species, in accordance with DEPI's approach, would relocate a population(s) from an isolated area of habitat subject to pressures associated with surrounding residential development to a large area set aside for conservation – the Western Grassland Reserve. It is considered that this will provide a significant conservation benefit to the species.</p>
12. Spiny Rice-flower offset	<p>The ability to offset through the propagation trial does not automatically provide a basis for approving removal of SRF</p> <p>No certainty that re-established SRF will recruit into the second generation</p> <p>Survival of an SRF plant after 2 years is not considered long enough for 'success' of the propagation project to be gauged</p> <p>Land tenure at the Brimbank Council propagation site (Isabella Williams Reserve) has not been adequately addressed</p>	4	<p>The removal of most of the SRF will not occur until the Spiny Rice-flower Project has demonstrated sustainable outcomes. The proponent believes that this satisfies the need for avoidance as the offset is not required until the latter part of development and then is provided once successful propagation of Spiny Rice-flowers is verified. The majority of Spiny Rice-flowers are retained until verification.</p> <p>The Spiny Rice-flower Propagation Project proposes (p. 13, Report 7045 [4.17]):</p> <ul style="list-style-type: none"> ▪ <i>The establishment of a viable and self-sustainable Spiny Rice-flower population at the recipient sites, of at least a total of 800 individuals.</i> <p><i>To be considered established, the Spiny Rice-flower population would need to demonstrate:</i></p> <ul style="list-style-type: none"> ▪ <i>The establishment of new plants that are able to flower and set seed</i> ▪ <i>The production of viable seed</i> ▪ <i>Approximate even numbers of annually flowering male and female plants</i> ▪ <i>New germinants recruiting in numbers similar to that in natural populations</i> ▪ <i>A growing population (i.e. recruitment exceeds mortality)</i>

General category	Particular issues raised	Number of submitters	Response
	<p>The outstanding issues raised in the second peer review of Dr Georgia Garrard remain unanswered, including:</p> <ul style="list-style-type: none"> ▪ The request that individuals be considered established only after surviving for at least 2 years ▪ Inadequate detail around the protection of retained SRF on the site prior to the establishment of 800 off-site plants ▪ Clarification regarding retention of SRF plants 7-11 & 51-52 in situ for 3 years ▪ Recipient sites: <ul style="list-style-type: none"> ○ Is MZ2 in the Isabella Williams Memorial Reserve considered a 'new' population ○ Viability of Quandong sites based on size (< 0.3 hectares) 		<p>Discussions have been held between the proponent and Brimbank City Council to the effect that the issue of land tenure of the Isabella Williams Memorial Reserve will be resolved based on the outcome of the EPBC Act assessment process. Brimbank Council has previously indicated in principle support for the inclusion of Isabella Williams Reserve as part of the Propagation Project subject to its approval by the Commonwealth and State.</p> <p>Dr Georgia Garrard states in her second peer review dated 14th March 2014 that "...most of the issues I raised have been satisfactorily addressed by the authors. In particular, my concerns regarding mitigation of project risks have been addressed in significant detail in the revised document."</p> <p>The following responses are provided to outstanding minor issues identified in this second peer review:</p> <ul style="list-style-type: none"> ▪ The Spiny Rice-flower Propagation Project Report 7045 (4.17) contained an error which has now been rectified in Report 7045 (4.18) – plants will be considered established if they survive for at least <u>2 years</u> after translocation ▪ The proponent will prepare a Spiny Rice-flower Interim Conservation Management Plan for the plants retained on site prior to the establishment of 800 off-site plants. This Plan will be prepared to the satisfaction of DEPI and the Commonwealth ▪ Female SRF plants outside the SRF Management Area retained <i>in situ</i>: <ul style="list-style-type: none"> ○ #7 (Stage 13) – at least until August 2015 ○ #8 (Stage 18) – at least until September 2018 ○ #9- 11, 51 & 52 (Stage 21) – at least until August 2019 ▪ Report 7045 (4.17) states that: "MZ2 and MZ3 (if required) can be considered for offset purposes as they are not currently managed for conservation purposes by Brimbank Council" – i.e. MZ2 constitutes a 'new' population for the purposes of offsetting ▪ Debbie Reynolds' research has investigated the approximate population size within a set area and found that the population sizes within an area of less than 0.3 hectares could range from 710 (Geggies Road) to more than 5,000 plants (McKenzie Road and Brownswaterholes Bridge Rail Reserve). Her findings established that with a greater female density the population was more likely to be able to produce greater numbers of germinants and that the species has a great potential to flourish in a high density spatial arrangement.
13. State-listed flora species consideration	Presence of numerous state listed threatened flora species should be considered, not just the presence of NTGVVP alone	1	State-listed flora species recorded at Precinct 2 will be addressed under the State approval process and have been addressed to some extent by the EES referral process. State-listed flora species are not under considered in the Commonwealth assessment process.

Attachment 1: Public submissions (8)

From: s47F
To:
Subject: FW: ATTENTION s47F
Date: Thursday, 16 October 2014 5:38:12 PM

From: s47F [mailto:s47F@optusnet.com.au]
Sent: Thursday, October 16, 2014 5:04 PM
To: s47F
Subject: Fwd: ATTENTION s47F

Stephen s47F

Date: 16 October 2014 5:00:12 pm AEDT
To: s47F [mailto:s47F@optusnet.com.au]
Subject: ATTENTION s47F

As local residents we ask that the Minister consider our arguments which are as follows for the Commonwealth to not allow the clearance of just under 20ha of federal protected grassland which contains 244 *Pimelea spinescens*.

From our reading the *Pimelea spinescens* propagation trial is important research but we cannot see how this will justify the eventual clearance of such a large population without any attempt to avoid or minimise. We can see that this type of research is important but why does it come at the expense of the species itself.

The area for development has been identified by the Sub-Regional Species Strategy for Growling Grass Frog as being strategically important habitat for this species. The loss of the overwintering habitat that will be removed will place intense pressure on the survival of this species.

The disregard for the Striped Legless Lizard population and the possibility of it being a key breeding site is astounding and simply because the site is considered by the consultants to be isolated. How is a 19 hectare patch isolated for this species and surely as so little is known of the habitats of this species that to consider the patch to be isolated is unfounded.

The Minister needs to consider the future pressures on the creek corridor with the addition of 850 households on the creek corridor and the current proposal does not have any significant open space therefore it will place ever growing pressure on the narrow creek corridor. The current development plan does not reflect current trends in the protection of waterways and natural vegetation. Many older developments within Brimbank bring the housing further back from the creek line and have managed to protect rocky outcrops and allow for passive recreation pursuits to occur alongside protection of remnant vegetation. Why should this estate be any different .

We ask that the Minister consider our arguments and that not approval be given for this controlled action.

Regards

s47F

16/10/2014

s47F

Brett Lane & Associates Pty. Ltd.
PO Box 337
Camberwell VIC 3124

Sunshine Office

Alexandra Avenue
Sunshine, Victoria 3020
T 9249 4000
F 9249 4351
W brimbank.vic.gov.au

Dear s47F

RE: Comments on Preliminary documentation – Modenia, Burnside Residential Development – The Point (EPBC 2011/6063)

As the adjacent municipality council staffs are providing comments on the preliminary documentation in order to help achieve a landscape scale picture and provide information to the Department of Environment and the Minister.

Detailed below are specific comments;

Growling Grass Frog

- The significant impact of construction coming to within 35m of a waterway and permanent removal and degradation of terrestrial habitat within 200m of a waterway with significant records of growling grass frog.
- Brimbank independent mapping lists the vegetation along this section of Kororoit Creek as having a high likelihood of Growling Grass Frog and is guiding changes to management to facilitate greater overwintering habitat and dispersal routes.
- The preliminary documentation refers to not coming within 30m of the waterway and 15m where it has been deemed as unsuitable habitat. This does not seem to fit with current Commonwealth and Victorian significant impact guidelines for this species.
- The National Recovery Plan for Growling Grass Frog outlines that 'frogs overwinter beneath thick vegetation, logs, rocks and other ground debris, sometimes at considerable distances from water bodies.' (Clemanns & Gillespie, DSE 2012) this proposal proposes to have a significant impact on the growling grass frog population by removing overwintering habitat.
- Whilst the Sub-Regional Strategy for the species applies to the Growth Areas it also identifies populations both within the growth areas and outside need to be protected and managed on a landscape level, and also on a patch or population level, where frogs have the capacity to move within and between sites, that is no barriers to dispersal. We believe that the greatest opportunity to achieve this outcome is by protecting this key waterway Kororoit Creek with large buffers that allow for protection and creation of additional breeding habitat with sufficient area for foraging and dispersal between sites. We can see how developments upstream and immediately downstream have been able to achieve a balance and believe that this development is not different and should be required to pull back to enable a wider corridor and protection of terrestrial habitat.
- The only impact considered in this document is the sediment and pollutant levels coming from the estate, this is inadequate.

- The current proposal does not allow for the development of open space infrastructure within the 35m corridor (e.g. shared trails, landscaping, water sensitive urban design treatments) and it has not been considered as an impact on the Growling Grass Frog as it will be guided by Melton City Council and Melbourne Water however if there is not enough room for this infrastructure then the already limited Growling Grass Frog habitat and vegetation will further be reduced.
- The current proposal does not show extensive open space beyond the bare minimum creek corridor as it is limited to 2 small and 1 medium sized reserve totaling approximately 1.4ha in a 87ha development. A minimum 5% developer contribution of open space would be 4.45Ha. Whilst this is not for the Commonwealth under the EPBC Act to comment on, the future pressure, on a narrow creek corridor set aside to protect the growling grass frog, to provide passive recreation pursuits should give rise to concerns for impacts on Growling Grass Frog overwintering and dispersal.
- Requiring the proponent to limit the placement of fill along the corridor therefore limit the change to the natural landscape will also reduce the potential to damage habitat of a known population of Growling Grass Frog.
- It is our belief that the impacts on the Growling Grass Frog need further consideration.

Striped Legless Lizard

- We acknowledge that Striped Legless Lizards have been detected, however we are concerned that whilst the report acknowledges that the area could be key breeding habitat there is no attempt to discern whether it is or not.
- We are concerned that the surveys were not undertaken in optimal conditions, with temperatures often too low for lizard observations.
- We dispute that the population is isolated, for starters it is a 60+ ha site of which 19+ ha site of remnant vegetation (suitable habitat) and without knowing more about the species we have no idea if they can cross the waterway and therefore have access to Isabella Williams Grassland to the west or areas of vegetation at Burnside Heights Recreation Reserve to the north.
- We do not know enough about the species to have this big of an impact occur.

Alternatives to the current proposal

- The developer offers no alternatives and whilst this is understandable as they are trying to maximize profit, the design of the subdivision could be changed to reach a compromise which would mean development with sections of significant setbacks to protect the creek corridor, the Growling Grass Frog and conservation of significant areas for Spiny Rice Flower and Striped Legless Lizard by removing development from areas 20, 21 and 22.
- The developer offers a 35m open space setback along Kororoit Creek as a protection for the waterway and the Growling Grass Frog this is barely over the minimum required under Clause 14 of the Victorian State Planning Policy Framework and offers no compensation for vegetation removed.
- Brimbank understands that an area as significant as 'The Point' would have triggered retention in the new growth areas. We can see that the retention of a wide corridor and conservation areas associated with the creek would have significant benefits to conservation of NTGVVP, Growling Grass Frog,

Spiny Rice-flower and Striped Legless Lizard and align better with neighbouring Caroline Springs and what is proposed for the newer suburbs in the new growth areas.

- Within this reach of Kororoit Creek large areas supporting flora and fauna have been set aside as part of historical developments. This reach, which 'the point' forms part of, is a critical connection of landscape scale for Growling Grass Frog, Spiny Rice-flower and Striped Legless Lizard. It would be considered inappropriate and outdated for housing to come within 30m of the waterway.
- Passive surveillance and general community ownership of the creek corridor is vital for the protection of the Growling Grass Frog in this section of the creek and the current layout offers disjointed access and creates areas where it will be difficult to navigate with tight and steep access to the creek.

Spiny Rice-flower Propagation Project

- Brimbank City Council has been included in the Spiny Rice-flower Propagation Project and considers the need for such research vital for the survival of this species and should be undertaken.
- Brimbank's involvement comes with numerous conditions and should not be considered as support for the clearance of the vegetation at the 'The Point'.
- These conditions include approved via the rigorous process from the three tiers of government. It should be noted that Brimbank City Council has not formally approved its participation in this trial.
- The land tenure of Isabella Williams Grassland part of MR1 and MR3 is country roads authority (Vic Roads) and the other part and MR2 are crown land. The land tenure has not been adequately addressed. Correspondence dated 20/6/2012 to Dennis Family Corporation highlighting the land tenure issues.
- The decision that a Spiny Rice-flower still alive after 2 years is established – due to the excellent germination success but limited survival rate due to climatic conditions we have concerns that this is not long enough.
- We are concerned that the areas outlined not to be cleared prior to 800 new individuals being secured, not enough detail as to what will be done to ensure that surrounding development will not have adverse effect on the existing population. Grassland reserves inadequately fenced and maintained attract rubbish and fill dumping, vehicle damage etc.
- We consider that the second peer review undertaken by Georgia Garrard remains unanswered, and we would like to understand how these remaining concerns have been addressed.

Natural Temperate Grasslands of the VVP

- We would like to highlight that the sites current condition does not reflect its potential, the site has been not been noticeably managed and has been unsecured for 25 years and still maintains high levels of diversity. Flora and fauna records can only be increased by active management.
- The recording of numerous listed species Matted Flax-lily, Tough Scurf Pea, Arching Flax-lily, Rye Beetle Grass, Slender Bindweed, Slender Tick-trefoil, Basalt Tussock-grass and the record of 2 Sun Orchids highlights a site of high value for genetic diversity and habitat and its preservation as high quality NTGVPP alone cannot be overlooked.

- The limited open space being offered by this proposal will potentially place extra pressures on the Brimbank managed open space and conservation assets which occur at Isabella Williams Reserve which will soon be linked by a pedestrian foot bridge and a planned road crossing. The populations of Spiny Rice-flower and presumed Striped Legless Lizard could be impacted through a significant increase of users and the required infrastructure mitigations to ensure the populations are not compromised.

We do not consider that all alternatives have been considered as part of this documentation and without change to the design of the estate to consider the preservation of part of the NTGVVP community and therefore a substantial number of the Spiny Rice-flower and Striped Legless Lizard population and the appropriate setbacks for the Growling Grass Frog as per the Biodiversity Conservation strategy for the Melbourne Growth Areas we do not consider that this proposed action should be approved.

Yours sincerely,

A large, bold, grey signature that reads 's47F'.

Acting Manager Environment

From: s47F
To:
Subject: FW: Burnside Residential Development
Date: Thursday, 16 October 2014 5:41:15 PM

From: s47F [mailto:s47F@nmbw.com.au]
Sent: Thursday, October 16, 2014 4:40 PM
To: s47F
Subject: Burnside Residential Development

Hello,

I would like to voice my objection to the proposed Burnside Residential Development and consequent destruction of highly valuable grassland ecology. I believe that this proposal should not be supported. Any sort of 'off set' agreement can not in fact off set the real value of this rare and intact vegetation.

best wishes,

s47F

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2 / 70 Kerr Street, Fitzroy 3065
Victoria, Australia
s47F
www.nmbw.com.au
NMBW Pty Ltd
ACN 079 825 488
ABN 28 079 825 488

From: s47F
To:
Subject: FW: Burnside on grasslands
Date: Thursday, 16 October 2014 5:42:15 PM

From: s47F @mediasoft.com.au]
Sent: Thursday, October 16, 2014 4:34 PM
To: s47F
Subject: Burnside on grasslands

Dear s47F I am writing to express my great opposition to the proposed Burnside North or North Burnside housing project.

The reasons for my opposition are many, and I will briefly outline a few below. Please feel free to make contact with me if you want any clarification.

1. Hundreds of children have expressed their views and desperately want these grasslands to remain, unharmed. Some of their quotes (among many, many more) are here:
from 5 year olds: 'We have to make sure the legless lizards have a home, we can't just squash these places'. 'The place was full of rubbish from the buildings nearby, which can kill the animals and make it hard for the plants. We are very sad to see it'.
from 9 and 10 year olds: 'We don't understand why the grown-ups can't see how important the grasslands are. We want them to be safe, we want to see the grasses, the flowers, the animals, not more houses'. 'People have killed too many grasslands already, and the lizards, butterflies, moths and frogs have fewer and fewer places to survive!' 'if we could, we would stop all the development, it makes us sad to see it!'
The children see the core value of such environments and the responsibility we have to protect them from urban encroachment. The fact that several hundred young residents want these spaces to be protected, should be enough for it to not go ahead!
We have a responsibility to leave a legacy of growth that is sensitive to our environment, progress that encompasses our deeper understanding of our planet and its particular environs, and what these offer to our mental and physical health. We can also be clever with how we explore these spaces to embrace them as vital parts of a flourishing economy, not just obliterating them.
2. this ecological community is under serious pressure, and too much has already been lost. It is unacceptable to keep losing/fragmenting.
3. there are several species within this area that are listed under the EPBC Act. Why would we do anything that puts these at any further risk? There is not enough known about the Striped Legless Lizard to take ANY action that threatens its existing habitat, and potential habitat.
4. It is suggested that a 15 metre buffer would be established along the creek, in order to support growling grass frog habitat, (also listed under the EPBC) which is at odds with current research that demonstrates at least 100m is needed.
5. It is stated that the development would result in the loss of the Spiny Rice flower and Matted Flax Lily populations, both species listed as threatened under the EPBC Act. There are suggestions that loss of these plants would not lead to fragmentation of the population - well of course, if all are eliminated and continue to be in these ways, fragmentation is no longer even possible. This is unacceptable, and contributes to the ongoing loss of species, habitats, unique systems, because of not very clever urban sprawl. There are other solutions, which do no impact in these ways.
6. we need to see the value of ALL ecological communities, and the small variability within each one as well. The less we see, the more limited our capacity for so many things.
7. How far can we keep making 'offsets' a way of dealing with actual loss of land? At what point will we say, that there is not much left to offset to, and the system is in a state of extreme disrepair and barely viable. Surely we need to stop well before we get to that point, in fact, since we know these species and ecological communities are already at risk, we can make a sound decision NOW.
8. All in all, it is utterly unacceptable that this generation of humans ignores its overwhelming responsibility to maintain all existing grasslands, and enhance lost ones to be thriving environments once again. We don't need to proceed in these mindless, short sighted ways.
9. The report has a few gaps that need to be addressed - such as, the timing of the survey is likely to have led to the omission of certain populations numbers/activity of striped legless lizard and possibly others. Also, the report By Dr Garrard suggests that further investigations are needed.
10. Given the significance of these species and ecological community, an Environmental Impact Statement should be undertaken.

There are many more reasons, based on scientific inquiry and human ethics.

I look forward to a bright future.

S47F

President s47F

Secretary: s47F

The Friends Of



Kororoit Creek

ABN: 34 615 852 093

PO Box 787
Sunshine Vic 3020

E-mail: s47F @fokc.org.au

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16 October 2014

s47F

Brett Lane & Associates Pty Ltd
s47F@ecologicalresearch.com.au

REFERENCE Burnside Residential Development – “The Point”
EPBC 2011/6063 – INVITATION FOR PUBLIC COMMENT

Since 1999, the Friends of Kororoit Creek (FOKC) have been carrying out a range of activities to improve Kororoit Creek and its surrounds in the Brimbank area. Its members are volunteers coming from all walks of life who share a passion and interest in maintaining the environment, including wildlife and the local native flora. Over time, FOKC has created and maintained a number of plantings along the Kororoit Creek and is keen to ensure that this important waterway in Melbourne’s western suburbs is preserved. This is not only for the benefit of the environment, but also for the people living in the area.

The proposed Burnside Residential Development has attracted a need for us to comment because it appears to have some serious deficiencies.

We have noted from the planning documents that the proposed development comes very close to the creek. Our overall preference is that local wildlife, including the Growling Grass Frog and the Striped Legless Lizard, be given the maximum possible chance to survive and thrive. Too much habitat is being destroyed by the proposed development.

We understand that other developments along this stretch of the creek have retained wide areas of native vegetation. FOKC do not support this development being any different. The minister should not approve the proposed clearance because a better design of the estate can be developed that ensures the environmental values are better preserved.

FOKC prefer a design which protects the creek environs to a greater extent and in so doing also helps preserve local flora species including the Spiny Rice Flower.

The estate design appears to have little open space overall. It relies greatly on the space along the creek to bolster its already small open space reserves. Given this, FOKC do not believe that the developer can protect the Growling Grass Frog and the vegetation while also providing for the open space needs of the planned 850 households.

FOKC understand from local experts that there are concerns about the survey timing for the Striped Legless Lizard including surveys undertaken when it was too cold (comments from Megan O’Shea) and therefore the population is underestimated. With that, there appears to be no attempt to discover whether the site is a key breeding site. We also understand that so little is known of the habits of this species that to consider the patch to be isolated is unfounded.

FOKC have a strong view that connected habitat is important for environmental preservation. We understand that the vegetation of 'The Point' is part of a series of either connected or potentially connected habitats for a variety of species and is therefore too important to be lost through the current design of this development.

FOKC consider that an Environmental Impact Statement is vital because the amount of land to be cleared has potential to have a severe impact on the Spiny Rice-flower, breeding sites for Striped Legless Lizard and the Growling Grass Frog.

Yours sincerely,

s47F

s47F

THE FRIENDS OF KOROROIT CREEK INC

WEBSITE - www.fokc.org.au

Proudly Supported by:

- ORICA LIMITED
- BRIMBANK CITY COUNCIL
- BUNNINGS SUNSHINE

15 October 2014

s47F

Brett Lane and Associates,
PO Box 337
Camberwell VIC 3124

RE: Burnside Residential Development – The Point (EPBC 2011/6063)

Dear s47F

I submit the following comments in relation to the assessment documentation that has been presented for the Burnside Residential Development at The Point. As you are aware, I have considerable experience in the study of Striped Legless Lizards and will therefore restrict my comments on the proposed development to this subject area.

My overarching concern about the assessment documentation is the somewhat confounding argument (page 31) that the site may provide 'key breeding habitat' for Striped Legless Lizards, but that this quality is diminished by the species' naturally small home range and poor likelihood of 'significant gene flow between populations in the study area and the surrounding landscape'.

The *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable striped legless lizard, *Delma impar** suggest that an 'important population of Striped Legless Lizards' may include 'key source populations for either breeding or dispersal'. Although the referral document provides recommendations for the methods and effort to survey for Striped Legless Lizards, it unfortunately does not provide recommendations in relation to methods/effort for assessing the quality of populations. That is, the recommendations are simply a minimum for assessing species presence/absence.

Clearly, the survey methods and effort were successful in establishing that Striped Legless Lizards do persist on the proposed development site but would be insufficient for evaluating whether the site provided either key breeding habitat or a key breeding population. Further to this, based on my own observations and a very coarse analysis of some data, I would suggest that at least some of the surveys were conducted in conditions that were not optimal for detecting the species, potentially negatively distorting any perception of the density of Striped Legless Lizards at this site.

Fortunately, the assessment documentation does state that the site may support a key breeding population. Given the proximity of this site to remnant NTGVVP grasslands in the St Albans and Deer Park areas that support seemingly robust populations of Striped Legless Lizard, the precautionary principal would suggest that, at the least, further detailed investigation of the population at this site is warranted.

To dismiss a potentially key breeding population of Striped Legless Lizards because it is unlikely that there would be any gene flow with populations in the surrounding landscape is concerning. The assessment documentation indicates that the site supports over 20 hectares of NTGVVP Striped Legless Lizard habitat but does not assess immediately adjacent non-native vegetation, even though Striped Legless Lizards are often detected in such locations. Thus, the overall area occupied by the population may actually be larger than 20 hectares. There are nearby examples of remnant habitat that are similar to or smaller in area that support seemingly robust Striped Legless Lizard populations. Examples include Denton Avenue Grassland, Victoria University Grassland and Iramoo Wildlife Reserve. If such sites were doomed because of their small size and perceived lack of connectivity in the surrounding landscape, then the conservation of this species in the Melbourne area would be precariously dependent on only a very small number of sites.


The proposed development makes no attempt to avoid or minimise impacts on Striped Legless Lizards. Instead it is proposed that habitat offsets will be located at Quandong within the Western Grassland Reserve, and that Striped Legless Lizards will be salvaged and translocated to unidentified suitable habitat according to the DEPI protocol. However, it is my understanding that this protocol (DEPI 2011: *Salvage and translocation of Striped Legless Lizard in the urban growth area of Melbourne*) and offsets to the Western Grassland Reserve are only relevant to development sites within the urban growth corridors identified under the Strategic Impact Assessment (DSE 2010). This proposed development site is not located within such an urban growth corridor.

In circumstances outside the urban growth corridor, it is my understanding that the policy of the DEPI Translocation Evaluation Panel is that 'DEPI will permit, or undertake, translocation of threatened vertebrate fauna into or within Victoria for the purposes of biodiversity conservation or scientific research, provided that the translocation provides or is considered likely to provide a significant conservation benefit or contribution to the recovery of the taxon'. This policy position is consistent with the National Recovery Plan for the Striped Legless Lizard *Delma impar* (Smith & Robertson, 1999). The proposed development does not demonstrate that salvage and translocation would provide any significant conservation benefit or contribute to scientific research for this species.

Page 43 of the *Flora and Fauna Assessment* report for this development outlines the method of salvage that would be adopted, which is in keeping with the DEPI protocol (with the exception that the site is not within an urban growth corridor). It is worth noting however, that pages 14 and 15 of the 'Strategic Approach' for this protocol outline a number of matters requiring resolution prior to any translocation attempt. These include identification of the release site including microhabitat selection; pre-release preparation of release sites; release protocols; and requirements/methods for ongoing monitoring of released animals. The assessment documentation for this proposed development simply indicates that salvage and translocation of Striped Legless Lizards will be the adopted strategy, without directly addressing any of these issues that require resolution. Also of concern on page 43, is the designation of the salvage area as being approximately 1.1 hectares, when the total area of available Striped Legless Lizard habitat is greater than 20 hectares.

Overall, as acknowledged in the assessment documentation, this development will have a significant impact on the Striped Legless Lizard, with no attempts to avoid or minimise the impact. Proposals for habitat offsets and salvage and translocation are not consistent with the Melbourne Strategic Impact Assessment, the policy of the Victorian Translocation Evaluation Panel or the National Recovery Plan for the Striped Legless Lizard. Given the floristic diversity and the presence of four matters of national significance under the EPBC Act 1999, I do not support the proposed development of this site. I recommend that the Minister reject the application for a controlled action.

Sincerely,



s47F

From: s47F
To:
Subject: FW: EPBC 2011/6063 - Modenia Burnside, Victoria - Comments on preliminary documentaion
Date: Thursday, 16 October 2014 5:45:19 PM

From: s47F @bigpond.com s47F @bigpond.com]
Sent: Thursday, October 16, 2014 2:08 PM
To: s47F
Cc: s47F @humegrammar.vic.edu.au
Subject: EPBC 2011/6063 - Modenia Burnside, Victoria - Comments on preliminary documentaion

Attention s47F

As local residents and active community members we offer these reasons why the Commonwealth should not allow the clearance of just under 20ha of federal protected grassland, 244 Spiny Rice-flower plants, possible key breeding habitat for Striped legless lizard, and impact on overwintering habitat of the Growling Grass Frog and impact so heavily on Kororoit Creek corridor.

It is our understanding that this stretch is identified by the Sub-Regional Species Strategy for Growling grass frog as being strategically important habitat (despite it being outside the Growth Area), but the preliminary documentation does not seem to consider the importance of the habitat and only considers the impacts of sediments and pollutants on the species rather than the loss of the overwintering habitat that will be removed.

The Minister needs to consider the future pressures on the creek corridor with the addition of 850 households on the creek habitats and the growling grass frog, the current proposal does not have any significant open space (1.4ha in total outside of the creek corridor) therefore it will place ever growing pressure on the narrow creek corridor and the growling grass frog habitat that survives.

The current development plan does not reflect current trends in the protection of waterways and natural vegetation, it offers no alternatives to a standard low density 1 house per block spread out as far as possible, where if the Commonwealth indicated it would not allow the clearance the developer would be forced to think differently and offer different levels/densities of housing on the site whilst also accommodating the protection of the grassland and creek corridor. Even older developments within Brimbank bring the housing further back from the creek line and have managed to protect rocky outcrops and allow for passive recreation pursuits to occur alongside protection of remnant vegetation, why should it be any different for this estate?

The developer offers a 35m buffer along Kororoit Creek as though they had a choice this is barely over the minimum required under Clause 14 of the Victorian State Planning Policy Framework.

Whilst we understand that the development plan layout is not of concern to the Federal government surely the opportunity to use the creek corridor and a variety of setbacks which reflect the landscape character and the species records shown in the documentation should be considered to preserve this important site. Here is a great opportunity to think outside the square (higher density housing) and change the estate to protect these valuable habitats along the lines of the new growth area plans. The Minister should not allow this proposed action to be approved and therefore require the developer to redesign the plan. For example maintaining a portion of stage 8, 21 and 20 and all of 22 and then where the creek widens again on the opposite bank (Burnside Heights Recreation Reserve) allow development to come closer to the creek (to approximately 60m). Where the housing development narrows the creek corridor again on the opposite bank to stage 12 and 14, change 'The Point'

development plan to widen the corridor again by pulling the stage back from the waterway. Whilst this would still mean the removal of vegetation and still require offsets it would be a good compromise.

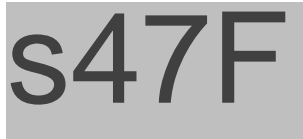
From our reading the spiny rice flower propagation trail is important research but we can not see how it justifies the eventual wholesale clearance of such a large population without any attempt to avoid or minimise, we are also concerned that the comments of the 2nd peer review appear unanswered and the security of the insitu plants unexplained.

The almost complete disregard for the Striped Legless Lizard population and the possibility of it being a key breeding site is astounding and simply because the site is considered by the consultants to be isolated, how is a 19 hectare patch isolated for this species and surely we do not know enough about this species to be able to say that it is isolated from other remnants/habitat on the creek?

Past Environmental impacts - In the past Dennis Family Corporation has come close to the creek with a variety of widths from approximately 60m to 30m, directly downstream and in this stretch the housing configuration does not take into consideration the lie of the land along the waterway and maintain any landscape characteristics of the natural creek and with the inclusion of a shared trail there is now a steep unmanageable batter with some fragments of remnant vegetation with no obvious attempts to rehabilitate.

We ask that the Minister consider our comments and that no approval be given for this controlled action.

Regards



s47F

RE: EPBC referral 2011/6063 - Burnside Residential Development – The Point

Thank you for the opportunity to provide comment on the proposed development at The Point – Burnside.

The Friends of Iramoo is a community organisation focused on the support and protection of native wildflower grasslands and their biodiversity, including the Striped Legless Lizard and other threatened grassland species and the promotion and advocacy for the protection of wildflower grasslands, biodiversity and foster sustainable living in the outer West of Melbourne

We understand that the proposed action is to undertake works to develop 65.4 hectares of land into a residential housing estate. While staged in total the proposed clearance includes:

- 19.992 hectares of natural temperate grassland
- At least 10.322 hectares of Striped Legless Lizard Habitat
- 244 Spiny Rice-Flowers
- Un-quantified impacts on the Growling Grass Frog
- 2 Matted Flax-lily plants

We acknowledge that a permit is sought under Section 201 of the EPBC Act. We note that under this section:

(3) The Minister must not issue the permit unless satisfied that:

(a) the specified action will contribute significantly to the conservation of the listed threatened species or listed threatened ecological community concerned; or

(b) the impact of the specified action on a member of the listed threatened species or listed threatened ecological community concerned is incidental to, and not the purpose of, the taking of the action and:

(i) the taking of the action will not adversely affect the survival or recovery in nature of that species or ecological community;
and

(ii) the taking of the action is not inconsistent with a recovery plan that is in force for that species or ecological community;
and

(iii) the holder of the permit will take all reasonable steps to minimise the impact of the action on that species or ecological community;

Outlined below is our assessment against the achievement of the above requirements. We also note that an offset strategy is proposed – however the EPBC Act is clear in its assessment that the ability to secure offsets should not be a determining factor in if an impact should go ahead. Offsets should only be considered once avoidance and minimisation is achieved.

Matter of National Environmental Significance 1 - Natural Temperate Grasslands of the Victorian Volcanic Plains

The site contains 21.04 hectares National Temperate Grasslands of the Victorian Volcanic Plain listed as Critically Endangered under the EPBC Act. The site also contains escarpment shrubland along the Kororoit Creek.

The Kororoit Creek corridor itself has been planned with expansions onto the top of banks to account for native grassland, which adjoins the creek corridor. This is particular evident in the Isabella Williams Reserve & Tenterfield Conservation Reserve on the other side of the creek and Bullum Bullum Reserve on the same side of the creek. These areas have all been managed and maintained for the grassland values that they hold. As a collective these grasslands form a matrix of significant habitat for a number of threatened species and communities.

Connectivity is one of the key principals in designing area of native vegetation retention. The native vegetation within the subject site has connectivity to adjoining conservation reserves and the creek corridor. The value of this corridor is particular important for the Striped Legless Lizard, Growling Grass Frog and Spiny Rice Flower and many other species found within native grasslands.

The Melbourne Strategic Impact Assessment and the Biodiversity Conservation Strategy Conservation Reserves include 26 conservation reserves within the UBG including 100 metre buffers to significant creek corridors include the Kororoit Creek.

Under the provisions of the EPBC Act – the ability to provide a ‘suitable offset’ is not to be used to justify the loss. This loss has to show that there were no other options to avoid or minimise the impact. No avoidance or minimisation is shown in this development. No clear environmental, social or economic reason is provided as to why this cannot be achieved within the project area. It is clearly evident that similar avoidance and minimisation have been achieved within grassland connected to Kororoit Creek Corridor. It is worth noting the in the VCAT decision (reference no. P674/2006 & P2948/2008) on this case noted:

‘We believe that the presence of so much native vegetation of high and very high significance within Precinct 2 casts serious doubts upon its development capacity. The native vegetation is not concentrated in a particular area but spread throughout the precinct. Until there is an agreement with DSE about what may be removed and how offsets may be provided, it is impossible to say with any certainty what the potential lot yield might be or what shape development may take.

It may be that the constraints on development of Precinct 2 provide an opportunity to think differently about development that may be suitable for 'The Point'. Why should a different style of development of a higher density and different built form not be contemplated here instead of just more of the same low density, single dwelling development, which characterises the surrounding areas of Burnside? A different style of development could provide more choice in housing and increased density in such a way that would justify the provision of more services. '

Any economic loss obtained from reducing the development footprint to account for some onsite retention could be made up through increasing the density of the housing form offered. The visual amenity of the Kororoit Creek Corridor and the location of both passive and activity open space in proximity to the site could account for this.

The design of the development area has not been sympathetic to the landscape nor the significant values it contains. Based on this the proposal in its current form should be refused.

Matter of National Environmental Significance 2 - Striped Legless Lizard

The assessment documentation has provided evidence that the site supports a known population of the Striped Legless Lizard listed as Vulnerable under the EPBC act.

The proposal does not seek to avoid or minimise any loss of habitat for this species.

Dr. Megan O'Shea has provided comment to the Friends of Iramoo, which suggests that at least some of the surveys were conducted in conditions that were not optimal for detecting the species, potentially negatively distorting any perception of the density of Striped Legless Lizards at this site.

The survey methods and effort used within the documentation did not provide any scientific evidence in the positive or negative to determine if a key breeding population of the Striped Legless Lizard existed on the site. Given this site location and habitat connectivity to other known or likely populations of this species the loss of the habitat could have serious consequences to the long term viability of the St Albans/ Burnside metapopulation. It is noted that the Striped Legless Lizard Recovery Plan suggests a cluster approach to management of Striped Legless Lizard populations, including the management of the genetic pool. Thus, the Modeina population would fit in to the western Melbourne management cluster.

Matter of National Environmental Significance 3 - Spiny Rice Flower

The site survey indicated that the development area contains at least 225 Spiny Rice Flower plants. This is a very significant population within the St Albans/Burnside area. It is also worth highlighting that an EPBC application to impact on Spiny Rice-flower is also being sought by DFC only within 1km of the study site 2011/6004. This proposal clearly must be considered as causing a drastic action of this species that could limit its ability to survive in the long term.

It is important to note that this site is not isolated from other Spiny Rice Flower individual and may provide a key genetic link between populations.

The research proposal indicated has merit in its concept and processes. However as per EPBC Act offset policy – the ability to offset does not automatically provide a recommendation for approval of the clearance. The risk profile provided for the reestablishment of 800 plants only considers first generation establishment. There is nothing that provides certainty that these plants will be able to recruit natural into the second generation.

Furthermore, there is no reason why this offset proposal could not be used to compensate for the loss of a percentage of the population while the majority of the population is retained in-situ within the conservation reserve. It is already clear from the Biodiversity Conservation Strategy that significant populations of Spiny Rice Flowers are difficult to find. This is why the State Government is required to find another 394 ha of Spiny Rice-flower habitat outside of the urban growth boundary.

The majority of the Spiny Rice Flowers on this site should be retained and protected in perpetuity.

Matter of National Environmental Significance 4 - Growling Gras Frog

The proposal seeks to only provide a 35 metre buffer from the creek. A 30 metre set back is already required under Clause 14 of the Victorian State Planning Policy Framework. This proposal does not provide any offsets of compensation over and above what would normal be required under Victorian Provisions as it is likely that a 3 metre shared path (plus an additional 2 metre clearance on each side) would also be required for this reserve.

Within the Melbourne Strategic Impact Assessment and the Biodiversity Conservation Strategy approved under the EPBC Act; The set backs identified for the Kororoit Creek Catchment are 100 metres from both side of the creek. It is clear that this could be achieved within this study area.

Assessment against Table 5 of the Brett Lane and Associates Report

EPBC Significance Criteria	Friends of Iramoo Summary Response
Reduce the extent of an ecological community	The proposal will impact on almost 20 hectares of significant native vegetation. No avoidance or minimisation is proposed when clearly there is significant opportunities to do so given the sites connectivity with the Kororoit Creek.
Fragment or increase fragmentation of an ecological community for example by clearing vegetation for roads and transmission line	The submitted documentation fails to adequately consider the linkages between this site and the broader spatial network of conservation reserves. The loss of this habitat will not only reduce the extent of this ecological community but isolate existing populations including the Tenterfield Conservation Reserve, Bullum Bullum Reserve and Isabella Williams Reserve from one another.
Adversely affect habitat critical to the survival of an ecological community	<p>The submitted report clearly states that the site may be an important breeding habitat for Striped Legless Lizard. The loss of this habitat may significantly impact on the ability if this species to disperse through the landscape.</p> <p>A population of 244 Spiny Rice Flowers is very significant in the context of the species. This loss could drastically affect the ability of the species to be retained into the future. While the offset project to identify key triggers for recruitment and regeneration for the species is welcome and needed; it should not come at the cost of a highly significant population. This project could be undertake in response to other less significant clearance proposals such as the clearance of a small portion of this site or for other DFC proposals such as the Burnside Shopping Centre site.</p>
Modify or destroy abiotic (non - living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The proposal will impact on abiotic factor both within the site and within the surrounding Kororoit Creek Catchment. This alteration may have significant impacts to the known Growling Grass Frog population within the Kororoit Creek –these impacts have not been quantified.

Result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community	The proposal has included photos which indicate the site contains Serrated Tussock. It is unclear if any action has been undertaken by DFC to control this threatening weed species from impacting on the threatened ecological community or the species within the site.
Interfere with the recovery of an ecological community	The loss of almost 20 hectares of high quality of National Temperate Grassland of the Victorian Volcanic Plains which serves as a key link between other conservation reserves should be considered as interfering with the recovery of the community. Within the Network of the Kororoit creek there is a significant opportunity to protect and enhance this ecological community in the longer term.

Summary

An appropriate set back from the creek corridor of a least 100 metres would be able to provide adequate protection of the Growling Grass Frog, achieve significant retention of the native grassland values, Spiny Rice Flowers and Striped Legless Lizards. There is no reason why additional retention can not be achieved on site and managed in perpetuity. This Biodiversity Conservation Strategy has highlighted that waterways, grasslands and grassy woodland of high value can and should be retained within the urban form and can be adequately designed and integrated with the community.

A clear message must be sent to the proponents of this application that the avoidance and minimisation of the loss of matters of national environmental significance is important to all levels of government. This site highlights an above standard quality and includes five matters of national environmental significance and must be retained.

As a representative group who seeks to protect these matters within the west of Melbourne this proposal concerns us. We request that the Minister for the Environment refuse the application.

Regards

s47F

On behalf of the
Friends of Iramoo

CC City of Melton
CC Brimbank City Council
CC Minister for Environment (State)
CC Minister for Environment (Federal)








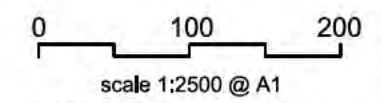
Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

Attachment 2: GGF Plan (prepared by Bosco Johnson Pty Ltd – 18 November 2014)

GGF Plan
Centrelne of Creek
Precinct 2

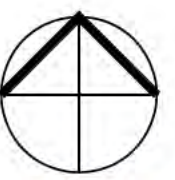
LEGEND:

-  Precinct 2
-  GGF LINE
-  Distance (m) between Centreline of Creek and GGF Line
-  Distance (m) between Centreline of Creek and edge of road
-  CENTRELINE OF CREEK



DATE: 18 November 2014
 REF: 29743 001
 DWG: 2974300DA

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WESTWOOD DRIVE
 ROCKBANK MIDDLE ROAD
 ROCKBANK MIDDLE ROAD
 ROCKBANK MIDDLE ROAD



Brett Lane & Associates Pty. Ltd.
Ecological Research & Management

**MODEINA ESTATE PRECINCT 2,
BURNSIDE, VICTORIA (EPBC 2011/6063)**

FINAL PRELIMINARY DOCUMENTATION



Prepared by

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Client

DFC (Project Management) Pty Ltd

211 Waverley Road,

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December 2014

BL&A Report No. 7045 (6.13)

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1. BACKGROUND INFORMATION

This document has been prepared as Preliminary Documentation under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for assessment under that Act by the Commonwealth Minister for the Environment of the last part of a residential development project at Burnside, an outer suburb north-west of Melbourne. The development is branded Modeina.

It represents the final Preliminary Documentation that will be the basis for the Commonwealth Minister for the Environment's assessment and decision in relation to this development. Draft Preliminary Documentation was placed on exhibition from 10th September to 9th October 2014. Eight submissions were received. This document incorporates responses to issues raised in these submissions. A detailed response to these issues is provided at the end of this document (Appendix 4).

DFC (Project Management) Pty Ltd (DFC) engaged Brett Lane and Associates Pty Ltd (BL&A) to undertake detailed flora and fauna investigations on an area of land in Burnside, Victoria (see locality map in Figure 1). This area of land is owned by North Burnside Pty Ltd, and is bounded by Rockbank Middle Road to the south, Westwood Drive to the west and Kororoit Creek along the northern and eastern boundaries. Part of this area of land is currently being developed into a residential estate branded Modeina.

Modeina is divided into two precincts, as detailed below:

- **Precinct 1** (23.2 hectares) is the first phase of the development, comprising 11 stages, and is currently being developed. This precinct is located in the western section of Modeina and does not support any areas of native vegetation. Precinct 1 was Referred under the EPBC Act in 2004 (Referral No. 2003/1185) and it was decided that this precinct was not a controlled action [particular manner] under the EPBC Act. A planning permit was issued on 3rd July 2013 to allow development of Precinct 1. Construction in this precinct commenced in 2013.

Precinct 1 does not form a component of this Preliminary Documentation.

- **Precinct 2** (65.4 hectares) makes up the remainder of Modeina and is the subject of this Preliminary Documentation. Development of Precinct 2 is not forecast to commence until Precinct 1 is nearing completion, currently forecast in late 2015.

Precinct 2 supports introduced and indigenous vegetation as well as a number of EPBC Act and state listed rare and threatened species, including Arching Flax-lily, Matted Flax-lily, Tough Scurf-pea, Rye Beetle-grass, Slender Bindweed, Slender Tick-trefoil, Basalt Tussock-grass, Growling Grass Frog, Striped Legless Lizard and Spiny Rice-flower. A total of 244 Spiny Rice-flower (75 of which are known female plants) occur in Precinct 2 (Figure 1). Native vegetation in this area also supports areas of Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), an EPBC Act listed ecological community.

Of the above listed values, Matted Flax-lily, Spiny Rice-flower, Growling Grass Frog, Striped Legless Lizard and NTGVVP are listed as threatened under the EPBC Act.

In 2011, North Burnside Pty Ltd, an entity related to DFC (Project Management) Pty Ltd, submitted a Referral to the Commonwealth Minister for the Environment, (DotE, then the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)) under the requirements of the EPBC Act (BL&A Report 7045 [5.0]) for the development of Precinct 2.

On the 1st of September 2011, the Minister decided the proposed action to develop Precinct 2 at Modeina was a controlled action to be assessed by Preliminary Documentation.

This Preliminary Documentation report has been prepared to provide all the relevant information to the Commonwealth Department of the Environment to allow the Minister to make an informed decision on the proposed action. An integral part of this Preliminary Documentation is the Spiny Rice-flower Propagation Project Report, provided in Appendix 2.



Legend

- Precinct 2
- Precinct 1



Figure 1: Locality map

Project: Modeina		
Client: DFC (Project Management) Pty Ltd		
Project No. 7045	Date 8/07/2014	Created By G.Graham / M.Ghasemi
Brett Lane & Associates Pty. Ltd. <i>Ecological Research & Management</i>		
<ul style="list-style-type: none"> ● Experience ● Knowledge ● Solutions 	Suite 5, 61-63 Camberwell Road Hawthorn East, VIC 3123 PO Box 337, Camberwell, VIC 3124, Australia	Ph (03) 9815 2111 / Fax (03) 9815 2685 enquiries@ecologicalresearch.com.au www.ecologicalresearch.com.au





Legend

Title Boundary

Precinct 1

NTGVVP

Native Vegetation

Escarpment Shrubland (EVC 895)

Heavier soils Plains Grassland (EVC 132_61)

Threatened Fauna Species

SLL

GGF

GGF habitat

B Habitat Zones

Threatened Flora Species

Arching Flax-lily

Matted Flax-lily

Rye Bee le-grass

Slender Bindweed

Slender Tick-trefoil

Spiny Rice-flower

Tough Scurf-pea

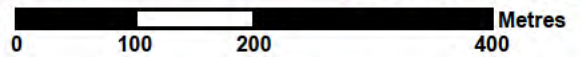


Figure 2: Study area and ecological values

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date 10/07/2014

Created By G. Graham / M. Ghasemi



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1.1. About DFC (Project Management) Pty Ltd.

DFC (Project Management) Pty Ltd is a subsidiary of Dennis Family Corporation (DFC) Pty Ltd and provides project management services. It is one of a number of related DFC companies that have interests in urban property development projects in Victoria and south-east Queensland. The information below has been provided by the Corporation.

“The founder of the Dennis Family Corporation, Bert Dennis OAM established a civil engineering consultancy in Melbourne in 1960, and from there began to invest and develop land originally in Melbourne’s west, but progressively developed residential estates and commercial developments throughout other metropolitan Melbourne growth corridors, regional Victoria, in Queensland and in China. More than fifty years on, the Dennis Family Corporation is Victoria’s largest private property developer and one of the State’s largest home-builders committed to providing affordable housing products.

The Dennis Family Corporation adheres to a set of values which reflect the company's vision as a family-owned and run operation:

- Honesty & Integrity
- Passion
- Caring
- Vision
- Quality

The Dennis Family Corporation is committed to finding innovative solutions to achieving appropriate development outcomes on their estates. The land comprising Modeina has been in the control of the Dennis Family Corporation since the early 1990s, and is owned by a related entity North Burnside Pty Ltd. Modeina is the final part of a master planned residential development that commenced in the early 1990’s.”

1.2. Project Objectives

Key objectives of the project, as provided by the proponent, are:

- “Develop residential land to create a master planned community that provides house and land at an affordable price.
- Provide social and community infrastructure to support the greater neighbourhood population.
- Provide the necessary physical infrastructure to support the future population growth and its integration with adjacent residential communities.
- Appropriately protect and enhance the natural environmental quality of the Kororoit Creek.”

1.3. Location of the Project

The northern and eastern boundaries of the development are defined by the Kororoit Creek, while the southern boundary abuts an existing residential estate and the western boundary abuts Precinct 1, which is currently under development. Areas north of the creek are now fully developed, and will be

connected by a road bridge along Westwood Drive. The development site is a continuation of the existing Earlington and Carinya Gardens housing estates (previously developed by Dennis Family entities) situated on Westwood Drive in Burnside, Victoria, approximately 20 kilometres west north-west of Melbourne. The area of previous and proposed development is also proximate to Caroline Springs. A locality map is provided as Figure 1 and coordinates are provided in Table 1.

Table 1: Project coordinates

Location Point	Latitude			Longitude		
	degrees	minutes	seconds	degrees	minutes	seconds
1	37	44	35	144	44	58
2	37	44	49	144	44	59
3	37	44	52	144	45	24
4	37	44	51	144	45	32
5	37	44	41	144	45	34
6	37	44	36	144	45	37
7	37	44	30	144	45	38
8	37	44	24	144	45	45
9	37	44	18	144	45	46
10	37	44	16	144	45	41
11	37	44	22	144	45	26
12	37	44	22	144	45	17
13	37	44	32	144	45	9

1.4. Background to the development of the Project

Modeina is the last piece of the 'jigsaw' in development of this part of the Melton Growth Area. It has been preceded by the earlier Burnside Development (Earlington and Carinya Gardens), which comprised approximately 1200 lots along with an expanding major activity centre.

Modeina is an area that has long been part of the master planning of the Melton development corridor to provide a substantial, efficient and affordable residential community. The Melton East Strategy 1987 identifies its development for urban purposes and the land is zoned accordingly.

The site is located within an area that includes the established suburbs of Caroline Springs to the west, Deer Park to the east and Burnside Heights to the north, across the Kororoit Creek.

Development of Modeina has been delayed since 2002, whilst DFC has sought to resolve planning matters with Melton Council and deal with the emerging biodiversity issues on the site.

1.5. How the action relates to other actions

A current EPBC approval (EPBC 2003/1185 - Non Controlled Action) has been provided for Precinct 1 of Modeina. The construction phase of Precinct 1 began in 2013.

1.6. Current status of the action

The project (Precinct 2, Modeina) is a controlled action under the Environment Protection and Biodiversity Conservation Act 1999 and will be assessed by Preliminary Documentation by the Commonwealth Minister for Environment (EPBC Reference: 2011/6063). This document responds to the Department's Preliminary Documentation requirements.

On 28th of June 2012, the Victorian Minister for Planning determined under Section 8B(3)(b) of the Environment Effects Act 1978 that an Environment Effects Statement was not required subject to conditions being met.

1.7. Consequences of not proceeding with the project

The proponent has provided the information below.

“Should the development of this land not be allowed to proceed, the opportunity to complete an integrated development providing some 850 additional residential lots, and provision of important social and community infrastructure, including a school, community centre (construction is programmed to commence in early 2015), and road connections to the north and west will be lost. The land will remain an island site in its current vacant state, surrounded by developed urban areas, with consequent adverse impacts on land supply, housing affordability, community amenity and infrastructure, and social cohesion.”

2. LEGISLATIVE, POLICY AND STRATEGIC CONTEXT

The subject site is located within the City of Melton local government area and is subject to the provisions of the Melton Planning Scheme. The site falls under the Port Phillip and Westernport Catchment Management Authority's region. It is zoned Residential 1 and Urban Floodway Zone (this zone affects the perimeter of the site, abutting the Kororoit Creek corridor). The overlays below apply to the site.

- Development Plan Overlay - Schedule 1 (Melton East Growth Area)
- Environmental Significance Overlay - Schedule 2 (Wetlands, Waterways and Riparian Strips)
- Land Subject to Inundation Overlay – Schedule 2.

The proposed development will require a planning permit from the City of Melton, including a specific permit to remove native vegetation under Clause 52.17 of the Melton Planning Scheme.

3. DESCRIPTION OF THE ACTION

3.1. The proposed action – Development of Precinct 2 at Modeina

This Preliminary Documentation specifically relates to the development of Precinct 2 of Modeina (EPBC 2011/6063). Precinct 2 (65.4 hectares) is the remaining area of development of Modeina, and with its neighbour, Precinct 1, it is a component of a larger action, namely the completion of development of Modeina. However, for the purposes of this Preliminary Documentation, it is being considered exclusively, Precinct 1 having already been subject to an earlier EPBC Act Referral and decision (EPBC 2003/1185).

Precinct 2 of Modeina (the project site) will allow for the development of approximately 590 residential lots, and a 3.5 hectare school site. A substantial area of linear public open space along Kororoit Creek will ultimately be vested with the City of Melton and/or Melbourne Water.

3.2. Spiny Rice-flower

The development of Precinct 2 at Modeina will result in an impact to various matters of national environmental significance as discussed in Sections 6 and 7 of this report. The project will ultimately affect a population of the Spiny Rice-flower (244 plants) in Precinct 2. Consequently DFC engaged BL&A and Dr Deborah Reynolds (Victoria University) in May 2011 to develop a Spiny Rice-flower Propagation Project. The aim of the project is to provide a suitable offset for the impacts to the species at Modeina and contribute to an improved understanding of conservation and management of the species for the future.

Between 2011 and 2014, DFC has continued to work with BL&A and Dr Deborah Reynolds to further develop the Propagation Project, and continued discussions with DotE and the Victorian Department of Planning and Community Development (DPCD). During this time the Propagation Project report was peer reviewed by Dr Georgia Garrard, an independent ecologist at RMIT University, to gain specialist feedback on the methods and scientific rigour of the Propagation Project. Comments raised in various discussions within the peer review have been responded to and incorporated into the final version of the Propagation Project Report, provided in Appendix 2. The Propagation Project Report forms an integral part of this Preliminary Documentation. Its implementation is to be undertaken in consultation with the Victorian Spiny Rice-flower Translocation Panel, which is under the auspices of the Spiny Rice-flower Recovery Team.

The current version of the Spiny Rice-flower Propagation Project Report was provided to the Commonwealth in early 2014 for consideration. As stated in correspondence received from the Commonwealth Department of the Environment (DotE) on 17th June 2014, the Department is broadly supportive of the Spiny Rice-flower Propagation Project, provided the commitments therein and discussed in the following section are fulfilled.

3.3. Kororoit Creek (Growling Grass Frog habitat)

The Sub-Regional Strategy for the Growling Grass Frog identifies the section of Kororoit Creek in the vicinity of the Action as 'potentially important habitat' based on pre-2000 records of the species in the waterway. More recently, BL&A recorded the species in the section of Kororoit Creek adjacent to Precinct 2. The

proposal will recognise the importance of this habitat by providing a Growling Grass Frog habitat buffer which is 30 metres from Kororoit Creek and the edges of wetland areas in this precinct – including wetlands where previous records were made and future stormwater treatment wetlands (Figure 3).

The perimeter road at the edge of the development itself is set back on average 50 metres from the creek (ranging from approximately 40 metres to up to 100 metre) to provide adequate space for recreational infrastructure. This distance is considerably greater than the minimum 35 metre creek setback required under the Commonwealth's approval of Precinct 1 and is not dissimilar to those on nearby developments along Kororoit Creek.

3.4. Staging plan

The Staging Plan for Modeina is shown in Figure 4. It is proposed that all Spiny Rice-flowers within Precinct 2 are progressively removed, subject to conditions relating to the Propagation Project being met, to allow for the ultimate development of the entire Precinct 2 area.

The indicative timing for the staging of Precinct 2 is provided below.

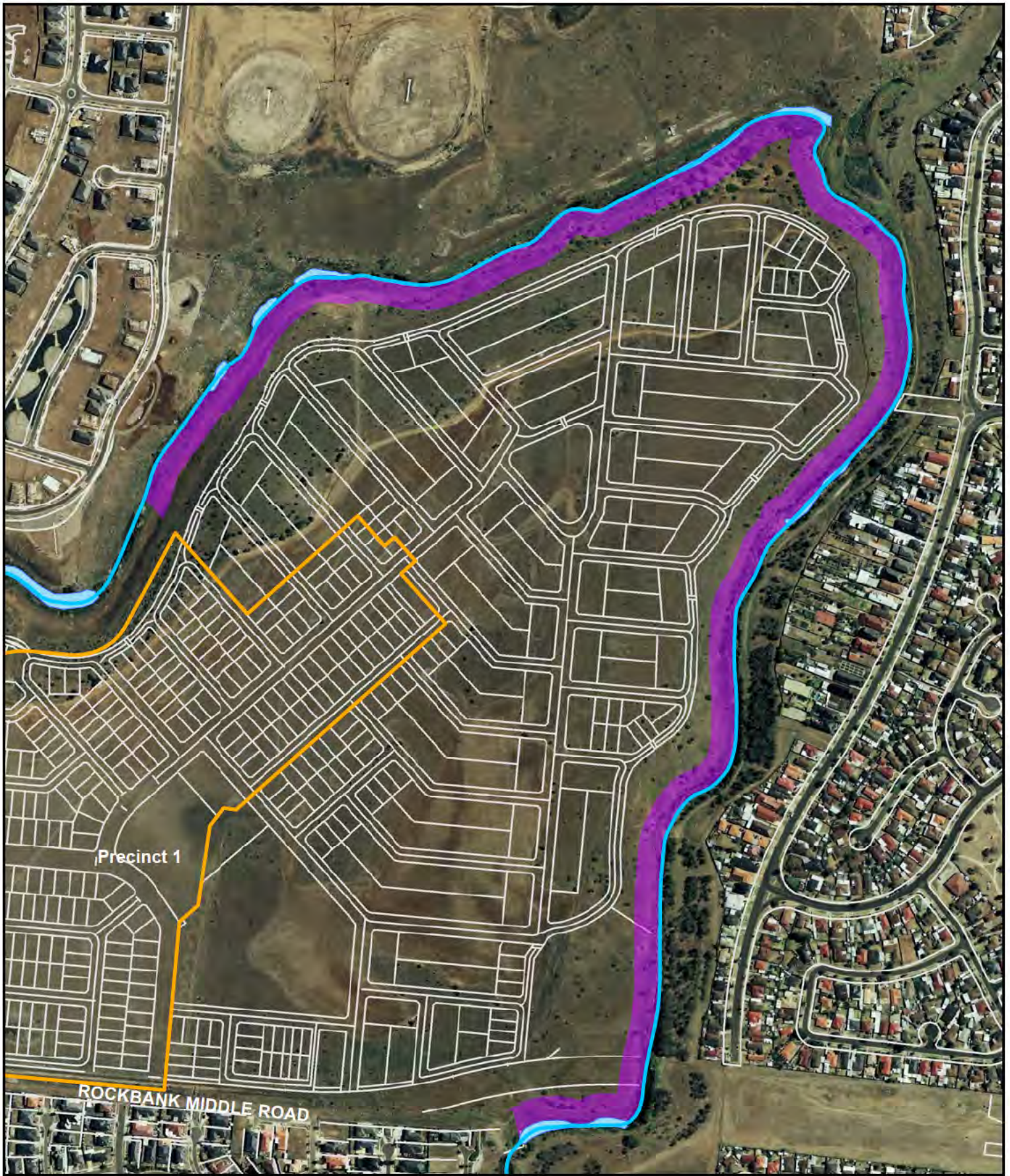
- Stages 12 and 13 (113 lots) to be constructed in Financial Year (FY) 2015/16
- Stages 14 and 15 (105 lots) to be constructed in FY 2016/17
- Stages 16 and 17 (96 lots) to be constructed in FY 2017/18
- Stages 18 and 19 (99 lots) to be constructed in FY 2018/19
- Stages 20 and 21 (107 lots) to be constructed in FY 2019/20
- Stage 22 (70 lots) to be constructed in FY 2020/21.

Note that this timing assumes the construction of the last stage of Precinct 1 (Stage 11) will commence in June 2015 for completion in late 2015. The construction of Stage 18PS (the school site) will be determined by the funding and programming of the Department of Education and Early Childhood Development (DEECD), but it is not expected to be required until about FY 2016/17.

Given that the majority of Spiny Rice-flowers at Modeina (237 plants) are contained in three planned stages, Stages 18PS, 21 and 22 (Figure 4), DFC has committed to avoid developing these stages until the Propagation Project demonstrates sustainable outcomes as described in Appendix 2. These stages are not forecast to commence until 2018.

Progress on the Propagation Project will be reported annually to the Commonwealth DoE and the Spiny Rice-flower Recovery Team. This will include the number and location of translocated plants, and confirmation of which plants have met the sustainability requirements for survival set out in Appendix 2. The results of the Project and the annual reports will be independently peer reviewed.

The staging of Modeina in relation to the location of all matters of national environmental significance (MNES) on site is shown in Figure 4. The number of Spiny Rice-flowers present in each stage, as well as the area of NTGVVP in each stage is presented in Table 2.



Legend

- Precinct 1 (not subject to this EPBC Act approval)
- Kororoit Creek
- Wetlands
- Creek/wetland 30m buffer

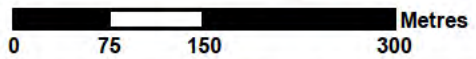


Figure 3: Growing Grass Frog habitat buffer

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date 18/11/2014

Created By G. Graham / M. Ghasemi

BI&A Bielt Lane & Associates Pty. Ltd.
Ecological Assessment & Management

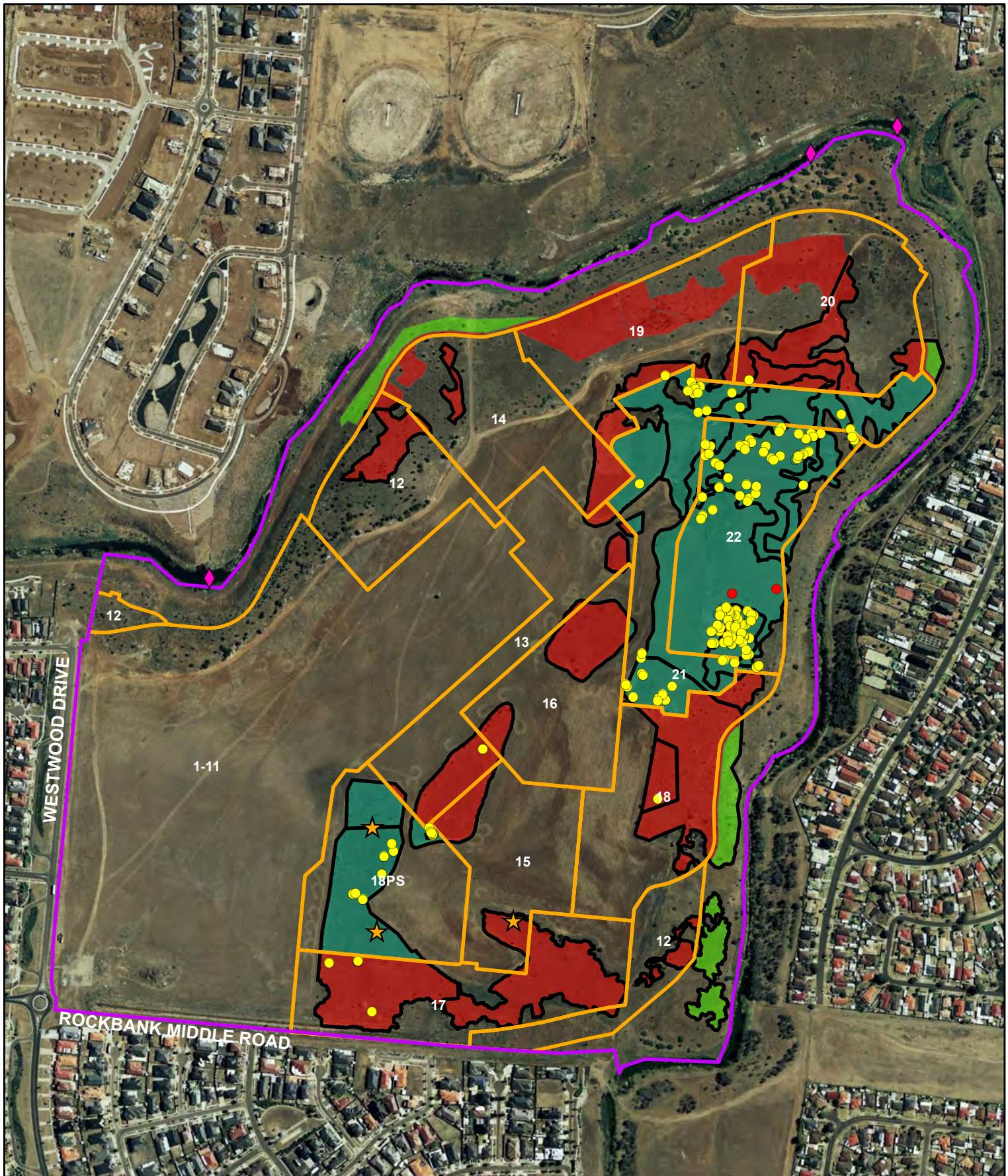
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Table 2: Proposed development staging

Stage	No. Lots	No. Spiny Rice-flower	NTGVVP removal (ha)
Precinct 2 – pre 2018			
12	57	0	0.642
13	56	1	0.807
14	58	0	0.460
15	47	0	0.557
16	49	0	0.892
17	47	4	2.597
18	49	1	1.960
19	50	0	0.425
20	61	1	1.330
Total	474	7	9.670
Precinct 2 – post 2018			
18 (PS)	0	26	1.824
21	46	36	4.018
22	70	175	4.480
Total	116	237	10.322

Notes: Precinct 2 – pre 2018 refers to development that will proceed in advance of the Spiny Rice-flower Propagation Project demonstrating sustainable outcomes. Precinct 2 post – 2018 refers to development that will proceed after the Propagation Project has demonstrated sustainable outcomes.



Legend

- Property boundary
 - Staging Plan
 - Native vegetation to be removed pre 2018
 - Native vegetation to be removed post 2018
 - Native vegetation to be retained
 - Natural Temperate Grassland of the Victorian Volcanic Plain
 - Spiny Rice-flower
 - Matted Flax-lily
 - Striped Legless Lizard
 - Growling Grass Frog
- Matters of National Environmental Significance**
- 15 Stages

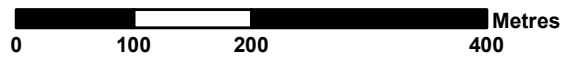


Figure 4: Staging Plan and Impacts to MNES

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045	Date 11/07/2014	Created By G. Graham / M. Ghasemi
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3.5. Construction Methods and Techniques

Construction of civil infrastructure including roads, drainage and utility services will be carried out in accordance with a project management plan. This plan will incorporate site environmental management controls to minimise the environmental impact of the civil construction.

Environmental impacts during construction will be minimised using measures such as silt retention fencing, controlled refuelling areas, protected soil stockpiles and site litter control. Following completion of construction, top-soiled areas will be re-grassed or planted as soon as practicable to minimise soil erosion and prevent silt washing into the surrounding or downstream waterways.

Permanent fence structures will be erected for the duration of construction around any areas of sensitivity or areas set aside for environmental reasons, to prevent unauthorised access and associated damage.

Particularly diligent environmental controls, including high visibility fencing and signage, will be installed prior to construction in any area abutting native vegetation and Spiny Rice-flowers to be maintained in future stages. This will ensure that only the minimum seven Spiny Rice-flowers are removed until demonstrated sustainable outcomes have been achieved through implementing the propagation project described in Appendix 2.

3.6. Design Parameters

The design of engineering infrastructure and services will incorporate elements of water sensitive urban design to minimise soil erosion and remove of nutrients from stormwater in accordance with Melbourne Water's best practice guidelines for stormwater quality management.

4. ALTERNATIVES TO THE PROPOSED ACTION

The proponent has no realistic alternative to the proposed action. The development of Precinct 2 at Modeina is the final stage of a development project that commenced when the land was rezoned for residential purposes in 1987. It is the last integral part of a development that will complete the delivery of significant infrastructure and facilities to support the now largely established residential community.

5. ECOLOGICAL ASSESSMENTS

A range of ecological assessments has been undertaken on the subject land, now referred to as Modeina, between 2002 and 2014. This has included:

- Overview flora assessment
- Habitat hectare assessment
- Targeted spring, summer and winter flora surveys
- Targeted Growling Grass Frog survey
- Targeted Striped Legless Lizard surveys.

Details of these ecological assessments are presented in Appendix 1. The methods and results are summarised in the following sections.

5.1. Native Vegetation surveys

Methods used to survey native vegetation in the original assessment (2002) were representative of the relevant protocols at the time of surveying. As this work was undertaken prior to the publication and application of Victoria's Native Vegetation Management Framework (NVMF), further native vegetation surveying was undertaken in 2004, with more detailed habitat hectare assessments in 2010 and 2011.

A summary of all native vegetation surveying undertaken at the project site is provided below:

- Original native vegetation survey: 27th June, 2nd July, 3rd and 7th October, 2002
- Additional native vegetation survey: 21st and 22nd April 2004
- Habitat hectare assessment (previously burnt area): 24th to 26th August 2010
- Habitat hectare assessment (remaining area): 21st October 2011

5.1.1. Listed Ecological Communities

Native vegetation at Modeina was assessed against identification criteria and condition thresholds for relevant EPBC Act listed ecological communities found to potentially occur. Specifically, the NTGVVP community comprised patches that meet at least one of the condition thresholds below.

- The total perennial tussock cover represented by the native grass genera *Themeda*, *Austrodanthonia*, *Austrostipa* or *Poa* is at least 50%.
- If the total perennial tussock cover represented by the above four native grass genera is less than 50%, the ground cover of native forbs (wildflowers) is at least 50% of total vegetation cover during spring-summer (September to February), or
- The cover of non-grass weeds is less than 30% of total vegetation cover at any time of the year.

Information was collected during habitat hectare assessment (August 2010 and October 2012) to ascertain the location of NTGVVP in the study area.

5.2. Flora surveys

The targeted flora surveys undertaken in 2010 and 2011 followed Victoria's Biodiversity Precinct Structure Planning Kit. All areas of native vegetation were surveyed in transects spaced five metres apart. Surveys were timed during the optimal flowering season for each targeted species to maximise detection. The location of listed flora individuals observed was recorded on a hand-held GPS, with a five-metre accuracy. Transect locations are presented in Figure 5. These represent an amalgamation of the 2010 and 2011 surveys. Survey dates are provided below.

- Spiny Rice-flower targeted survey: 24th to 26th August 2010
- Spring flora targeted survey: 3rd and 21st October 2011
- Plump swamp Wallaby-grass targeted survey: 7th November 2011
- Matted Flax-lily targeted survey: 9th December 2011

Further details of these surveys are provided below.

5.2.1. *Spiny Rice-flower*

Two qualified botanists with extensive Spiny Rice-flower survey experience conducted the targeted Spiny Rice-flower survey. The survey covered all areas mapped as native vegetation during the vegetation survey, as well as a large area in the north-eastern section of the study area that had previously been burned.

Although at the time of surveying, a specific guideline for transect separation was not documented by the Commonwealth guidelines, the Victorian survey guidelines (DSE 2010) were applied and transects were surveyed five meters apart. Correct survey methodology and timing ensures that the population present is not significantly different to that recorded.

Limitations

A large proportion of Spiny Rice-flower individuals recorded at the project site had finished flowering and were difficult to locate in the field, despite the optimal survey season being selected. Nonetheless, the survey provides an accurate account of the status and extent of the species in the study area due to the intensive nature of the survey.

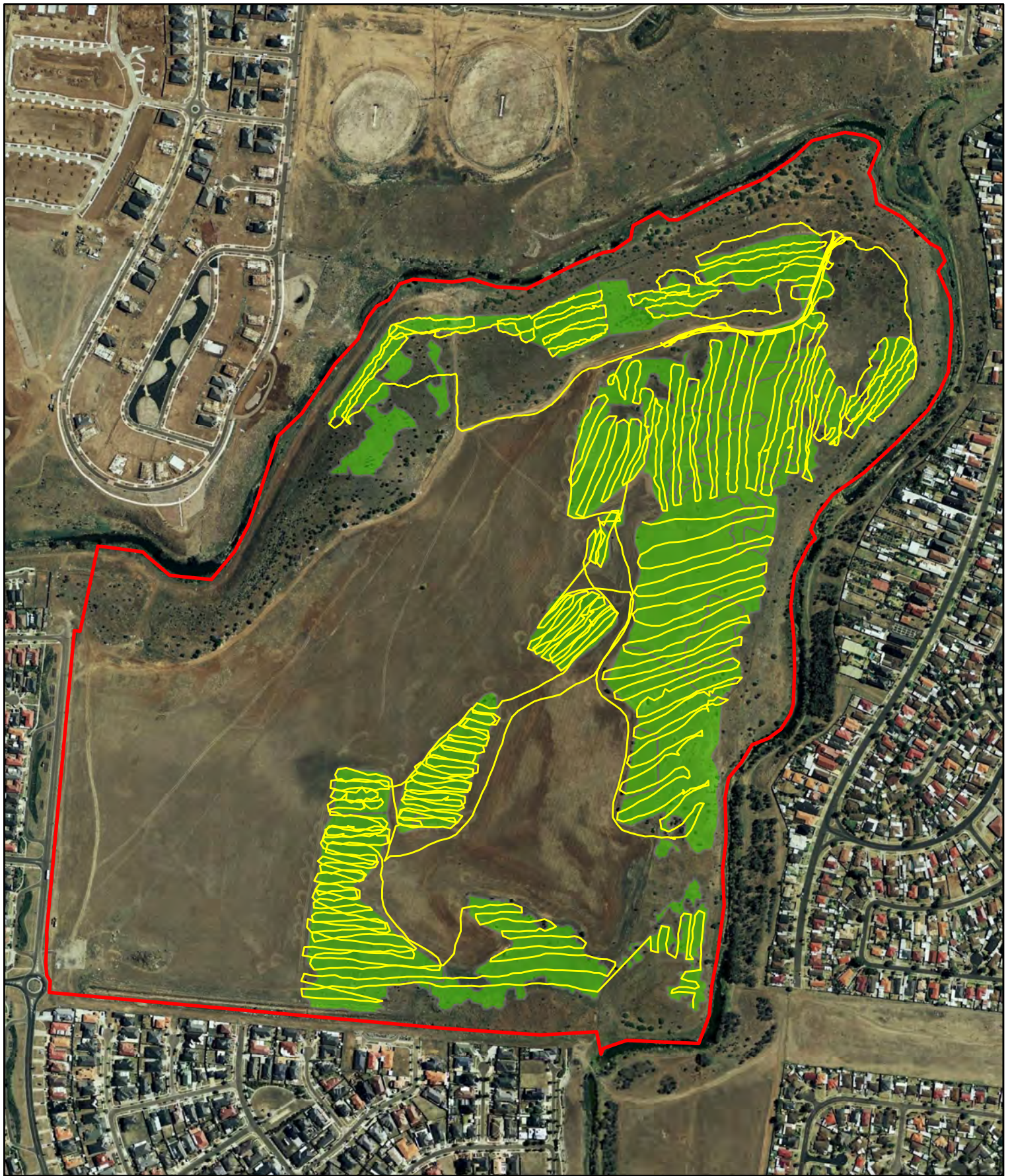
Potential difficulties in locating the species were indicated early in the 2010 survey and the approach was adjusted to ensure that as many plants as possible were found by taking more time to cover the area. The height of grasses at the site during the survey was considered not to be a significant impediment to locating Spiny Rice-flower individuals. The species was found in much the same areas as the earlier 2004 survey. Prior to this earlier survey, a fire in the 2003/2004 season created conditions ideal for finding the plants as it thinned the grass cover and made more plants visible. Combined survey results therefore provide an accurate indication of the numbers and distribution of the species in the area.

5.2.2. Other threatened flora species

Targeted surveys were undertaken for other threatened flora species for which suitable habitat occurred in the study area at suitable times of year. Details of these surveys are provided below.

- Spring flora targeted survey (August 2010):
 - Austral Toad-flax
 - Basalt Sun-orchid
 - Button Wrinklewort
 - Clover Glycine
 - Fragrant Leek-orchid
 - Large-headed Fireweed
 - Maroon Leek-orchid
 - Purple Diuris
 - Small Golden Moths
 - Small Scurf-pea
 - Sunshine Diuris
 - Curly Sedge
- Plump swamp Wallaby-grass targeted survey (November 2011):
 - Plump swamp Wallaby-grass
- Matted Flax-lily targeted survey (December 2011):
 - Matted Flax-lily

Considering surveys were undertaken following the applicable Victorian survey protocol during optimal flowering times these are considered to be comprehensive and to provide an accurate measure of the presence and extent of threatened flora at the project site.



Legend

- Study Area
- Native Vegetation
- Transect Locations

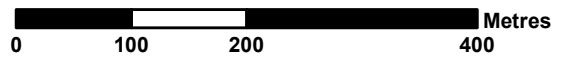


Figure 5: Targeted Flora Transect Locations

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date 8/07/2014

Created By G. Roy / M. Ghasemi

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5.3. Fauna Surveys

While a specific fauna survey was not undertaken at the project site, observations were made based on data collected during the vegetation assessments on the availability of suitable habitat for listed fauna species. Targeted surveys were deemed necessary for Growling Grass Frog and Striped Legless Lizard based on the presence of suitable habitat. Targeted fauna survey dates are presented below.

- Striped Legless Lizard Pitfall trap survey: 12th to 23rd December 2002
- Growling Grass Frog targeted survey: 28th to 30th January 2003
- Striped Legless Lizard tile grid survey: 24th August to 10th December 2010

Details of the surveying undertaken for the above species are provided in the following sections. A discussion is provided in Section 5.3.3 detailing reasons for excluding Golden Sun Moth surveys.

5.3.1. Striped Legless Lizard

Pitfall traps were originally used to survey for Striped Legless Lizard in the study area in 2002. This type of survey methodology has since become outdated and is rarely used to determine the presence/absence of the species and inform approval decisions.

Current Commonwealth guidelines for Striped Legless Lizard surveying indicates that this should be undertaken using artificial shelter (e.g. roof tiles) configured in a grid of 10 x 5 tiles. Survey effort within a site of up to 30 hectares is three grids per hectare. Survey effort in sites exceeding 30 hectares is 10 grids. Given the area of suitable habitat in the study area comprised approximately 20.5 hectares, eight grids were considered to be a suitable survey effort to meet the guidelines. As such, these were established within remnant native grassland in the study area in 2010. Sites were chosen based on appropriate structure and density of grasses considered to potentially support the species. Areas considered likely to provide the best available habitat for Striped Legless Lizard were within the mapped NTGVVP; the fact that Striped Legless Lizard was found confirmed this strategy was effective.

During the subsequent habitat hectare assessment in 2011 (See Section 5.1), additional areas of native vegetation were mapped resulting in a total of 24.24 hectares of native vegetation within the project site. The use of eight tile grids to survey for Striped Legless Lizard in this area of habitat was considered to satisfy the Commonwealth guidelines of one grid per three hectares.

Surveys were undertaken according to Victorian Guidelines (DSE 2010) whereby surveys are to be undertaken for a minimum of three months and that tiles need to be checked at intervals no longer than fortnightly. Commonwealth guidelines, which indicate that tiles need to be checked at least twice a month, ideally once a week, were also met. Given Striped Legless Lizard was found at the project site, the survey methods are considered effective for the species.

5.3.2. *Growling Grass Frog*

Targeted surveys undertaken for Growling Grass Frog in January 2003 confirmed that the species occurs within the Kororoit Creek valley immediately adjacent to the Modeina. Previous records of Growling Grass Frog exist at the site, namely on three occasions from August to October 2000 (Viridans Biological Databases, 2011). At nearby Caroline Springs, (less than two kilometres from Modeina), numerous records of Growling Grass Frog exist from 2004 to December 2007 (Viridans Biological Databases, 2011). It is likely that more recent records exist but have yet to be entered into the database (e.g. BL&A, unpublished observations).

It is considered likely that the species has survived the drought conditions that prevailed until mid-2010 and the species still exists in the Kororoit Creek valley. There is potential in times of flooding that the species could move from Caroline Springs into the Kororoit Creek corridor adjacent to Modeina. While no recent targeted surveys for Growling Grass Frog have been carried out near Modeina, the species is presumed as persisting in the waterway system and measures to avoid impacts have been developed and are discussed in Section 8 of this Preliminary Documentation.

5.3.3. *Golden Sun Moth*

Assessment by BL&A suggests there is no suitable habitat for Golden Sun Moth at the project site. While over 20 hectares of native grassland vegetation occurs across Precinct 2, these areas are dominated by dense stands of Kangaroo Grass (*Themeda triandra*) with spear grasses (*Austrostipa* spp.) and wallaby grasses (*Austrodanthonia* spp.) occurring at significantly lower densities.

There is little bare ground between the tussocks, a habitat structure characteristically favoured by the species. Although Golden Sun Moth has historically been recorded in areas supporting Kangaroo Grass (Endersby and Koehler 2006), Red-leg Grass (*Bothriochloa* spp.) and the introduced Chilean Needle-grass *Nassella neesiana* (Braby and Dunford 2006) it is not clear whether they can survive or thrive in such habitat. It is possible that such habitat is peripheral to the species' usual home range and further study is required to determine this (Braby and Dunford 2006).

The Golden Sun Moth prefers wallaby grasses, with an open structure often including bare ground; spear grasses may also comprise a significant proportion of projecting foliage cover (O'Dwyer and Attiwill 1999; Endersby and Koehler 2006; BL&A, unpublished observations). Sites that conform to this structure and support Golden Sun Moth include the Broadcast Australia property at Delahey, Westmeadows Lane, Truganina and the southwest corner of Palmers Road and Sayers Road, Truganina. Other sites supporting Golden Sun Moth, such as at Lara, Warrambeen and Lockerbie (Kalkallo) also lacked dense tussocks of Kangaroo Grass and instead were dominated by wallaby grasses and spear grasses (BL&A, unpublished observations). Surveys undertaken by BL&A in areas of dense tussock Kangaroo Grass have failed to locate them in this specific grassland type.

A comparison of the remnant grassland habitat at Modeina and some high quality habitat where Golden Sun Moth is known to occur is shown below (Figure 6 a-c).

Given the majority of the site has been subject to earthworks and the remainder is dominated by densely tussocking Kangaroo Grass, this assessment indicates habitat for this species is unlikely to occur.

Figure 6: Golden Sun Moth Habitat Quality Comparison



(a) Known GSM habitat at Warrambeen, Victorian Volcanic Plain



(b) Habitat assessed as poor quality for Golden Sun Moth at Modeina – note dense tussock structure dominated by Kangaroo Grass and Serrated Tussock



(c) Dense vegetation with a lack of inter-tussock spaces

6. DESCRIPTION OF THE ENVIRONMENT AND MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Detailed information on the occurrence of vegetation communities, flora and fauna in the proposed development site are provided in the full flora and fauna assessment report in Appendix 1. Matters of national environmental significance recorded at the project site are presented in this section.

Note that differences in reported areas of native vegetation between this Preliminary Documentation and Appendix 1 relate to the presence of areas of lower quality native grassland that qualify as remnant patch vegetation under the Victorian native vegetation condition threshold but not under the higher EPBC Act threatened community condition threshold. Rounding errors may also account for some very minor differences in areas reported.

6.1. Ecological Communities

The EPBC Act Protected Matters Search Tool identified three ecological communities as having the potential to occur in the study area:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Temperate Grassland of the Victorian Volcanic Plain

The two woodland communities do not occur at the project site due to lack of treed habitats in the area.

Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) was recorded at the project site and is discussed below.

6.1.1. *Natural Temperate Grassland of the Victorian Volcanic Plain*

The study area supports 20.94 hectares of NTGVVP. This ranges in quality under the Victorian habitat scoring system from 24/100 to 59/100 across 16 patches (habitat zones) ranging in size from approximately c. 0.1 to almost five hectares. The extent of NTGVVP at the project site is shown in Figure 3. Remaining areas of native vegetation do not meet the condition threshold for this community.

6.2. Flora species

The EPBC Act Protected Matters Search Tool indicated that the study area supported or potentially supported nine species listed under the EPBC Act. An additional three EPBC Act listed flora species were identified as potentially occurring following the review of the Flora Information System (FIS). The likelihood of these species occurring in the study area is assessed in Table 3.

Following targeted flora surveys undertaken at the project site (See Section 5.2), it was concluded that two EPBC Act listed flora species occur at the project site:

- Spiny Rice-flower (critically endangered) – 244 plants
- Matted Flax-lily (endangered) – two plants

During the original targeted surveys, 224 Spiny Rice-flower plants were identified. A further 20 plants were identified during a Striped Legless Lizard salvage program implemented as part of works under EPBC Referral No. 2003/1185.

Table 3: EPBC Act listed flora species and their likelihood of occurrence.

Common Name	Scientific Name	EPBC Act Listing	Habitat	Likelihood of Occurrence
Austral Toad-flax	<i>Thesium australe</i>	V	Occurs on grasslands, grassy woodlands or sub-alpine grassy heathlands. Usually associated with Kangaroo Grass and Poa spp. However it will grow with other hosts, at least in the glasshouse.	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Button Wrinklewort	<i>Rutidosia leptorhynchoides</i>	E	Basaltic grasslands (Jeanes 1999).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Clover Glycine	<i>Glycine latrobeana</i>	V	Grasslands and grassy woodlands (Jeanes 1996).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Curly Sedge	<i>Carex tasmanica</i>	V	Occurs in seasonally wet, fertile, heavy basalt clay soils, usually around the margins of slightly saline drainage lines or freshwater swamps. The dominant vegetation type varies, but is often grassy/sedgy and generally lacks trees (Carter 2010).	No habitat present in the study area therefore unlikely to occur.
Fragrant Leek-orchid	<i>Prasophyllum suaveolens</i>	E	Fertile grassy plains (Bates 1994).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Large-headed Fireweed	<i>Senecio macrocarpus</i>	V	Themeda grasslands on basalt (Walsh 1999).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Maroon Leek-orchid	<i>Prasophyllum frenchii</i>	E	Favouring heathland and Grassland on black clays (Bates 1994).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Matted Flax-lily	<i>Dianella amoena</i>	E	Lowland grassland and grassy woodlands on very well-drained to seasonally waterlogged fertile soils (Carr & Horsfall 1995).	Recorded – 2 plants at Modeina
River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	V	Wetlands and permanent swamps (Walsh 1994).	No suitable habitat present therefore unlikely to occur.
Small Golden Moths	<i>Diuris basaltica</i>	E	Confined to the basalt plains of south-western Victoria, growing in native grassland and grassy woodland (Jeans and Backhouse 2006).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.
Spiny Rice-flower	<i>Pimelea spinescens subsp. spinescens</i>	C	Grasslands or open shrublands on basalt derived soils (Entwisle 1996). Prefers shallow depressions and drainage lines with moderate soil moisture (D.Coppolino pers. obs.).	Recorded – 244 plants at Modeina
Sunshine Diuris	<i>Diuris fragrantissima</i>	E	Grassland in well-structured red-brown or blackish basaltic loam. Found in open areas on slopes or rock outcrops (Jones, 2006).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur.

A sun-orchid leaf (*Thelymitra* sp.) was recorded in the study area during the Spiny Rice-flower survey in August 2010. Key identification features were not present at the time of the survey. Targeted flora surveys were undertaken in October, November and December 2011. The orchid was not identified as being present at this time, despite the surveys being undertaken at a suitable time of year to detect the species. It is possible that the dense grasses present on site out-competed this orchid.

Considering only one individual was recorded on one occasion, a significant population of this orchid, regardless of the species, is not considered to be present at the project site.

6.3. Fauna species

The EPBC Act Protected Matters Search Tool identified 16 listed fauna species as occurring or potentially occurring in the search region (study area and a surrounding 10 kilometres). This included seven birds, four mammals, one reptile, one frog, two fish and one invertebrate species. An additional 16 EPBC Act listed migratory species were identified as potentially occurring. The likelihood of occurrence of these species in the study area is presented in Table 4.

Based on previous records and targeted fauna surveys undertaken at the project site (Section 5.3), it was concluded that two EPBC Act listed fauna species occur at the project site or in habitats immediately adjacent to the site:

- Striped Legless Lizard (vulnerable)
- Growling Grass Frog (vulnerable)

Table 4: Likelihood of occurrence of EPBC Act listed species in the study area

Common Name	Scientific Name	EPBC Act Status	Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
Birds						
Australasian Bittern	<i>Botaurus poiciloptilus</i>	EN	Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant and Higgins 1990).	8	1999	Absence of suitable habitat, unlikely to occur.
Australian Painted Snipe	<i>Rostratula australis</i>	VU, M (CAMBA)	Lowlands on shallow freshwater swamps with emergent vegetation and flooded saltmarshes (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
Cattle Egret	<i>Ardea ibis</i>	M (JAMBA, CAMBA)	Wooded lands and terrestrial freshwater wetlands and pasture, in association with cattle (Marchant and Higgins 1990).	3	1990	Absence of suitable habitat, unlikely to occur.
Common Greenshank	<i>Tringa nebularia</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	3	1994	Absence of suitable habitat, unlikely to occur.
Curlew Sandpiper	<i>Calidris ferruginea</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	1	1990	Absence of suitable habitat, unlikely to occur.
Eastern Great Egret	<i>Ardea modesta</i>	M (JAMBA, CAMBA)	Occurs in a variety of wetlands including: permanent water bodies on flood plains; shallows of deep permanent lakes, either open or vegetated with shrubs or trees; semi-permanent swamps with tall emergent vegetation (e.g. Typha) and herb dominated seasonal swamps with abundant aquatic flora (Marchant and Higgins 1990).	1	1996	Absence of suitable habitat, unlikely to occur.
Fairy Tern	<i>Sterna nereis nereis</i>	VU	Sheltered coasts, on mainland and inshore and offshore islands. Occurs in embayment, such as harbours, inlets, bays, estuaries and lagoons and on ocean beaches. Also on lakes and salt ponds (Higgins and Davies 1996).	None	None	Absence of suitable habitat, unlikely to occur.
Fork-tailed Swift	<i>Apus pacificus</i>	M (JAMBA, CAMBA, ROKAMBA)	Aerial, over inland plains, sometimes above foothills or in coastal areas, over cliffs and urban areas (Higgins 1999).	None	None	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	EPBC Act Status	Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
Latham's Snipe	<i>Gallinago hardwickii</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)	Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes (Naarding 1983; Higgins and Davies 1996).	7	2001	Absence of suitable habitat, unlikely to occur.
Little Stint	<i>Calidris minuta</i>	M (ROKAMBA)	Mudflats, sandflats, sheltered coastal estuaries, islets, freshwater lakes, lagoons and saltworks (Higgins and Davies 1996).	1	2000	Absence of suitable habitat, unlikely to occur.
Malleefowl	<i>Leipoa ocellata</i>	VU	Mainly in semi-arid zones (200–450 mm rainfall), but in higher rainfall area of heath and mallee-heath; rarely arid zones. Associated with mallee, particularly floristically rich tall dense mallee of higher rainfall areas (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
Marsh Sandpiper	<i>Tringa stagnatilis</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabits sandy, muddy or rocky shores, usually coastal, rarely far inland. Often on beaches and mudflats, sandflats and occasionally rock shelves (Higgins and Davies 1996).	2	1990	Absence of suitable habitat, unlikely to occur.
Pectoral Sandpiper	<i>Calidris melanotos</i>	M (JAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	4	1991	Absence of suitable habitat, unlikely to occur.
Plains-wanderer	<i>Pedionomus torquatus</i>	VU	This species inhabits native grasslands with sparse cover, preferring grasslands that include Wallaby Grass and Stipa species (Marchant and Higgins 1993).	2	1990	Absence of suitable habitat, unlikely to occur.
Rainbow Bee-eater	<i>Merops ornatus</i>	M (JAMBA)	Usually in open or lightly timbered areas, often near water. Occur in partly cleared land such as farmland and in sand-dunes, both coastal and inland (Higgins 1999).	3	2001	Absence of suitable habitat, unlikely to occur.
Red-necked Stint	<i>Calidris ruficollis</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	6	2001	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	EPBC Act Status	Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
Regent Honeyeater	<i>Xanthomyza phrygia</i>	EN, M (JAMBA)	Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. It could also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001).	None	None	Absence of suitable habitat, unlikely to occur.
Rufous Fantail	<i>Rhipidura rufifrons</i>	M (Bonn Convention (A2H))	Primarily found in dense, moist habitats. Less often present in dry sclerophyll forests and woodlands (Higgins et al. 2006).	6	1997	Absence of suitable habitat, unlikely to occur.
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	M (Bonn Convention (A2H))	Tall forests and woodlands in wetter habitats but not in rainforest (Higgins et al. 2006)	None	None	Absence of suitable habitat, unlikely to occur.
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	1	1990	Absence of suitable habitat, unlikely to occur.
Swift Parrot	<i>Lathamus discolor</i>	EN	Prefers a narrow range of eucalypts in Victoria, including White Box, Red Ironbark and Yellow Gum as well as River Red Gum when this species supports abundant 'lerp' (Emission et al. 1987; Higgins 1999; Kennedy and Tzaros 2005).	2	1990	Absence of suitable habitat, unlikely to occur.
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	M (CAMBA)	Maritime habitats, terrestrial large wetlands and coastal lands of tropical and temperate Australia and offshore islands, ranging far inland only over large rivers and wetlands (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
White-throated Needletail	<i>Hirundapus caudacutus</i>	M (JAMBA, CAMBA, ROKAMBA)	Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999).	2	1988	Absence of suitable habitat, unlikely to occur.
Mammals						
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	VU	Rock faces with large tumbled boulders, ledges and caves (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	VU	Roosts in riverine habitat in Melbourne and forages widely in flowering eucalypts and fruit trees (Menkhorst 1995).	1	2010	Absence of suitable habitat, unlikely to occur.
New Holland Mouse	<i>Pseudomys novaehollandiae</i>	VU	Coastal heath and scrub, heathy woodland, open forest and vegetated sand-dunes (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	EPBC Act Status	Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	EN	Rainforest, wet and dry forest, coastal heath and scrub and River Red-gum woodlands along inland rivers (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.
Reptiles						
Striped Legless Lizard	<i>Delma impar</i>	VU	Tussock grasslands on the volcanic plains, often associated with scattered rocks and cracked soils (Cogger 2000).	235	2010	Recorded
Frogs						
Growling Grass Frog	<i>Litoria raniformis</i>	VU	Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann and Gillespie 2004).	220	2009	Recorded
Fish						
Australian Grayling	<i>Prototroctes maraena</i>	VU	Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader and Backhouse 1983).	6	1982	Absence of suitable habitat, unlikely to occur.
Dwarf Galaxias	<i>Galaxiella pusilla</i>	VU	Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002).	None	None	Absence of suitable habitat, unlikely to occur.
Invertebrates						
Golden Sun Moth	<i>Synemon plana</i>	CE	Areas that are, or have been native grasslands or grassy woodlands. It is known to inhabit degraded grasslands with introduced grasses being dominant, with a preference for the native wallaby grass being present (DEWHA 2009).	7	2008	Absence of suitable habitat, unlikely to occur.

6.3.1. Striped Legless Lizard

Striped Legless Lizard was found at Grids 6, 7 & 8 presented in Figure 1 of BL&A Report No. 7045 (2.6) (Appendix 1). The dates of these records are documented in Table 6 of the same report.

The tile grids were surveyed six times during the 2010 survey season on 28th September, 13th October, 26th and 29th October (these days are combined to form one check as the ambient temperature was too high on October 26th to complete the survey), 8th November, 25th November and 10th December. The last two visits were inadvertently omitted from Table 6 of BL&A Report No. 7045 (2.6); no Striped Legless Lizards were found on either of these visits.

In a regional study O'Shea (1996, cited in DSEWPC 2011a) indicated that Striped Legless Lizards appeared to have small home ranges, with four of six recaptures occurring less than 10 metres from the original capture site. It has been found to occur at densities between 10 to 40 individuals per hectare (DSEWPC 2011a) and is known to move distances of up to 50 metres over a period of weeks (Smith and Robertson 1999). Striped Legless Lizards are known to occupy sites with as little as 0.25 hectares of suitable habitat (Hadden 1995), although sites of less than 0.5 hectares are considered unlikely to support a sustainable population of Striped Legless Lizards (DSEWPC 2011b).

Given the size and availability of suitable habitat on the Modeina site, it may be considered a key breeding site for Striped Legless Lizards.

However, connectivity between this site and others supporting likely habitat for Striped Legless Lizards is poor. The only connecting habitat is along Kororoit Creek where discrete patches of rocky escarpment habitat are present. However, these are scattered and in some places absent along the banks, where much of the connecting habitat is narrow, e.g. between Bracknell Place, Albanvale, and Paringa Way, Burnside.

Other nearby Striped Legless Lizard populations are known from the Broadcast Australia property at Delahey; Iramoo Wildlife Reserve at Deer Park; land south of the Western Freeway, at Derrimut Grassland Reserve and in the Mt Cottrell area. Areas between Modeina and these populations comprise unsuitable habitat such as roads, cleared or 'improved' pasture or residential suburbs.

It is considered unlikely that Striped Legless Lizards would regularly move between these sites due to the barriers and obstacles to movement that stand in their way. Therefore while habitat in Modeina may provide a key breeding habitat, it is considered unlikely there would be significant gene flow between the Striped Legless Lizard populations in the study area and the surrounding landscape.

6.3.2. Growling Grass Frog

Growling Grass Frog is known to occur in Kororoit Creek (see Appendix 1 for details). Habitats along the creek have been identified for Growling Grass Frog management as shown in Appendix 3. This management area is based on a 30 metre buffer around wetland areas (including those where the records were identified and future stormwater treatment wetlands) and a 15 metre buffer either side of Kororoit Creek.

7. RELEVANT IMPACTS

7.1. Ecological Communities of National Environmental Significance

The ecological community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), listed under the Act, was recorded in the study area in the form of Plains Grassland.

The proposed development is to be undertaken in two parts; the first part will proceed on the basis of commitments provided by the proponent in relation to the Spiny Rice-flower Propagation Project, and the second part would be subject to secondary consent once the Propagation Project has demonstrated sustainable outcomes as detailed in Appendix 2.

The first part of the development will result in the loss of 9.67 hectares of NTGVVP (pre 2018).

The second part of the development will result in the removal of 10.322 hectares and be subject to secondary consent relating to the Spiny Rice-flower Propagation Project (post 2018). More detailed design of the development, particularly where it abuts Kororoit Creek, may be possible to reduce this final removal area to less than 10 hectares.

A further 0.943 hectares will be retained in the Kororoit Creek creekside reserve (adjacent to stages 12 and 18 in the south-eastern part of the development).

Based on a review of relevant EPBC Act Policy Statements, development of Precinct 2 of the Modeina is considered to have a significant impact on the following listed threatened community:

- Natural Temperate Grassland of the Victorian Volcanic Plain (clearance of >0.5 hectares of natural temperate grassland).

Table 5 discusses the level of impact of the proposed development against the significant impact criteria.

Table 5: Significant impact criteria and the proposed development

EPBC Act Significance Criteria	Modeina Development Impact
Reduce the extent of an ecological community	The proposed development will result in the initial loss of 9.67 hectares of the community. This is based on the retention of specific areas as per Figure 3. A further 10.322 hectares of NTGVVP will be lost in the area retained subject to the outcomes of the Spiny Rice-flower propagation project.
Fragment or increase fragmentation of an ecological community for example by clearing vegetation for roads and transmission lines	The natural temperate grassland on Modeina is already isolated from other patches of NTGVVP. Therefore the loss of grassland in the project site would not significantly increase fragmentation of the community overall.
Adversely affect habitat critical to the survival of an ecological community.	It is unlikely that the loss of the NTGVVP would affect habitat critical to the survival of the ecological community. This is because the remnant vegetation is already isolated from other remnant patches of the community. The proposed vegetation loss will be offset initially in the proposed Western Grassland Reserves where an extensive area of this community will be protected and rehabilitated (15,000 hectares). The offset vegetation will be better protected than the existing site would be under a no development scenario.
Modify or destroy abiotic (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The development will remove at least 9.67 hectares of the community. The impacts will be confined to the site and will not result in any off-site impacts that will affect more extensive remaining occurrences of this community elsewhere in its range. A further 10.322 hectares will be removed but this will be dependent on the Spiny Rice-flower propagation project achieving the outcomes defined in Appendix 2.
Result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community	The construction of the housing estate itself is not expected to result in the introduction of any additional invasive species not already present in the area. Less than one hectare of NTGVVP will be retained along the creek and will be managed as part of a conservation and amenity oriented creekside reserve along Kororoit Creek, adjacent to the development site. Impacts of the development will not result in the introduction of invasive species other remnant areas of this community that are not connected to the development site.
Interfere with the recovery of an ecological community	In this case recovery of the NTGVVP community is not contingent on the ongoing preservation of the grassland on the development site. The site does not contain any key elements that cannot be found elsewhere in the VVP and the patch is isolated from other patches of NTGVVP. The offsetting of removal in the proposed Western Grassland Reserves will contribute to the conservation of a large, viable remnant (15,000 hectares) of this community in the future.

7.2. Flora of National Environmental Significance

Two flora species listed as threatened under the EPBC Act, Spiny Rice-flower (244 individuals) and Matted Flax-lily (two individuals), were recorded within the study area during the investigations. The proposed development would ultimately result in the loss of the Spiny Rice-flower and Matted Flax-lily populations. In the initial stages of the development, seven Spiny Rice-flowers and two Matted Flax-lilies would be lost. The remaining Spiny Rice-flower population would be removed after demonstrated sustainable outcomes have been achieved through implementing the propagation project described in Appendix 2. Species-specific impact significance guidelines have been prepared for Spiny Rice-flower. The impact to Matted Flax-lily is assessed against the general significant impact guidelines for endangered species. The assessments are provided in Table 6.

Table 6: Significant Impact Assessment for Listed Flora Species

EPBC Act Significance Criteria	Modeina Development Impact
Spiny Rice-flower	
Any fragmentation of a population	The current population is isolated from other Spiny Rice-flower populations in the area. The closest known population is located in the Isabella Williams Reserve, and the two populations are separated by Kororoit Creek. The proposed removal of the plants would therefore not result in the population being fragmented. Isabella Williams Reserve is one of three important recipient sites for propagated Spiny Rice-flowers from the proposed development site. Therefore, if successful, the propagation project will ensure persistence in the nearby landscape of material from the development site population.
Loss of more than five individuals	In the initial stages of development, seven Spiny Rice-flowers would be lost. A further 237 would ultimately be removed. Impacts to Spiny Rice-flower are therefore considered to be significant. Details of the proposed mitigation and offset measures are provided in Section 8 of this report
Any loss of individuals from any population which occurs on the edge of the Spiny Rice-flower’s current known distribution.	The population of Spiny Rice-flower is not assessed as being on the edge of the species’ known distribution.
Matted Flax-lily	
Lead to a long-term decrease in the size of a population	The Matted Flax-lily population at Modeina comprises two individuals and is therefore not a significant population, given the majority of significant populations within Victoria exceed 10 plants (Carter 2010). Therefore, the loss of these two individuals would not significantly impact the population, lead to a long-term decrease in population size, fragment an existing population, modify the habitat, given its isolation in the landscape, or interfere with the recovery of the species.
Reduce the area of occupancy of the species	
Fragment an existing population into two or more populations	
Adversely affect habitat critical to the survival of a species	
Disrupt the breeding cycle of a population	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat	
Introduce disease that may cause the species to decline	
Interfere with the recovery of the species	

7.3. Fauna of National Environmental Significance

Two fauna species listed under the EPBC Act were recorded in the study area: Striped Legless Lizard and Growling Grass Frog.

The proposed development will result in a loss of 24.24 hectares of Striped Legless Lizard habitat (encompassing both NTGVVP and other areas of suitable habitat).

Access tracks and shared paths are to be provided along the Kororoit Creek corridor to assist in connectivity and passive recreation. The location, route and design specification is unlikely to be finalised until a planning permit is in place for the development. However, to provide certainty in relation to mitigation of impacts on the Growling Grass Frog in Kororoit Creek, a 30 metre buffer around wetlands and 15 metre buffer along the creek between wetlands will be established to avoid disturbance to the frog. These buffers will be revegetated and rehabilitated as per the species' requirements (e.g. no shading of creek pools) and will be managed as per an Environmental Management Plan that will be developed prior to construction commencing, reflecting measures summarised in the drainage strategy (Appendix 3).

Specific significant impact guidelines have not been developed for either species. However, both are listed as vulnerable under the EPBC Act, for which generic guidelines have been developed. The impact of the proposed development has been assessed against these criteria, and is presented in Table 7.

Base on the analysis in this table, a significant impact would occur on the Striped Legless Lizard, but not on the Growling Grass Frog.

Table 7: Significance impact assessment for Striped Legless Lizard and Growling Grass Frog

Impact significance guideline	Striped Legless Lizard	Growling Grass Frog
Lead to a long-term decrease in the size of a population	<p>The proposed development would result in the removal of up to 24.24 hectares of habitat suitable for Striped Legless Lizard (coinciding with mapped areas of native grassland). Although the removal of this habitat will be staged, as described in Section 3.3, the result will be the ultimate loss of the Striped Legless Lizard population. Under the precautionary principle it is considered that this population may constitute a key breeding population.</p> <p>On this basis, the proposed development may significantly impact the species as defined in the significant impact criteria.</p>	<p>The size of the population utilising Kororoit Creek adjacent to Precinct 2 is unknown; however, an Environmental Management Plan will be developed to avoid any impacts to the species by siting works outside a buffer zone around suitable habitat along the creek. Therefore a decline in the population size is considered unlikely.</p>
Reduce the area of occupancy of the species		<p>Available habitat for the species will not decrease given works will be excluded from suitable habitat and a 30-metre habitat buffer zone from Kororoit Creek and the edges of wetland areas (including those where the records were identified and future stormwater treatment wetlands) in this precinct. Rehabilitation along the creek banks has the potential to increase the availability of habitat.</p>
Fragment an existing population into two or more populations		<p>The population will not be fragmented as a result of the proposed development as areas of suitable habitat will be protected by the 30-metre habitat buffer.</p>
Adversely affect habitat critical to the survival of a species		<p>The habitat available for the species will not be affected as development will be excluded from the 30-metre habitat buffer and a total setback from Kororoit Creek averaging 50 metres.</p>
Disrupt the breeding cycle of a population		<p>The breeding cycle of the species will not be affected as development will be excluded from areas of suitable habitat.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline		<p>The Environmental Management Plan will be designed to avoid any impacts to the frog’s habitat through the establishment of a 30-metre habitat buffer. Therefore, impacts would not be significant.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat		<p>The Environmental Management Plan will ensure no invasive species are introduced into the creek system.</p>
Introduce disease that may cause the species to decline		<p>Measures to prevent disease from entering the creek system are detailed in Section 8. These are designed to ensure disease does not enter the creek system and include excluding works within the 30-metre habitat buffer.</p>
Interfere with the recovery of the species		<p>By excluding works within 30 metres of the creek and wetland habitats, as well as rehabilitating these post-construction, the species’ recovery will be enhanced.</p>

8. PROPOSED MITIGATION MEASURES AND OFFSETS

8.1. Mitigation Measures

8.1.1. Kororoit Creek

A drainage strategy has been developed for the project to minimise impacts to Kororoit Creek (see Appendix 3). This includes the environmental mitigation measures presented below.

- Creation of a 30 metre buffer area around existing wetlands and Growling Grass Frog habitat (e.g. future stormwater treatment wetlands) along Kororoit Creek.
- Creation of a 15 metre buffer along the creek between these areas.
- Siting wash-down areas away from the creek.
- Managing waste at the construction site to prevent waste from entering the waterway system.
- Fencing environmentally sensitive areas.
- Placing silt fences along the creek to avoid any impacts to the waterway system.
- Water quality will be further protected through the presence of hay bales at a number of key points during construction.

The location of the 30 metre Growling Grass Frog buffer is presented in Appendix 3. This area and adjoining areas will be revegetated as per Growling Grass Frog habitat requirements and will include the creation and enhancement of overwintering, breeding, foraging and basking habitat. Key considerations are presented below.

- Ephemeral and permanent wetlands will be enhanced to maximise habitat diversity.
- Banks will be gently sloping and provide a variety of edge types. These will be enhanced through placement of rocks and vegetation to create microhabitats within these areas.
- Stormwater treatment wetlands will be incorporated to minimise pollutants and/or sediments from entering the waterway from the development.
- Revegetation will be undertaken using indigenous plants preferred by Growling Grass Frogs and their prey species. Submerged and floating vegetation will be included.

Management of the Kororoit Creek Corridor is likely to be governed by relevant Environmental Management Plans, Landscape Plans and direction from the City of Melton and Melbourne Water, and will incorporate the foregoing measures.

The corridor is likely to be used for passive pursuits, including walking, cycling, flora and fauna watching and possibly fishing. Human access will be restricted around pools used by the frog to ensure minimal disturbance to wildlife through dense, low plantings and fencing.

8.1.2. Native vegetation & fauna

The proposed development will result in the ultimate loss of the majority of native vegetation from the site. The development and implementation of the Spiny Rice-flower Propagation Project has been structured to compliment the staged development of the site and ensure the species will not be significantly impacted until the Project has

demonstrated sustainable outcomes, as described in Appendix 2. Impacts to other listed matters (i.e. Striped Legless Lizard and Matted Flax-lily) will therefore also occur consistent with the timing in this staging plan.

In relation to Striped Legless Lizard rocky escarpment along Kororoit Creek will be retained and subject to an Environmental Management Plan. Furthermore, removed habitat throughout the project site will be subject to the salvage protocol currently adopted by the Victorian Department Environment and Primary Industries (DEPI) for grassland areas being removed in the area of Melbourne's growth corridors subject to the EPBC Act Strategic Impact Assessment (DSE 2010). This will ensure that as many individuals as possible of the species are detected, salvaged and translocated to suitable habitat.

Salvage for SLL was implemented in accordance with this protocol in late 2013 for an area associated with the development of the outfalls described in EPBC Referral 2003/1185. No SLL were found or salvaged during this work.

8.2. Proposed Offsets

The proponent understands the need to identify a suitable offset site for the removal of NTGVVP, Striped Legless Lizard habitat and Spiny Rice-flower.

The removal of NTGVVP will occur as described in sections 3.3 and 7.1.

Pre 2018 development will require the removal of 9.67 hectares (i.e. less than 10 hectares), which is proposed to be offset into the Western Grassland Reserves in accordance with the Policy Statement for Melbourne Urban Development for proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act. Specifically, this will occur on a property north-west of Werribee called 'Quandong', which is located in the Western Grasslands Reserve and owned by a related entity, MG Pastoral Pty Ltd. In 2010, the property was included in the proposed WGR as part of the EPBC Act Melbourne Strategic Assessment.

Post 2018 development will require the removal of the remaining NTGVVP, an area totalling 10.322 hectares. This will be subject to a secondary consent process by the DotE and subject to the demonstrated sustainable outcomes of the Spiny Rice-flower Propagation Project (see Appendix 2). Offsets for this removal are also proposed to be provided on the same property (Quandong).

The proposed offset site for the removal of Striped Legless Lizard habitat is also to be co-located at Quandong. The grassland habitats at Quandong have been confirmed as supporting the Striped Legless Lizard with the species being recorded during a targeted tile grid survey of grassland in the north western part of the property in winter-spring 2011 (BL&A, unpubl. data). Grasslands that include or are contiguous with this habitat will satisfy the lizard offset requirements.

The presence of NTGVVP and Striped Legless Lizard at Quandong, together with its role in the Spiny Rice-flower Propagation Project (where a portion of the propagated plants will be established in areas of NTGVVP), makes it both appropriate and efficient as an offset site.

In relation to Spiny Rice-flower, the Propagation Project is proposed as an offset. Details of the project are provided in Appendix 2. Implementation of this project is to be undertaken in consultation with the Victorian Spiny Rice-flower Translocation Panel, which is under the auspices of the Spiny Rice-flower Recovery Team.

The aim of the Propagation Project is to provide a suitable offset for the impacts to Spiny Rice-flower at Modeina and contribute to an improved understanding of conservation and management for the species in the future. Dr. Deborah Reynolds of the Spiny Rice-flower Recovery Team and Victoria University is leading the project. Much of the experience gained by Dr. Reynolds during her PhD will be used to maximise the project's success.

Seeds collected at Modeina will be stored and germinated at the “Indigenous Nursery” that has successfully germinated the seeds in the past. Experimental methods will be used to identify the most successful methods of germinating the seed. Details of this will be published in peer-reviewed journals. Seeds and germinants will be collected using methods based on Dr. Reynolds’ research to date. Attempts to stimulate seeding and germination of propagules of Spiny Rice-flower at the Burnside site are underway through a carefully controlled experiment using a range of biomass and weed control strategies.

A number of translocation sites have been identified for the proposed project. Two new populations will be created at Quandong, as part of the proposed Western Grassland Reserves. Another population will be established nearby at the Isabella Williams Reserve, adjacent to an existing Spiny Rice-flower population. More details are provided below and in Appendix 2.

Brimbank Council have indicated in principle support for this subject to all relevant regulatory approvals being obtained. This Isabella Williams Reserve supports an existing Spiny Rice-flower population and has been selected due to its close proximity to the proposed development area. It is located approximately 200 metres south-east of the study area. The land is owned by Brimbank Council and, as such, will be protected in perpetuity. At this stage the site is managed by Council and the same contractors currently undertaking the management works for Council would be used to manage the proposed site to ensure appropriate management measures are implemented. Documentation accompanying the project will include a ten-year management plan that will ensure the grassland will be positively managed. Council will review the documentation to ensure that the management practices are compatible with the current conservation-oriented management of the site. The project will be undertaken in a manner that does not compromise the current population of the Spiny Rice-flower in the reserve, but rather compliments and improves the long-term viability of the existing population.

As part of the research to be undertaken two additional areas are proposed for inclusion in the Propagation Project; one supporting suitable habitat for the species but not supporting any Spiny Rice-flower plants, and one a ploughed paddock that is seeded with forb species. These are located on Quandong, a property owned by a related DFC entity and identified to be acquired and included in the Western Grassland Reserves as part of Melbourne’s Growth Areas EPBC Act Strategic Assessment. Should the Spiny Rice-flower propagation project be successful at the Quandong sites, it will be appropriately secured and managed in perpetuity. In addition, a management plan will be prepared to ensure the Quandong sites are managed appropriately.

At this stage it is not possible to determine the duration of the Propagation Project, given the limited knowledge on the species. The success of the project will be dependent on a number of factors including environmental conditions, success in germinating seed and transplanting natural germinants. Of note, the development staging will ensure that the majority of the existing population of Spiny Rice-flower at Modeina will be retained onsite until the Propagation Project has demonstrated sustainable outcomes confirmed by independent peer review.

As part of the rigorous scientific program, the propagation sites will be monitored regularly. Reporting to the department will be undertaken on a yearly basis, and research papers will be published when significant results are obtained.

The project will be considered a complete success when 800 Spiny Rice-flower plants are established at the recipient sites for a minimum of two years, fulfilling the Spiny Rice-flower offset obligations for the Modeina development.

Development of stages supporting the majority of the species will not commence until the propagation project has demonstrated sustainable outcomes. These areas are shown in green in Figure 3 and support 237 of the 244 Spiny Rice-flower plants.

9. ENVIRONMENTAL RECORD OF PERSONS PROPOSING TO TAKE THE ACTION

A copy of the DFC's Sustainability Policy is provided below.

Examples of recent and continuing urban development projects that have responded to environmental challenges include:

- Manor Lakes. An 8,000 lot master planned community in Wyndham Vale, Victoria, for which 2,500 lots have been developed to date. As part of the development, Manor Lakes has undertaken extensive enhancement and protection measures of the Lollypop Creek.
- Hunt Club. An award winning 2,000 lot master planned community in Cranbourne, Victoria, for which 1,600 lots have been developed to date.
- The Hunt Club was the first residential community in Victoria to be provided with recycled water for use in toilet flushing, garden watering and car washing directly delivered to their homes via a reticulated pipe system. It is estimated that this will save approximately 40% of potable water consumption in the estate.

The Hunt Club Estate has been the recipient of the following:

- 2002 UDIA Victoria Award – Best Residential Development of 400 lots or more.
 - 2006 HIA Green Smart Accreditation.
 - 2006 HIA Green Smart Award for Best Estate of the Year.
 - 2006 UDIA Victoria Award – Environmental Excellence.
- Morningside Estate, Gisborne, comprising 50 lots, has been sensitively planned to ensure the retention of some 1000 trees and associated habitat improvement works comprising of the planting of an additional 30,000 native trees and plants and devoting over half the estate to public open space purposes.

The Morningside Estate was the recipient of the 2007 UDIA Victoria Award – Landscape Award.

10. INFORMATION SOURCES PROVIDED IN THE PRELIMINARY DOCUMENTATION

Reliability of the surveys is based on experienced, qualified botanists and zoologists finding the target species concerned.

- AVW and Victorian Biodiversity Atlas (VBA): These databases are administered by DEPI and holds all records of fauna species within Victoria. Data for these have been gathered from ecological surveys undertaken by DEPI, museum specimens, professional zoologists and botanists, competent field naturalists and zoological and botanical literature. Records from these databases provide an indication of which species are present in an area and not an estimate of population size. The date of the records is provided in Section 3.
- FIS: This database is administered by DEPI and holds all records of flora within Victoria prior to 2010. Data have been collected by ecological surveys undertaken by the DEPI, herbarium specimens, botanists, competent field naturalists and botanical literature. Records from this database provide an indication of which species are present in an area and not an estimate of population sizes.
- EPBC Act Protected Matters Search Tool: The Department of the Environment administers this online database. Information originates from AVW, VBA and FIS and Bioclim modelling of potential species occurrence.
- BL&A Surveys:

Date of Assessment	Survey Type
12/12 – 23/12/2002	Pitfall Striped Legless Lizard Survey
21/04 - 22/04/2004	Vegetation assessment
24/08 – 10/12/2010	Tiled Striped Legless Lizard Survey
24/08 – 26/08/2010	Habitat hectare assessment for areas which had been previously burned and were not included in the 2004 assessment
24/08 – 26/08/2010	Spiny Rice-flower surveys
27/06, 2/7, 3/10, 7/10 2002	Vegetation assessment and Spiny Rice-flower observations
28/01 – 30/01/2003	Growling Grass Frog survey
3/10/2011 – 21/10/11	Targeted spring flora survey (Austral Toad-flax, Basalt Sun-orchid, Button Wrinklewort, Clover Glycine, Curly Sedge, Fragrant Leek-orchid, Large-headed Fireweed, Maroon Leek-orchid, Purple Diuris, Small Golden Moths, Small Scurf-pea, Sunshine Diuris)
October – November 2011	Habitat hectare assessment of areas identified in 2004
7/11/2011	Targeted flora survey (Plump Swamp Wallaby-grass)
9/12/2011	Targeted flora survey (Matted Flax-lily)

11. REFERENCES

- Braby, MF & Dunford, M 2006, 'Field observations on the ecology of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae)', *Australian Entomologist* 33: 103–110.
- Department of Environment Water Heritage and the Arts 2009, *Matters of National Environmental Significance – Significant Impact Guidelines 1.1*, Department of Environment Water Heritage and the Arts, Canberra.
- Department of Sustainability and Environment 2003, *Action Statement No. 132, Spiny Rice-flower Pimelea spinescens subsp. spinescens*, DSE, East Melbourne, Vic.
- Department of Sustainability and Environment 2010, *Biodiversity Precinct Structure Planning Kit*, DSE, East Melbourne, Vic.
- Department of Sustainability, Environment, Water, Population and Communities 2011a, *Delma impar* in Species Profile and Threats Database, Department of Sustainability, Environment, Water, Population and Communities, Canberra. Available from: <http://www.environment.gov.au/sprat>. Accessed Mon, 19 Sep 2011 10:38:54 +1000.
- Department of Sustainability, Environment, Water, Population and Communities 2011b, *Environment Protection and Biodiversity Conservation Act 1999* referral guidelines for the vulnerable striped legless lizard, *Delma impar*, Department of Sustainability, Environment, Water, Population and Communities, Canberra.
- Endersby I & Koehler S 2006, 'Golden Sun Moth *Synemon plana*: discovery of new populations around Melbourne', *Victorian Naturalist* 123 (6): 362-365.
- Hadden, S 1995, *Distribution, Status and Habitat Requirements of the Striped Legless Lizard Delma impar (Fischer)*, Flora and Fauna Branch, Department of Conservation and Natural Resources (Vic.), report to Australian Nature Conservation Agency, April 1995.
- O'Dwyer, C & Attiwill, PM 1999, 'A comparative study of habitats of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae): implications for restoration'. *Biological Conservation*, 89, 131-141.

Appendix 1: Flora and Fauna Assessment Report

BL&A Report 7045 (2.7) – updated

**MODEINA ESTATE, BURNSIDE
FLORA AND FAUNA ASSESSMENT**

DFC (Project Management) P/L



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Report No. 7045 (2.7)

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1. EXECUTIVE SUMMARY

Brett Lane and Associates Pty Ltd conducted a flora and fauna assessment of approximately 80 hectares of land formerly known as 'The Point', Burnside, a property proposed for a residential development known as Modeina Estate. It is the continuation of the existing Earlington and Carinya Gardens housing estates situated on Westwood Drive in Burnside, west of Melbourne.

Planning of the final stage of development at Burnside (Modeina Estate Precinct 2) is currently underway as is the preparation of a planning permit for this precinct.

Initial investigations were conducted from 2002 to 2004. Additional field work was undertaken in 2010 and 2011 to update the habitat hectare assessment, conduct Striped Legless Lizard surveys and targeted spring and summer flora surveys.

A total of 24.24 hectares of native vegetation was recorded within the study area in the form of Heavier Soils Plains Grassland (EVC 132_61) and Escarpment Shrubland (EVC 895).

Eight rare or threatened flora species were recorded during the field assessments including two listed under the EPBC Act, three listed under the FFG Act and eight listed on the DSE Advisory List of rare and threatened flora.

One ecological community listed as threatened under the EPBC Act, Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) was recorded in the study area in the form of Plains Grassland Ecological Vegetation Class (EVC). This area also constitutes the Western (Basalt) Plains Grasslands Community listed as threatened under the FFG Act.

Two threatened fauna species, the Growling Grass Frog and Striped Legless Lizard were recorded within the study area during the field assessments. These species are both listed under the EPBC Act, FFG Act and the DSE Advisory List of threatened fauna.

The following implications would pertain to the current development proposal:

- A planning permit is required for vegetation removal under State and local planning provisions.
- The current proposal triggers a referral to DSE due to the proposed removal of more than 0.5 hectares of an endangered EVC.
- The following offset targets, meeting like-for-like rules, would be required for the removal of native vegetation (ultimate proposal):
 - 20.54 habitat hectares for the removal of 10.5 habitat hectares (23.87 hectares) of Very High conservation significance *Heavier soils* Plains Grassland (EVC 132_61)
 - 0.29 habitat hectares for the removal of 0.14 habitat hectares (0.37 hectares) of Very High conservation significance Escarpment Shrubland (EVC 895).
- Offsets for the proposed development cannot be achieved within the study area. A third party offset site is proposed to be located in the Western Grassland Reserve in accordance with EPBC Act policy guidelines.
- The project has been referred to the Commonwealth and is deemed to be a 'controlled action' that will be assessed by preliminary documentation.

- The Responsible Authority is likely to consider impacts on FFG Act-listed species and communities and DSE-listed species when deciding on the planning application for the project.
- As more than 10 hectares native vegetation of an endangered EVC is proposed to be removed for the development, a Referral to the state Minister for Planning on whether and Environment Effects Statement (EES) was submitted and the decision was that an EES is NOT required, subject to certain conditions being met. It is proposed that EPBC Act Preliminary Documentation will be considered in addressing the 'No EES conditions'.

2. INTRODUCTION

Brett Lane and Associates Pty Ltd conducted a flora and fauna assessment of approximately 80 hectares of land formerly known as 'The Point', Burnside, a property proposed for a residential development known as Modeina Estate. It is the continuation of the existing Earlington and Carinya Gardens housing estates situated on Westwood Drive in Burnside, west of Melbourne.

Planning of the final stage of development at Burnside (Modeina Estate Precinct 2) is currently underway as is the preparation of a planning permit for this precinct.

This investigation was commissioned to provide information on the extent and condition of native vegetation and fauna habitat in the study area, ascertain the likely presence and status of rare and threatened flora and fauna species, and to outline any implications under relevant national, state and local legislation and policies. Of particular focus were any implications of the proposal under Victoria's Native Vegetation Management Framework (DNRE 2002), referred to herein as the 'Framework'.

2.1. Initial assessment

An initial investigation was conducted from 2002 to 2004. The scope of this investigation included:

- Flora and fauna survey targeting the occurrence and potential occurrence of listed threatened species and communities based on site conditions and a review of existing information.
- A targeted Growling Grass Frog survey.
- A targeted Striped Legless Lizard survey using pitfall trapping methods, considered appropriate at the time (see Appendix 5), briefly summarised in this report).
- Mapping and habitat scoring of native vegetation on the subject land to calculate likely offset requirements under the state Native Vegetation Management Framework.
- Mapping of the occurrence of rare and threatened flora during spring.

2.2. Updated assessments

In 2010 and 2011 the following assessments were undertaken to ensure that up-to-date and acceptable information is available for the project.

Flora and fauna surveys were undertaken in 2010. The scope of this updated investigation includes:

- An August survey of all remnant native vegetation at the site for Spiny Rice-flower.
- Habitat hectare assessment of areas of grassland previously burnt and not assessed as part of the initial field investigation.
- A Striped Legless Lizard tile grid survey (a more recently used method of survey considered better at detecting the species than the earlier pitfall trapping method adopted).

Additional flora surveys were undertaken in 2011. The scope of this updated investigation includes:

- Habitat hectare assessment of areas of grassland previously assessed during the initial investigation undertaken in 2004.
- Remapping vegetation patches assessed in 2004 to include areas which may not have been dominated by native vegetation and were therefore excluded during the initial assessment.
- Updated targeted spring and summer flora surveys.

This report provides the findings of the initial investigation from 2002 and 2004 as well as the results of the surveys undertaken in 2010 and in 2011.

This report is divided into the sections described below.

Section 3 describes the sources of information, including the methods used for the field surveys.

Section 4 provides an overview of the characteristics of the study area.

Section 5 presents the results of the initial and updated investigations, describing the flora and fauna of the study area and presenting the results of the targeted surveys.

Section 6 discusses the implications of the findings under relevant Commonwealth, State and local legislation and policies.

The initial flora survey was carried out in 2002 by Mark Trengove of Geelong Indigenous Nursery, while the targeted Striped Legless Lizard survey was carried out in December 2002 by Peter Robertson and Geoffrey Heard of Wildlife Profiles Pty Ltd.

A more detailed flora survey, consistent with the then new requirements under the state Native Vegetation Management Framework, was undertaken in 2004 by a team from Brett Lane & Associates Pty Ltd.

Additional components of the investigation, including the surveys undertaken in 2010 and 2011 were undertaken by a team from Brett Lane & Associates Pty Ltd, comprising Justin Sullivan (Botanist), Davide Coppolino (Botanist), Rachel Omodei (Botanist), Brett Macdonald (Botanist), Joshua Wellington (Botanist), Peter Lansley (Zoologist), Khalid Al-Dabbagh (Zoologist), Curtis Doughty (Zoologist), Gabrielle Roy (Senior Ecologist and Project Manager) and Brett Lane (Principal Consultant).

3. SOURCES OF INFORMATION

3.1. Existing information

Existing information on flora and fauna used in this investigation is described below. Note that ‘study area’ refers to the north-eastern part of the development envelope, namely Modeina Estate, Burnside, which is bounded to the north and east by Kororoit Creek, Rockbank Middle Road to the south and Westwood Drive to the west. It is located in the suburb of Burnside approximately 20 kilometres west of Melbourne.

Existing information has been obtained from a wider area, termed the ‘search region’ defined for this assessment as an area with radius ten kilometres from the approximate centre point of the study area of coordinates: latitude 37° 44’ 33” S and longitude 144° 45’ 23” E. Updated information on flora and fauna was obtained as part of the updated assessment.

3.1.1. Flora

The study area was originally inspected on 27th June, 2nd July, 3rd October and 7th October 2002. This work pre-dated the introduction of Victoria’s Native Vegetation Management Framework, but included a detailed species inventory and analysis of two 25 meter diameter quadrats at sites considered to contain better quality native vegetation within the study area, including one containing the critically endangered Spiny Rice-flower (*Pimelea spinescens* ssp. *spinescens*).

The 2002 work identified a number of key issues for the future residential development of the land. These included:

- The presence of a nationally listed threatened flora species, namely the Spiny Rice-flower, and the state-listed threatened flora species Glaucous Flax-lily (*Dianella longifolia* var. *grandis*) and Tough Scurf-pea (*Cullen tenax*).
- The presence of intact Plains Grassland vegetation (EVC 132), that is considered endangered in the Victorian Volcanic Plains bioregion. In addition the ecological community of Plains Grassland is listed under the *Flora and Fauna Guarantee Act 1998* as threatened within Victoria. This community has since 2008 also been listed at a national level on the *Environmental and Biodiversity Conservation Act 1999* under the designation ‘Natural Temperate Grasslands of the Victorian Volcanic Plain’ (NTGVVP).

The site was reassessed in April 2004. The updated assessment aimed to review the extent of the above mentioned issues to inform the development planning assessment process for the proposed Stage Two subdivision. Note that Stage One of the subdivision was designed to avoid impacts on any native vegetation and fauna habitat. It was then referred to the Commonwealth under the EPBC Act and was not considered to be a “controlled action.”

In the updated assessment, more recent flora records from the Viridans Flora Information System (FIS), a database administered by the Department of Sustainability and Environment (DSE) were obtained (Viridans Biological Databases 2011a). This database search listed all plant species, including rare and threatened plants found in the search region.

The likelihood of suitable habitat in the study area for nationally threatened flora species was ascertained through a search of the online *Environment Protection and Biodiversity*

Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (DEWHA 2010) using the same search region.

Plant taxonomy used throughout this report follows the FIS standards.

3.1.2. Ecological Vegetation Classes

In the 2004 assessment, pre-1750 (pre-European settlement) vegetation mapping was reviewed to determine the type of native vegetation likely to occur in the study area. Information on Ecological Vegetation Classes was obtained from published EVC benchmarks. Updated sources for these benchmarks included:

- Relevant EVC benchmarks for the Victorian Volcanic Plain bioregion¹ (DSE 2009a).
- Biodiversity Interactive Maps (DSE 2009b).

3.1.3. Fauna

A list of the fauna species recorded in the search region was obtained from the Atlas of Victorian Wildlife (AVW), a database administered by DSE (Viridans Biological Databases 2011b).

Fauna taxonomy used throughout this report follows the AVW nomenclature.

The presence or likelihood of occurrence in the study area of nationally threatened fauna species was obtained through the EPBC Act Protected Matters Search Tool (DSEWPC 2012).

3.2. Field methodology

3.2.1. Flora Assessment

Overview Assessment

The initial flora assessment was conducted in June, July and October 2002. The whole study area was traversed on foot.

Targeted Surveys

A targeted survey for Spiny Rice-flower was undertaken by two botanists from the 24th to 26th of August 2010 in all areas mapped as native vegetation in the previous assessment, as well as the large area in the north east part of the site which had previously been burnt. These areas were visually searched along transects spaced five metres apart. The locations of threatened flora were recorded using handheld GPS to an accuracy of approximately five metres. Mapping of native vegetation and detailed habitat hectare assessment was undertaken in the previously burnt area during this survey.

Spring and summer targeted surveys were undertaken by a team of botanists. All areas mapped as native vegetation were surveyed.

¹ A bioregion is defined as “a geographic region that captures the patterns of ecological characteristics in the landscape, providing a natural framework for recognising and responding to biodiversity values”. In general bioregions reflect underlying environmental features of the landscape (DNRE 1997).

Habitat Hectare Assessment

Native vegetation in Victoria has been defined by the DSE as belonging to three categories:

- Remnant patch
- Scattered trees
- Degraded treeless vegetation.

A description of these is provided below with the prescribed DSE methods to assess them. Wetlands are not assessed as native vegetation under the Framework.

Remnant patch

Remnant patches of native vegetation comprise indigenous plant species considered part of a clearly definable EVC and are defined by the DSE as:

- An area of native vegetation, with or without trees, where at least 25% of the understorey cover is indigenous (excluding bare ground), and/or
- “A group (i.e. three or more) of trees where the tree canopy cover is at least 20%” (DSE 2007a).

Remnant patch vegetation is assessed using the habitat scoring or habitat hectare method (Parkes *et al.* 2003; DSE 2004) whereby components of native vegetation (e.g. tree canopy, understorey and ground cover) are assessed against a DSE-issued EVC benchmark (see appendices) that described the notional pre-European condition of that EVC. The score effectively measures the percentage resemblance of the vegetation to its original condition.

The habitat hectare score assists in defining the value of remnant native vegetation for assessing its conservation significance and for calculating offsets if removal of native vegetation is approved.

Scattered trees

DSE (2007a) define scattered trees as indigenous canopy trees with a diameter at breast height (1.3 metres) (DBH) greater than ten centimetres “within an area where at least 75% of the total understorey plant cover is introduced vegetation and the overall canopy cover for a group (i.e. three or more) of trees is less than 20%”.

Scattered trees are counted and their DBH measured. The size class of scattered trees is based on the large tree DBH in the relevant benchmark for the EVC to which it once belonged.

Degraded treeless vegetation

Degraded treeless vegetation comprises all other vegetation (DSE 2007a), either:

- “Minor treeless vegetation” which is vegetation that does not have more than 25% understorey cover that is native or does not contain any canopy trees, or
- “Modified treeless vegetation” which is vegetation that has more than 25% understorey cover that is native, but is now dominated by species that are unlikely to have originally dominated the site. This may include such situations as former grasslands that have had a history of cropping, and now have an extremely modified

cover consisting of a few opportunistic, primary colonising native grass species generally amongst exotic species, with little other indigenous diversity.

Minor treeless vegetation requires no further assessment or offsets.

The determination of a patch supporting modified treeless vegetation must be confirmed by DSE. In the case where modified treeless vegetation supports habitat for a rare or threatened species, this will be treated as a remnant patch. A habitat hectare assessment will be required and the conservation significance will be based on the determination of best 50% or remaining 50% habitat. Offsets will be required for the removal of this type of vegetation.

Modified treeless vegetation which does not support habitat for a rare or threatened species requires no further assessment or offsets.

Habitat hectare assessments

Flora and native vegetation assessments in accordance with Victoria's Native Vegetation Management Framework were conducted in autumn 2004. The study area was traversed on foot on the 21st and 22nd April 2004. All areas mapped as vegetation habitat zones were thoroughly inspected. A number of areas could not be assessed as these had been recently burned.

The habitat hectare assessment for the burned was undertaken between October 24th and 26th 2010.

The original habitat hectare assessment was updated on 21st October 2011.

3.2.2. Fauna

The habitats present in the study area were assessed based on information collected during the flora assessments, for their likelihood to support threatened fauna. The results of the likelihood of occurrence are presented in Section 7.2.3.

Threatened species considered to have potential to occur in the study area were the Growling Grass Frog, Striped Legless Lizard and Fat-tailed Dunnart targeted surveys were undertaken for these.

Fauna habitat types were characterised in the study area and are described in Section 5.2.1. The quality of fauna habitat was assessed based on the criteria detailed below. These are based on habitat components which include including old-growth trees, fallen timber, leaf litter, surface rocks. Three quality categories were used, as described below:

High: The majority of fauna habitat components are present and habitat linkages to other remnant ecosystems in the landscape are intact.

Moderate: The majority of fauna habitat components are present but habitat linkages to other remnant ecosystems in the landscape are absent; or

The majority of habitat components are absent but habitat linkages to other remnant ecosystems in the landscape are intact.

Low: The majority of fauna habitat components are absent and habitat linkages to other remnant ecosystems in the landscape are absent.

Striped Legless Lizard Targeted Survey

Two targeted surveys were undertaken for Striped Legless Lizard in the study area including a pitfall trap survey in 2002 and a tile grid survey in 2010. Since the original survey, the tile grid survey was method developed and is now the standard survey methodology (DSE 2010).

2002 Targeted Survey

The targeted survey report is presented in Appendix 5. Pitfall traps were distributed within the habitat mapped as high quality Plains Grassland, dominated by Kangaroo Grass *Themeda triandra*, identified as suitable Striped Legless Lizard habitat.

Ten pitfall traps were installed among drift fence lines use to direct animals into the traps. These were inspected daily over a 12 day period from the 12th to 23rd December 2002.

2010 Targeted Survey

The Striped Legless Lizard survey was undertaken using methods consistent with the DSE Biodiversity Precinct Planning Kit, including using the tile grid method, previously used successfully to survey for Striped Legless Lizard in the basalt plains grasslands of Melbourne (DSE 2010).

Eight grids were set up in the study area, the location of which was determined based on habitat suitability. Habitats included areas of native grassland and rocky outcrops (Figure 1).

In each grid, 50 grooved terracotta or concrete roof tiles were placed in a 20 x 45 metre grid configuration, with tiles spaced five metres apart. The north-west corner of the grid was recorded using a handheld GPS and the tiles were individually numbered with a permanent marker.

The tile grids were laid out on August 24th and 25th 2010 and monitored at fortnightly intervals. The first monitoring took place on September 28th, with the last checked on December 10th. Each grid was checked six times.

The grids were checked between 7 am and 11 am. The time of checking the grids was randomised, to eliminate time-of-day differences. The weather conditions during the monitoring ranged from mild to hot and varied from overcast to clear skies. These conditions were considered suitable for detecting the Striped Legless Lizard using the tile grid method. The weather conditions of grids at the time of tile checking are summarised in Appendix 7.



Legend

- Study Area
- Tile Grids

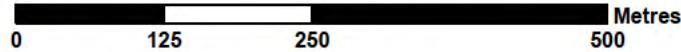


Figure 1: Locations of Tile Grids		
Project: 'The Point' Burnside		
Client: The Burnside North Trust		
Project No. 7045.3	Date 1/9/2010	Created By C.Doughty/ M.Ghasemi
BL&A Brett Lane & Associates Pty. Ltd. Ecological Research & Management		
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Growling Grass Frog Targeted Survey

The targeted frog survey of Kororoit Creek within the area of the proposed development was undertaken over three consecutive nights from the 28th to 30th January 2003. Weather conditions varied considerably and are described below in Table 1. Note that no weather observations were recorded on the first night of surveying.

Table 1: Summary of Weather Conditions

Date	Max Temp (°C)	Min Temp (°C)	Rainfall (mm)	Description
28/01/03			0	Cool and clear conditions.
29/01/03	38	23	0	Warm and humid with some very light rain.
30/01/03	29	15	2	Cool and clear, afternoon rain.

Weather conditions were considered suitable for the detection of frogs, particularly on the night of 29th January 2003, which was warm and humid with some very light rain.

The presence of the Growling Grass Frog was assessed by walking along the creek after dark and stopping at each of several larger pools for five minutes to listen for the unique calls of any frog species. The call of the Growling Grass Frog was then played through a tape recorder to elicit call responses from any male frogs in the area. A further five minutes were then spent listening for calls in response. A spotlight was then shone on the pool and surrounds in an attempt to locate any frogs in the area. In total, approximately 15 minutes was spent each night in each pool searching for the species.

Although the survey methodology is not consistent with the current protocol (DSE 2010) the species was recorded using this survey technique. Further surveys have not been conducted for this reason as it is assumed the species is still present in the area. This has been corroborated by Figure 5 in section 5.2.3.

3.3. Limitations of field assessment

Where feasible, all efforts are made to schedule flora and fauna field surveys in optimal weather conditions and times of year. Nevertheless, field surveys usually fail to record all species present for various reasons, including the seasonal absence of some species and short survey duration. Rare or cryptic species are often missed in short surveys.

Detailed flora surveying was carried out in late winter and spring, when many annual and spring-emergent plant species were able to be detected. The timing of the survey and condition of vegetation was considered suitable to ascertain the extent and quality of native vegetation. Notwithstanding this, a significant proportion of remnant grassland in the study area had been recently burnt at the time of the vegetation assessment and accurate mapping and habitat scoring was not possible. It is also worth noting that the indigenous cover threshold for assessable remnant patch native vegetation under the Framework has changed

from 10% to 25% and reassessment of the site should be considered for this reason as well.

The targeted fauna assessments were undertaken at seasonally appropriate times and using methods that meet the requirements issued by DSE on survey methods for these species.

Targeted surveying for Spiny Rice-flower was conducted during August 2010, towards the end of the flowering period for the species. As such, a large proportion of individuals recorded at the site had finished flowering and were difficult to locate in the field. Despite this, a large survey effort was conducted throughout all areas of native vegetation within the study area and it is considered that the results provide an accurate account of the status and extent of the species in the study area.

Wherever appropriate, a precautionary approach has been adopted in the discussion of implications. That is, where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.

4. SITE DESCRIPTION

Modeina Estate at Burnside is a property of approximately 80 hectares of privately owned land, located 20 kilometres west of Melbourne. It is bordered by the Kororoit Creek to the north and east, and newly developed residential estates to the south and west. The property slopes gently from the basalt flats in the west down to the creekline and contains numerous rocky rises and areas of surface rock (refer to Figure 3 for study area location and boundary). The study area supports a mosaic of native and exotic vegetation.

Reflecting historical land management practices, much of the elevated sections of the site have been cultivated and converted to exotic pasture. The remaining areas not cleared of rocks or historically cultivated support native grasslands or remnant shrublands. Some of these native vegetation remnants are in good condition and support a high cover of indigenous species.

Land along the escarpment of Kororoit Creek supports a mix of exotic and indigenous species, including several remnant River Red-gums. The area along the creek is typically rocky and slopes down to the banks of the creek. Where exotic vegetation dominates the escarpment and creekline it is largely composed of a dense shrubland of African Boxthorn (*Lycium ferocissimum*) with a ground-layer of Serrated Tussock (*Nassella trichotoma*), Artichoke Thistle (*Cynara cardunculus*) and Soursob (*Oxalis pes-caprae*). Bare ground is also common.

A few small patches of remnant Escarpment Shrubland persist along the escarpment adjacent to the Kororoit Creek. Such areas are characterised by the shrubs Tree Violet (*Melicytus dentatus* s.l.) and Sweet Bursaria (*Bursaria spinosa*) with scattered tussocks of Kangaroo (*Themeda* sp.) and Spear Grass (*Austrostipa* sp.) beneath. Invading and degrading these areas are a number of exotic species.

The remnant grasslands are generally on flat to slightly undulating land with scattered basalt outcrops and rocks. Kangaroo and Spear grasses are typically dominant within these patches, along with a suite of indigenous small shrubs, herbs and graminoids. Parts of the grassland are wet and rocky and consequently moisture loving weeds, such as Phalaris (*Phalaris aquatica*) and Paspalum (*Paspalum dilatatum*) have become established. Other weeds, such as Serrated Tussock, African Boxthorn and Artichoke Thistle have also invaded some of these areas of indigenous vegetation.

The native grasslands are represented by several patches separated by land subject to historic clearing, weed invasion and recent burning. These fragments vary in species diversity and cover, and presence of threatened species. Species of significance recorded within the grasslands, in both the 2002 and 2004 assessments, include the Spiny Rice-flower (*Pimelea spinescens* ssp. *spinescens*), Tough Scurf-pea (*Cullen tenax*) and Arching Flax-lily (*Dianella longifolia* var. *grandis* Syn. *Dianella* spp. aff. *longifolia* [Benambra]). Additional threatened flora species were recorded during the 2010 and 2011 targeted surveys.

In 2004 a significant proportion of the site had been recently burnt, much of this supported diverse native grasslands and populations of the threatened Spiny Rice-flower identified in previous surveys. Due to the lack of vegetative material at the time of the 2004 surveys it was not feasible to map or assess the vegetation

in these areas. These areas are now known to have persisted as native vegetation and recovered well from the fire. Detailed mapping of habitat zones and habitat hectare assessment was undertaken in this area as part of the August 2010 survey. In 2011, the reassessment of the vegetation patches surveyed in 2004 indicated that these areas were still dominated by native vegetation however the biodiversity appeared to have decreased due to the high level of biomass created by the dominant Kangaroo Grass.

The cultivated land within the study area supports predominately exotic vegetation with scattered opportunistic native vegetation such as Windmill Grass and wallaby grasses. The land is generally flat, with few rocks, and the vegetation consists of Artichoke Thistle, Sweet Briar, African Box-thorn and grass or weed seedlings amongst the disturbed soil. This vegetation was not mapped in detail or assessed as it is exotic and of minimal ecological value.

The surrounding landscape reflects development trends west of Melbourne. Some areas still support rural land while others have recently been developed for housing. In general there is limited native vegetation remaining in the region. Remnant vegetation is limited to isolated reserves such as the Derrimut Grasslands and St. Albans Protected Native Grassland Reserve.

The study area lies within the Victorian Volcanic Plain bioregion and falls within the Port Phillip and Westernport catchment. It is currently zoned Residential 1 zone and is subjected to an Environmental Significance Overlay (ES02) in the Melton planning scheme.

5. ASSESSMENT RESULTS

The study area and areas of native vegetation are provided in Figure 3.

5.1. Vegetation assessment

5.1.1. Flora Species

During all field assessments to date, a total of 119 plant species were recorded within the study area. Of these, 79 (66%) were indigenous and 40 (34%) were introduced or non-indigenous native in origin (Appendix 1).

Updated FIS records (Viridans Biological Databases 2010a) and the EPBC Protected Matters Search Tool (DSEWPC 2012) indicates that within the search region there are records of, or there occurs potential suitable habitat for, 45 rare or threatened flora species. Of these, 12 species were listed under the federal EPBC Act, 19 on the state *Flora and Fauna Guarantee Act 1988* (FFG Act) and 43 on DSE's Advisory List for Rare and Threatened Flora (DSE 2005).

The likelihood of occurrence in the study area of threatened species listed under the FFG Act or the EPBC Act is addressed in Table 2. Species that may occur in the study area are highlighted. This analysis indicates that suitable habitat occurs on site for 15 listed flora species:

- Austral Toad-flax
- Basalt Sun-orchid
- Button Wrinklewort
- Clover Glycine
- Fragrant Leek-orchid
- Maroon Leek-orchid
- Matted Flax-lily
- Plump Swamp Wallaby-grass
- Purple Diuris
- Small Golden Moths
- Small Milkwort
- Small Scurf-pea
- Spiny Rice-flower
- Sunshine Diuris
- Tough Scurf-pea

The following DSE-listed species were considered to potentially occur in the study area:

- Flat Spike-sedge
- Austral Crane's-bill
- Pale-flower Crane's-bill
- Plains Joyweed
- Grey Spike-sedge
- Pale Spike-sedge
- Native Peppercross
- Austral Trefoil
- Basal Podolepis.

Eight DSE listed species were recorded during the targeted survey:

- Arching Flax-lily
- Rye Beetle-grass
- Spiny Rice-flower
- Tough Scurf-pea'
- Matted Flax-lily
- Slender Bindweed
- Slender Tick-trefoil
- Basalt Tussock-grass.

Table 2: FFG Act and EPBC Act listed flora species and likelihood of occurrence

Common Name	Scientific Name	Conservation Status		Habitat	Likelihood of Occurrence
		EPBC	FFG		
Austral Toad-flax	<i>Thesium australe</i>	V	L	Occurs on grasslands, grassy woodlands or sub-alpine grassy heathlands. Usually associated with Kangaroo Grass and Poa spp. However it will grow with other hosts, at least in the glasshouse.	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Basalt Sun-orchid	<i>Thelymitra gregaria</i>		L	Grassland in well-drained red-brown basaltic loam (Jones 2006).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Buloke	<i>Allocasuarina luehmannii</i>		L	Woodlands on non-calcareous soils. Commonly grows with Grey Box (Entwisle 1996).	No suitable habitat present therefore unlikely to occur .
Button Wrinklewort	<i>Rutidosia leptorhynchoides</i>	E	L	Basaltic grasslands (Jeanes 1999).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Clover Glycine	<i>Glycine latrobeana</i>	V	L	Grasslands and grassy woodlands (Jeanes 1996).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Fragrant Leek-orchid	<i>Prasophyllum suaveolens</i>	E	L	Fertile grassy plains (Bates 1994).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Large-headed Fireweed	<i>Senecio macrocarpus</i>	V	L	Themeda grasslands on basalt (Walsh 1999).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Maroon Leek-orchid	<i>Prasophyllum frenchii</i>	E	L	Favouring heathland and Grassland on black clays (Bates 1994).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Matted Flax-lily	<i>Dianella amoena</i>	E		Lowland grassland and grassy woodlands on very well-drained to seasonally waterlogged fertile soils (Carr & Horsfall 1995).	Recorded
Pale Plover-daisy	<i>Leiocarpa leptolepis</i>		L	Confined to NW Victoria in woodland and grassy woodland (Jeanes 1999).	No suitable habitat present therefore unlikely to occur .
Plump Swamp Wallaby-grass	<i>Amphibromus pithogastrus</i>		L	Swampy depressions in Themeda grassland, sedgeland or woodland (DSE 2004b; Walsh 1994).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Purple Diuris	<i>Diuris punctata var. punctata</i>		L	Lowland native grasslands, grassy woodlands, heathy woodlands and open heathlands, usually on fertile, loamy soils and including periodically inundated areas. (DSE 2004c)	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	V		Wetlands and permanent swamps (Walsh 1994).	No suitable habitat present therefore unlikely to occur .
Small Golden Moths	<i>Diuris basaltica</i>	E	L	Confined to the basalt plains of south-western Victoria, growing in native grassland and grassy woodland (Jeans and Backhouse 2006).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Small Milkwort	<i>Comesperma polygaloides</i>		L	Heavy soils supporting grasslands and grassy woodlands (Walsh 1999).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Small Scurf-pea	<i>Cullen parvum</i>		L	Seasonally wet areas with heavy soils in Grasslands and Grassy (River Red-gum) Woodlands: includes grazing country and table drains. In areas with rainfall of between 450 and 700 mm (Jeanes, 1996).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Spiny Rice-flower	<i>Pimelea spinescens subsp. spinescens</i>	C	L	Grasslands or open shrublands on basalt derived soils (Entwisle 1996). Prefers shallow depressions and drainage lines with moderate soil moisture (D.Coppolino pers. obs.).	Recorded
Sunshine Diuris	<i>Diuris fragrantissima</i>	E	L	Grassland in well-structured red-brown or blackish basaltic loam. Found in open areas on slopes or rock outcrops (Jones, 2006).	Suitable habitat present but species not recorded during targeted surveys therefore unlikely to occur .
Swamp Diuris	<i>Diuris palustris</i>		L	Scattered distribution throughout western Victoria. Usually in swampy depressions in grassland or open woodland. Numbers have reduced due to agricultural clearing (Entwisle 1994).	No suitable habitat present therefore unlikely to occur .
Tough Scurf-pea	<i>Cullen tenax</i>		L	Grasslands and grassy woodlands, subject to irregular flooding, with relatively rich soils derived from alluvium. *An exception is the population near Shelford, which grows from rocky clay soils derived from basalt* (DSE 2005)	Recorded

5.1.2. Threatened Flora recorded

Eight rare or threatened flora species were recorded during the field assessments. Threatened flora species as well as the number of individuals recorded are detailed in Table 3. The locations of these plants are shown in Figure 2.

Table 3: Threatened flora recorded within the study area

Common Name	Scientific Name	No. of individuals recorded	EPBC	FFG	DSE
Spiny Rice-flower	<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	224	C	f	e
Matted Flax-lily	<i>Dianella amoena</i>	2	E	f	e
Tough Scurf-pea	<i>Cullen tenax</i>	49		f	e
Arching Flax-lily	<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)	772			v
Rye Beetle-grass	<i>Tripogon loliiformis</i>	7			r
Slender Bindweed	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	3			k
Slender Tick-trefoil	<i>Desmodium varians</i>	2			k
Basalt Tussock-grass	<i>Poa labillardierei</i> var. (Volcanic Plains)	**			k
TOTAL		1059			

C = Critically Endangered; E = Endangered; V = Vulnerable; K = poorly known L = Listed as threatened under FFG Act

** Recorded commonly throughout the study area.

Two individuals of potentially threatened Sun Orchid (*Thelymitra* sp.) were also recorded during the August 2010 survey.



Legend

Study Area

Threatened flora species

- Arching Flax-lily
- Matted Flax-lily
- Rye Beetle-grass
- Slender Bindweed
- Slender Tick-trefoil
- Spiny Rice-flower
- Tough Scurf-pea

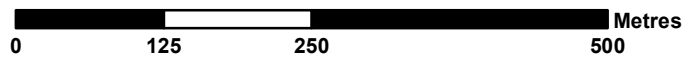


Figure 2: Threatened flora species recorded

Project: 'The Point' Burnside

Client: The Burnside North Trust

Project No. 7045.3

Date 30/08/2010

Created By J. Sullivan / J.Wen



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5.1.3. Ecological Communities

The EPBC Act Protected Matters Search Tool identified three ecological communities as having the potential to occur in the study area:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)
- Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.

Of the Plains Grassland EVC recorded in the study area 21.04 hectares qualified as Natural Temperate Grassland of the Victorian Volcanic Plain. More details are provided in the following sections.

5.1.4. Ecological Vegetation Classes

Pre-European EVC mapping (DSE 2009b) indicates that the study area and surrounds would have supported Plains Grassland (EVC 132) and Escarpment Shrubland (EVC 895) prior to European settlement based on modelling of factors including rainfall, aspect, soils and remaining vegetation.

Evidence on site, including floristic composition and soil characteristics, suggested that *Heavier Soils Plains Grassland* (EVC 132_61) was present on the plateau in the central part of the study area. One patch of Escarpment Shrubland (EVC 895) occurs in the northern part of the study area.

Riparian Woodland (EVC 641) and Creekline Grassy Woodland (EVC 68) are mapped as present along Kororoit Creek (DSE 2009b) beyond the boundary of the study area.

Heavier Soils Plains Grassland (EVC 132_61) has an endangered conservation status in the Victorian Volcanic Plain bioregion. The benchmark for this EVC describes it as “treeless vegetation less than one metre tall dominated by largely graminoid and herb life forms. Occupies fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least than 500 millimetres annual rainfall” (Appendix 6).

Western Basalt Plains Grassland, a floristic community of this EVC, is listed as endangered on Schedule 2 of the Flora and Fauna Guarantee Act 1988 (FFG Act). The community is also listed under the EPBC Act in the form of Natural Temperate Grasslands of the Victorian Volcanic Plain (NTGVVP).

Escarpment Shrubland (EVC 895) occurs in the northern part of the study area and is distinguished by a high cover of Sweet Bursaria. This EVC has an endangered conservation status in the Victorian Volcanic Plain bioregion. The benchmark for this EVC describes it as “rocky escarpments in steep valleys or gorges, associated with limestone or basalt. Sites have moderate to high fertility, are well-drained but subject to regular summer drought due to shallow soils. Eucalypt woodland to 15 metres tall or non-eucalypt shrubland to eight metres tall, with occasional eucalypts; lichen-covered rock outcrops are common” (Appendix 6).

The locations of remnant patches of native vegetation in the study area are shown in Figure 3 and results of the habitat hectare assessment in Table 4. Detailed habitat hectare results are provided in Appendix 2.

Table 4: Summary of habitat zones at Modeina Estate, Burnside


Habitat Zone (see Figure 3)	Area (hectares)	EVC	Habitat hectare score out of 100	Conservation Significance	NTGWP
A*	0.41	<i>Heavier soils Plains Grassland (EVC 132)</i>	52	Very high	X
B*	2.60		40	Very high	X
C*	1.59		35	Very high	X
D*	0.63		41	Very High	X
E*	0.29		35	Very high	X
F*	2.37		49	Very high	X
G*	0.12		50	Very high	X
H*	1.14		38	Very high	X
I*	0.76		42	Very High	X
J**	0.44		55	Very high	X
K**	4.36		50	Very high	X
L*	1.05		49	Very high	X
M*	0.18		42	Very high	X
N**	1.59		59	Very High	X
O**	2.91		46	Very high	X
P**	1.24	32	Very high		
Q*	0.37	Escarpment Shrubland (EVC 895)	39	Very high	
R*	1.59	<i>Heavier soils Plains Grassland (EVC 132)</i>	35	Very high	
S*	0.60		24	Very high	X
Total	24.24				

* = Assessed as part of the September 2011 botanical survey; ** = Assessed as part of the August 2010 survey


The conservation significance of habitat zones is based on the bioregional conservation status of the EVCs, habitat score of the vegetation, any significant site attributes and the results of the best / remaining 50% habitat assessment, presented in Appendix 3.




Legend

 Study Area

Native Vegetation

 Heavier soils Plains Grassland (EVC 132_61)

 Escarpment Shrubland (EVC 895)

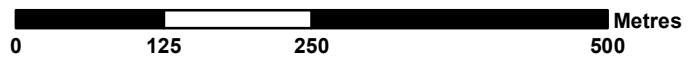


Figure 3: Study area and Native vegetation

Project: 'The Point' Burnside

Client: The Burnside North Trust

Project No. 7045.3

Date 30/08/2010

Created By J. Sullivan / J.Wen



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5.2. Fauna

5.2.1. *Habitat assessment*

The study area supports the following habitat types:

- Rocky grassland
- Cultivated land
- Waterway habitat.

Rocky Grassland comprises the uncultivated portions of the site shown as vegetation remnants in Figure 3. These areas vary in quality from low, with less dense cover and a predominance of exotic grass, such as Serrated Tussock, to high, with a dense cover of native Kangaroo Grass. Surface rock provides habitat for a range of ground fauna. The targeted Striped Legless Lizard survey focussed on this habitat (see later). The habitat quality of these areas varied from moderate to high.

Cultivated land included all previously ploughed areas. This provided limited fauna habitat opportunities and past cultivation would have removed many species of ground fauna from these areas. This habitat is considered to be of low quality.

Waterway habitat consists of both the water and banks of the Kororoit Creek. The creek is characterised by a series of pools with densely vegetated shallower intervening sections. Vegetation is dominated by sedges and rushes, which provide dense cover for a range of frogs and waterbirds. This habitat is considered to be of moderate to high quality.

5.2.2. *Fauna species*

The review of existing information and current field survey indicated that 111 fauna species may occur within the study area, including 83 bird (nine introduced), 12 mammal (six introduced), ten reptile and six frog species (Appendix 4).

During the field assessment 52 fauna species were recorded. This included 40 bird (nine introduced), six mammal (five introduced), three reptile and three frog species (Appendix 4).

5.2.3. *Listed threatened fauna species*

The review of existing information and current field survey indicate that within the search region 55 rare or threatened fauna species (42 bird, five mammal, two reptile, two frog, two fish and two invertebrate species) listed on the EPBC Act, FFG Act and/or the DSE advisory list (DSE 2007b) may occur within the study area. Their likelihood of occurrence within the study area is assessed and presented in Table 5. Species that are likely to occur are highlighted.

Table 5 indicates whether any of the listed rare or threatened species are also listed as migratory species under the EPBC Act.

Table 5: Threatened fauna identified as occurring or potentially occurring in the study area

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Birds								
Australasian Bittern	<i>Botaurus poiciloptilus</i>	EN	L	EN	Terrestrial wetlands, including a range of wetland types but prefers permanent water bodies with tall dense vegetation, particularly those dominated by sedges, rush, reeds or cutting grass (Marchant and Higgins 1990).	8	1999	Absence of suitable habitat, unlikely to occur.
Australasian Shoveler	<i>Anas rhynchotis</i>			VU	Large and deep permanent bodies of water and aquatic flora abundant. Also occurs on billabongs, watercourses and flood waters on alluvial plains, freshwater meadows, shallow swamps, reed swamps, wooded lakes, sewage farms and farm dams (Marchant and Higgins 1990).	1	1990	Absence of suitable habitat, unlikely to occur.
Australian Painted Snipe	<i>Rostratula australis</i>	VU, M (CAMBA)	L	CE	Lowlands on shallow freshwater swamps with emergent vegetation and flooded saltmarshes (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
Australian Pratincole	<i>Stiltia isabella</i>			NT	Open plains, sparsely wooded plains and tussock grasslands; usually in arid and semi-arid zones (Higgins and Davies 1996).	4	1988	Absence of suitable habitat, unlikely to occur.
Baillon's Crake	<i>Porzana pusilla palustris</i>		L	VU	Occurs in a range of ephemeral and permanent wetlands such as swamps, creeks and lakes, with dense vegetation and abundant floating plants, but also in open waters with clumped vegetation (Marchant and Higgins 1993).	1	1999	Absence of suitable habitat, unlikely to occur.
Black Falcon	<i>Falco subniger</i>			VU	Woodlands, open country and terrestrial wetlands; in arid and semi-arid zones; mainly over open plains and undulating land with large tracts of low vegetation (Marchant and Higgins 1993).	3	1987	The species could potentially fly over the study area however it is unlikely to occur regularly.
Black-chinned Honeyeater	<i>Melithreptus gularis gularis</i>			NT	Open box-ironbark forests and woodlands. Usually found in Red or Mugga Ironbarks, Grey Box, Yellow Gum and Yellow Box, especially mature tall trees along gullies, low-lying flats and lower slopes (Higgins et al. 2001; Tzaros 2005).	9	1991	Absence of suitable habitat, unlikely to occur.
Blue-billed Duck	<i>Oxyura australis</i>		L	EN	Terrestrial wetlands and prefers deep permanent, well vegetated water bodies (Marchant and Higgins 1990).	4	1988	Absence of suitable habitat, unlikely to occur.
Brolga	<i>Grus rubicunda</i>		L	VU	Wetlands that include permanent open water and deep freshwater marsh (Marchant and Higgins 1993).	3	1991	Absence of suitable habitat, unlikely to occur.
Brown Quail	<i>Coturnix ypsilophora australis</i>			NT	Tall ground vegetation, such as grass, ferns, shrubs over damp or swampy ground; also grasslands, cereal crops, or stubble, leafy crops, heath, bracken and stands of vegetation fringing freshwater wetlands (Marchant and Higgins 1993).	1	1973	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Cattle Egret	<i>Ardea ibis</i>	M (JAMBA, CAMBA)			Wooded lands and terrestrial freshwater wetlands and pasture, in association with cattle (Marchant and Higgins 1990).	3	1990	Absence of suitable habitat, unlikely to occur.
Common Greenshank	<i>Tringa nebularia</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))			Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	3	1994	Absence of suitable habitat, unlikely to occur.
Curlew Sandpiper	<i>Calidris ferruginea</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))			Inhabits wide range of coastal or inland wetlands with varying levels of salinity; mainly muddy margins or rocky shores of wetlands (Higgins and Davies 1996).	1	1990	Absence of suitable habitat, unlikely to occur.
Eastern Great Egret	<i>Ardea modesta</i>	M (JAMBA, CAMBA)	L	VU	Occurs in a variety of wetlands including: permanent water bodies on flood plains; shallows of deep permanent lakes, either open or vegetated with shrubs or trees; semi-permanent swamps with tall emergent vegetation (e.g. Typha) and herb dominated seasonal swamps with abundant aquatic flora (Marchant and Higgins 1990).	1	1996	Absence of suitable habitat, unlikely to occur.
Fairy Tern	<i>Sterna nereis nereis</i>	VU	L	EN	Sheltered coasts, on mainland and inshore and offshore islands. Occurs in embayment, such as harbours, inlets, bays, estuaries and lagoons and on ocean beaches. Also on lakes and salt ponds (Higgins and Davies 1996).	None	None	Absence of suitable habitat, unlikely to occur.
Fork-tailed Swift	<i>Apus pacificus</i>	M (JAMBA, CAMBA, ROKAMBA)			Aerial, over inland plains, sometimes above foothills or in coastal areas, over cliffs and urban areas (Higgins 1999).	None	None	Absence of suitable habitat, unlikely to occur.
Freckled Duck	<i>Stictonetta naevosa</i>		L	EN	Terrestrial wetlands; prefer fresh, densely vegetated waters, particularly floodwater swamps and creeks vegetated with lignum or cane grass (Marchant and Higgins 1990).	1	1995	Absence of suitable habitat, unlikely to occur.
Hardhead	<i>Aythya australis</i>			VU	Inhabits large, deep waters where vegetation is abundant; particularly deep swamps and lakes, pools and creeks. Also occur on freshwater meadows, seasonal swamps with abundant aquatic flora, reed swamps, wooded lakes and swamps, rice fields, and sewage ponds (Marchant and Higgins 1990).	2	1949	Absence of suitable habitat, unlikely to occur.
Latham's Snipe	<i>Gallinago hardwickii</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)		NT	Occurs in wide variety of permanent and ephemeral wetlands; it prefers open freshwater wetlands with dense cover nearby, such as the edges of rivers and creeks, bogs, swamps, waterholes (Naarding 1983; Higgins and Davies 1996).	7	2001	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Lewin's Rail	<i>Rallus pectoralis pectoralis</i>		L	VU	Occurs in a variety of densely vegetated wetland habitats, fresh or saline and usually with areas of standing water; requires shallow water areas to forage in (Marchant and Higgins 1993).	2	2003	Absence of suitable habitat, unlikely to occur.
Little Bittern	<i>Ixobrychus minutus dubius</i>		L	EN	Inhabits terrestrial wetlands, mainly in dense emergent vegetation in freshwater swamps, lakes and watercourses (Marchant and Higgins 1990).	4	2007	Absence of suitable habitat, unlikely to occur.
Little Stint	<i>Calidris minuta</i>	M (ROKAMBA)			Mudflats, sandflats, sheltered coastal estuaries, islets, freshwater lakes, lagoons and saltworks (Higgins and Davies 1996).	1	2000	Absence of suitable habitat, unlikely to occur.
Malleefowl	<i>Leipoa ocellata</i>	VU	L	EN	Mainly in semi-arid zones (200–450 mm rainfall), but in higher rainfall area of heath and mallee-heath; rarely arid zones. Associated with mallee, particularly floristically rich tall dense mallee of higher rainfall areas (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
Marsh Sandpiper	<i>Tringa stagnatilis</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))			Inhabits sandy, muddy or rocky shores, usually coastal, rarely far inland. Often on beaches and mudflats, sandflats and occasionally rock shelves (Higgins and Davies 1996).	2	1990	Absence of suitable habitat, unlikely to occur.
Musk Duck	<i>Biziura lobata</i>			VU	It inhabits terrestrial wetlands, estuarine habitats and sheltered inland waters. Almost entirely aquatic; preferring deep water of large swamps, lakes and estuaries, where conditions are stable and aquatic flora abundant (Marchant and Higgins 1990).	1	2008	Absence of suitable habitat, unlikely to occur.
Nankeen Night Heron	<i>Nycticorax caledonicus hillii</i>			NT	Inhabits littoral and estuarine habitats and terrestrial wetlands. Mainly nocturnal; forage over soft or firm substrates in still or slow-moving shallow water, on exposed shores, banks and flats of wetlands, or swampy vegetation; often where sheltered by tall emergent or ground vegetation, and near trees used for roosting (Marchant and Higgins 1990).	2	1994	Habitat present along Kororoit Creek. Available habitat in the surrounding region therefore likely to occur.
Pectoral Sandpiper	<i>Calidris melanotos</i>	M (JAMBA, ROKAMBA, Bonn Convention (A2H))		NT	Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	4	1991	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Pied Cormorant	<i>Phalacrocorax varius</i>			NT	In marine and coastal habitats. They require trees in which to nest, such as dead eucalypts or melaleucas and also occurs in the Murray-Darling Basin and other large lakes (Marchant and Higgins 1990).	1	1902	Absence of suitable habitat, unlikely to occur.
Plains-wanderer	<i>Pedionomus torquatus</i>	VU	L	CE	This species inhabits native grasslands with sparse cover, preferring grasslands that include Wallaby Grass and Stipa species (Marchant and Higgins 1993).	2	1990	Absence of suitable habitat, unlikely to occur.
Rainbow Bee-eater	<i>Merops ornatus</i>	M (JAMBA)			Usually in open or lightly timbered areas, often near water. Occur in partly cleared land such as farmland and in sand-dunes, both coastal and inland (Higgins 1999).	3	2001	Absence of suitable habitat, unlikely to occur.
Red-chested Button-quail	<i>Turnix pyrrhоторax</i>		L	VU	Inhabits dense, sometimes damp grasslands with little or no tree cover; also in acacia, eucalypts and melaleuca woodlands with ground cover of long grass (Marchant and Higgins 1993).	8	1997	Absence of suitable habitat, unlikely to occur.
Red-necked Stint	<i>Calidris ruficollis</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))			Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	6	2001	Absence of suitable habitat, unlikely to occur.
Regent Honeyeater	<i>Xanthomyza phrygia</i>	EN, M (JAMBA)	L	CE	Inhabits dry box-ironbark eucalypt forests near rivers and creeks on inland slopes of the Great Dividing Range. It could also occur in small remnant patches or in mature trees in farmland or partly cleared agricultural land (Higgins et al. 2001).	None	None	Absence of suitable habitat, unlikely to occur.
Royal Spoonbill	<i>Platalea regia</i>			VU	Terrestrial wetlands, sheltered marine habitats and wet grasslands. Foraging limited to shallow waters; often among aquatic or emergent vegetation or submerged logs that shelter prey and favour coastal habitats (Marchant and Higgins 1990).	1	1980	Absence of suitable habitat, unlikely to occur.
Rufous Fantail	<i>Rhipidura rufifrons</i>	M (Bonn Convention (A2H))			Primarily found in dense, moist habitats. Less often present in dry sclerophyll forests and woodlands (Higgins et al. 2006).	6	1997	Absence of suitable habitat, unlikely to occur.
Satin Flycatcher	<i>Myiagra cyanoleuca</i>	M (Bonn Convention (A2H))			Tall forests and woodlands in wetter habitats but not in rainforest (Higgins et al. 2006)	None	None	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))			Inhabit shallow fresh to saline wetlands, usually coastal to near-coastal, but occasionally farther inland. Wetlands often have open fringing mudflats and low emergent or fringing vegetation (Higgins and Davies 1996).	1	1990	Absence of suitable habitat, unlikely to occur.
Spotted Harrier	<i>Circus assimilus</i>			NT	It prefers open woodlands that do not obstruct low flight, and natural and exotic grasslands in arid and semi arid areas (Higgins and Davies 1996).	1	1990	The species could potentially fly over the study area however it is unlikely to occur regularly.
Swift Parrot	<i>Lathamus discolor</i>	EN	L	EN	Prefers a narrow range of eucalypts in Victoria, including White Box, Red Ironbark and Yellow Gum as well as River Red Gum when this species supports abundant 'lerp' (Emison et al. 1987; Higgins 1999; Kennedy and Tzaros 2005).	2	1990	Absence of suitable habitat, unlikely to occur.
Whiskered Tern	<i>Chlidonias hybridus javanicus</i>			NT	Inhabit shallow terrestrial freshwater wetlands, either permanent or ephemeral, including lakes, swamps, river pools, reservoirs, sewage farms and others (Higgins and Davies 1996).	12	2001	Absence of suitable habitat, unlikely to occur.
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	M (CAMBA)	L	VU	Maritime habitats, terrestrial large wetlands and coastal lands of tropical and temperate Australia and offshore islands, ranging far inland only over large rivers and wetlands (Marchant and Higgins 1993).	None	None	Absence of suitable habitat, unlikely to occur.
White-throated Needletail	<i>Hirundapus caudacutus</i>	M (JAMBA, CAMBA, ROKAMBA)			Aerial, over all habitats, but probably more over wooded areas, including open forest and rainforest. Often over heathland and less often above treeless areas such as grassland and swamps or farmland (Higgins 1999).	2	1988	Absence of suitable habitat, unlikely to occur.
Mammals								
Brush-tailed Rock Wallaby	<i>Petrogale penicillata</i>	VU	L	CE	Rock faces with large tumbled boulders, ledges and caves (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.
Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>			NT	Native grasslands associated with rocky areas, rough pastures and the edges of stubble paddocks (Menkhorst 1995).	4	1990	Targeted surveys undertaken for this species and none were recorded therefore unlikely to occur.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	VU	L	VU	Roosts in riverine habitat in Melbourne and forages widely in flowering eucalypts and fruit trees (Menkhorst 1995).	1	2010	Absence of suitable habitat, unlikely to occur.
New Holland Mouse	<i>Pseudomys novaehollandiae</i>	VU	L	VU	Coastal heath and scrub, heathy woodland, open forest and vegetated sand-dunes (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.

Common Name	Scientific Name	Conservation Status			Habitat	Number of Records	Year of Last Record	Likelihood of Occurrence
		EPBC	FFG	DSE				
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	EN	L	EN	Rainforest, wet and dry forest, coastal heath and scrub and River Red-gum woodlands along inland rivers (Menkhorst 1995).	None	None	Absence of suitable habitat, unlikely to occur.
Reptiles								
Bearded Dragon	<i>Pogona barbata</i>			DD	Semi-arboreal species and is usually found on fallen timber, stumps, branches and fence posts (Cogger 2000). The species will forage on foliage and flowers.	1	1988	Absence of suitable habitat, unlikely to occur.
Striped Legless Lizard	<i>Delma impar</i>	VU	L	EN	Tussock grasslands on the volcanic plains, often associated with scattered rocks and cracked soils (Cogger 2000).	235	2010	Recorded
Frogs								
Brown Toadlet	<i>Pseudophryne bibronii</i>		L	EN	Wet and dry forest, grassy areas besides small creeks, alpine grasslands and mossy bogs (Cogger 2000).	1	1988	Absence of suitable habitat, unlikely to occur.
Growling Grass Frog	<i>Litoria raniformis</i>	VU	L	EN	Permanent, still or slow flowing water with fringing and emergent vegetation in streams, swamps, lagoons and artificial wetlands such as farm dams and abandoned quarries (Clemann and Gillespie 2004).	220	2009	Recorded
Fish								
Australian Grayling	<i>Prototroctes maraena</i>	VU	L	VU	Large and small coastal streams and rivers with cool, clear waters with a gravel substrate and altering pools and riffles (Cadwallader and Backhouse 1983).	6	1982	Absence of suitable habitat, unlikely to occur.
Dwarf Galaxias	<i>Galaxiella pusilla</i>	VU	L	VU	Vegetated margins of still water, ditches, swamps and backwaters of creeks, both ephemeral and permanent (Allen et al. 2002).	None	None	Absence of suitable habitat, unlikely to occur.
Invertebrates								
Eltham Copper	<i>Paralucia pyrodiscus lucida</i>		L	VU	In the Eltham area of its range, this Butterfly appears to require a well-drained gentle slope, with a north to west aspect. Its known habitat is sparse dry woodland (Webster 2003).	2	1920	Absence of suitable habitat, unlikely to occur.
Golden Sun Moth	<i>Synemon plana</i>	CE	L	CE	Areas that are, or have been native grasslands or grassy woodlands. It is known to inhabit degraded grasslands with introduced grasses being dominant, with a preference for the native wallaby grass being present (DEWHA 2009).	7	2008	Absence of suitable habitat, unlikely to occur.

C = Critically Endangered; E = Endangered; V = Vulnerable; NT = Lower risk, near threatened; DD = data deficient; L = Listed as threatened under FFG Act; M = Listed migratory species; (JAMBA) = Japan-Australia Migratory Bird Agreement; (CAMBA) = China-Australia Migratory Bird Agreement; (ROKAMBA) = Republic of Korea- Australia Migratory Bird Agreement; (Bonn) = Bonn Convention

Birds

Based on the assessment in Table 5, one listed bird species was considered likely to occur regularly in the study area.

- Nankeen Night Heron
(DSE: near-threatened)

This species occurs along waterways and may occur along Kororoit Creek. The creek would not be impacted by development as it will be protected by a 30 metre buffer. Furthermore, construction management measures will be in place to ensure any species frequenting the creek are not adversely impacted.

Migratory Birds

The review of existing information identified 18 listed migratory bird species within the search region. None were considered likely to occur due to the absence of suitable habitat in the study area.

Mammals

Base on the assessment in Table 5, one listed mammal species, the Fat-tailed Dunnart was considered likely to occur in the study area.

The proposed development would impact Fat-tailed Dunnart through habitat loss, fragmentation and degradation. Targeted surveys were undertaken for this species using the same methods as described for the Striped Legless Lizard, below. During these surveys no Fat-tailed Dunnarts were recorded. Therefore, it is considered unlikely that the proposed development would result in a significant impact on the species.

Reptiles

Based on the assessment in Table 5, Striped Legless Lizard was considered likely to occur and targeted surveys were undertaken.

Striped Legless Lizard was not recorded during the first assessment in 2002. However, the species was recorded in Tile Grids 6, 7 and 8 during the 2010 survey. The results are presented in Table 6.

Table 6: Results of tile grid survey

Visit Number	Date	Grid Number	Time	T below (°C)	H below (%)	Species
1	28/09/2010	None recorded				
2	13/10/2010	8	9:35	16.7	HH	SLL
3	26/10/2010 (Grids 1, 2, 3, 4, 5 & 8) & 29/10/2010 (Grids 6 & 7)	4	10:05	20	57	House Mouse x 5
		3	10:30	22	78	House Mouse
		6	9:14	17	HH	SLL x 2
		7	9:45	20	84	SLL
		7	9:45	20	84	House Mouse
4	8/11/2010	4	8:00	16.8	HH	House Mouse
		1	8:59	18.3	HH	House Mouse
		7	9:51	20.4	HH	SLL
5	25/11/2010	None recorded				
6	10/12/2010	None recorded				

*T below (°C) = Temperature under tile; H below (%) = Humidity under tile (HH = High Humidity, over 90%).

A total of five Striped Legless Lizards were recorded in the study area, all in grids located in the north of the study area (Figure 4). The habitat present was assessed as being of moderate quality. Slough was also found under a tile in grid 8.

None were found in the high quality grassland located in the north-eastern section of the study area.



Figure 4: Striped Legless Lizard recorded in the study area

Fish

Based on the assessment in Table 5, no listed fish species were considered likely to occur.

Frogs

There exists 220 Growling Grass Frog records within the search region. Many of these are located in Kororoit Creek, with the most recent in close proximity to the study area being from 2007 (Figure 5).

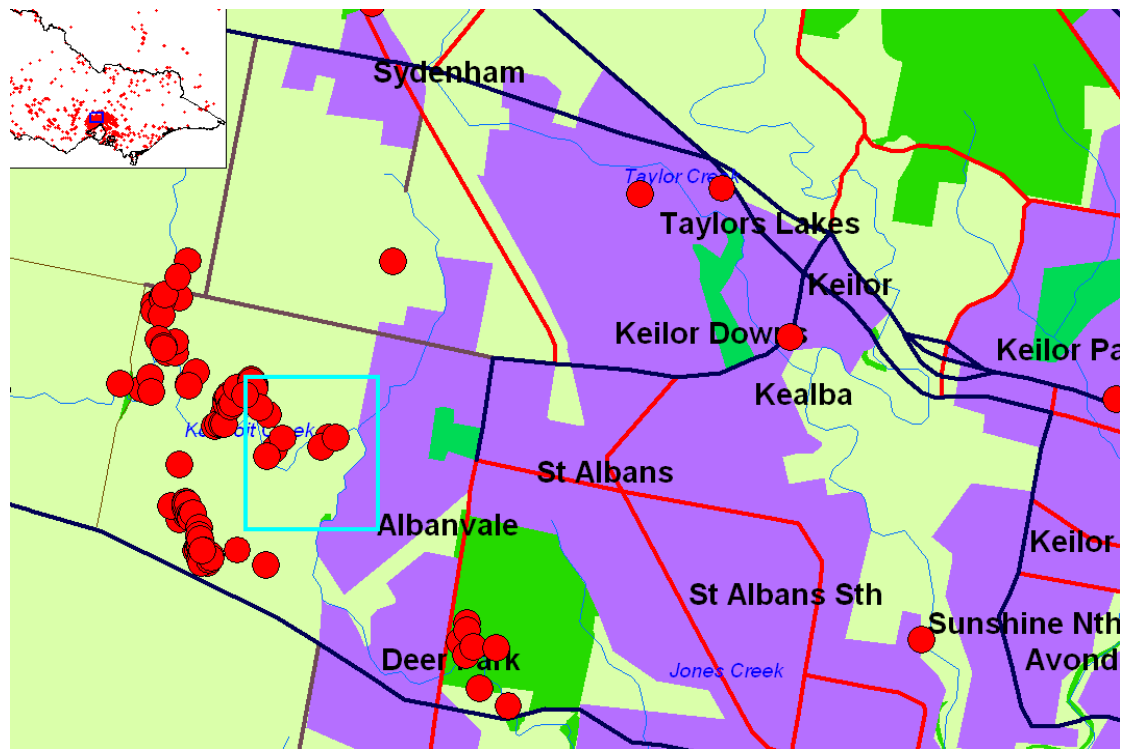


Figure 5: AWW records of Growling Grass Frog

The blue box denotes the location of the study area and the red dots represent Growling Grass Frog records. Source: Viridans Biological Databases 2011b

During the targeted surveys, Growling Grass Frog was recorded in Kororoit Creek, (Figure 6). Although the proposed development would not result in a direct impact on this species, indirect impacts could occur through run-off into the creek and other disturbance to the creek related to the construction and post-construction phases of development.

On the night of 28 January 2003 two individual Growling Grass Frogs were heard calling from a pond in the north eastern corner of the site, where the creek bends to the south. The following evening one individual was heard calling from the large pond in the north western corner of the site. On the night of 30 January 2003, a sub-adult individual was located by spotlighting in a small pond in the north eastern corner of the site. Non-threatened frog species located included the Eastern Banjo Frog (*Limnodynastes dumerilii*), heard calling, and the Spotted Grass Frog (*Limnodynastes tasmaniensis*) located while spotlighting along the creek.

Frog activity over the three nights was low, with very few individuals calling. For instance, the Spotted Marsh Frog was not heard calling on the site but was confirmed as occurring on the site when an individual was located while spotlighting.



Figure 6: Location (red points) of Growling Grass Frog Records, January 2003

Invertebrates

Based on the assessment in Table 5, no listed invertebrate species were considered likely to occur in the study area.

Remnant native grassland in the study area is dominated by dense Kangaroo Grass with limited inter-tussock spaces, a habitat considered unsuitable for the threatened Golden Sun Moth. The lack of any significant cover of wallaby grasses (the preferred food plant of the Golden Sun Moth), adds to the unsuitability of this habitat.

6. IMPACTS AND REGULATORY IMPLICATIONS

6.1. Proposed development and direct impacts

The proposed development will ultimately involve the removal of all native vegetation within the study area. This would involve the:

- Direct removal of EPBC Act, FFG Act and DSE listed species.
- Direct removal of habitat suitable for EPBC Act, FFG Act and DSE listed species.
- Direct removal of an EPBC Act and FFG Act listed ecological community.
- Indirect habitat degradation through possible run-off entering Kororoit Creek.

A small area that protects the most concentrated population of Spiny Rice-flower will be retained as a reserve. Further investigations into propagation of the Burnside Spiny Rice-flower material will be undertaken and a secure propagation site found. Provided this propagation program is successful, then the remaining Spiny Rice-flowers will be removed and the reserve developed.

6.2. Planning controls

6.2.1. State provisions

Destruction, lopping or removal of native vegetation on allotments of 0.4 hectares or more requires a planning permit under Clause 52.17 of all Victorian Planning Schemes. A permit is required for the removal of native vegetation for the project.

Before issuing a planning permit, Responsible Authorities are obligated to refer to Clause 15.09 (Protection of Flora and Fauna) in the Planning Scheme. This refers in turn to the Native Vegetation Management Framework, discussed in the following section.

The current development proposal will require a permit for the removal of native vegetation. Further details are provided in section 6.3 of the area to be removed and how the state Native Vegetation Management Framework has been addressed.

6.2.2. Local provisions

Part of the study area is subject to an Environmental Significance Overlay (ES02) in the Melton planning scheme. This overlay covers the Kororoit Creek corridor to about 60 metres each side of the centreline of the creek, along the northern boundary of the study area. The overlay is intended to protect, conserve and enhance significant landscapes, including escarpment and riparian areas, and to recognise and acknowledge the fire risk of such areas.

A permit is required to remove, destroy or lop any vegetation, including dead vegetation in the area mapped within ES02.

6.3. Native Vegetation Management Framework

6.3.1. How the Framework operates

Any proposal that requires a permit under Clause 52.17 to remove native vegetation from the study area must demonstrate that the three-step approach of ‘Net Gain’ outlined in the Framework has been applied. This approach is hierarchical and includes the following principles:

- Adverse impacts on native vegetation should be *avoided*, particularly removal of vegetation.
- Where impacts cannot be avoided, impacts should be *minimised* through responsive planning and design, with input from relevant experts.
- Appropriate *offsets* need to be identified to compensate for native vegetation removal.

A combination of project design and offsetting should aim to achieve a net gain in the area and quality of native vegetation across Victoria.

Responses to planning permit applications to remove native vegetation vary depending on the conservation significance of the vegetation proposed for removal. Conservation significance determines both the likelihood of approval and, importantly, the scale of the required offset. This is summarised in Table 7.

Table 7: Likely response to applications for removal of intact native vegetation

Framework conservation significance	Likely response to application for clearing	Likely offset requirements
VERY HIGH	Clearing not permitted unless exceptional circumstances apply. Offset Management Plan to be submitted with application.	Substantial Net Gain At least 2 X calculated loss in habitat hectares plus a large tree protection and replacement offset if any large trees are removed
HIGH	Clearing generally not permitted	Net Gain At least 1.5 X calculated loss in habitat hectares plus a large tree protection and replacement offset if any large trees are removed

Offset targets are directly related to the habitat hectare value of the removed vegetation. They can comprise indigenous vegetation retained for conservation purposes within the study area, or vegetation elsewhere, secured on a case-by-case basis by the proponent or through the DSE Bush Broker scheme.

Clause 66.02 of the planning scheme determines the role of the DSE in the assessment of indigenous vegetation removal planning permit applications. If an application is referred to the DSE then the Responsible Authority must follow that department’s recommendation in relation to that permit application. The criteria presented in Table 8 indicate when the DSE becomes a referral authority.

Table 8: Application referral criteria

Applications will be referred to the Department of Sustainability and Environment under the following circumstances:

Remnant Patch Vegetation (may include trees)

- To remove more than 0.5 hectares of vegetation in an EVC with Bioregional Conservation Status of Endangered, Vulnerable or Rare.
- To remove more than one hectare of vegetation in an EVC with Bioregional Conservation Status of Depleted or Least Concern.

The current proposal triggers a referral to DSE due to the proposed removal of more than 0.5 hectares of an endangered EVC.

6.3.2. Response to Framework principles

The project will result in the removal of most areas of Plains Grassland vegetation across the site. An area of several hectares containing the largest population of the Spiny Rice-flower will be retained as an interim measure, pending the development of a successful Spiny Rice-flower propagation plan at a site elsewhere. If this propagation plan is successful then the proponent proposes to remove the balance of the grassland on the site.

Native vegetation, including Escarpment Shrubland, will be included in revegetation works along the retained reserve along the Kororoit Creek. This reserve will also be carefully managed for the protection of a population of the Growling Grass Frog.

Offsets will be found for proposed removal, as described below.

6.3.3. Offset targets for removal from habitat zones

Offsets for the removal of native vegetation from habitat zones are directly related to the habitat hectare value of the removed vegetation. These may include the permanent protection (e.g. Section 173 agreement under the *Planning and Environment Act 1987*) for conservation purposes of other existing remnant vegetation. Offsets may be located within the study area or offsite, and maintained for up to 10 years. Offsite offsets may be identified on a case-by-case basis by the proponent or through the DSE Bush Broker scheme.

Offsets must be of a like-for-like nature as outlined in the Framework. Like-for-like requirements are summarised in Table 9.

Table 9: Like-for-like requirements for offsetting removal of remnant patch native vegetation

Like-for-like criteria	Conservation significance			
	Very high	High	Medium	Low
Type of vegetation that may be used for offsets	Same EVC	Same EVC OR <i>very high</i> conservation significance vegetation within the same bioregion	Any EVC in the same bioregion OR <i>very high</i> or <i>high</i> conservation significance vegetation in an adjacent bioregion	
Minimum quality of the existing vegetation proposed as the basis of an offset	90% of the quality in the area being lost	75% of the quality in the area being lost	50% of the quality in the area being lost	
Maximum proportion of the offset target (in Habitat Hectares) that may be achieved through revegetation	10%	25%	50%	100%

Offset targets for removal from habitat zones are presented in Table 10.

Note that this includes the proposed ultimate removal of all grassland from the site, pending the outcome of the proposed Spiny Rice-flower propagation plan.

Table 10: Offset targets for removal from habitat zones

Habitat Zone	Conservation Significance	EVC	Area of Removal (ha)	Total Loss (Hha)	Net Gain Multiplier	Net Gain Target
A	Very high	132_61	0.41	0.21	x 2	0.43
B	Very high	132_61	2.60	1.04	x 2	2.08
C	Very High	132_61	1.59	0.55	x 2	1.10
D	Very high	132_61	0.63	0.26	x 2	0.52
E	Very High	132_61	0.29	0.10	x 2	0.21
F	Very high	132_61	2.37	1.16	x 2	2.32
G	Very high	132_61	0.12	0.06	x 2	0.12
H	Very High	132_61	1.14	0.43	x 2	0.87
I	Very high	132_61	0.76	0.32	x 2	0.64
J	Very High	132_61	0.44	0.24	x 2	0.48
K	Very High	132_61	4.36	2.17	x 2	4.34
L	Very high	132_61	1.05	0.51	x 2	1.03
M	Very high	132_61	0.18	0.07	x 2	0.15
N	Very High	132_61	1.59	0.94	x 2	1.88
O	Very High	132_61	2.91	1.33	x 2	2.67
P	Very High	132_61	1.24	0.40	x 2	0.80
Q	Very High	895	0.37	0.14	x 2	0.29
R	Very High	132_61	1.59	0.56	x 2	1.12
S	Very High	132_61	0.60	0.15	x 2	0.29
Totals			24.25	10.64		21.34

The process of calculating offsets is highly complex. The area required to achieve the offset target is based on vegetation quality within the offset site and the proposed management, tenure and security. Previous experience has demonstrated that 107 hectares of suitable native vegetation may be required to achieve this offset target. This is based on a potential 20% improvement of the offset site. It should be noted that this is an approximation only. The potential for an offset site to achieve the required offset target can only be calculated once the final offset site has been identified.

This offset target cannot be achieved within the study area. A third party offset site (i.e. site located on another property) would need to be identified through discussions with the Responsible Authority or with the DSE BushBroker coordinator. Financial contribution to the local government may also be used to account for part, or all, of the required offset. The cost of such an offset would require detailed negotiations with the relevant municipality.

Current planning practice requires an offset plan to be prepared to the satisfaction of the Responsible Authorities. This plan will need to be signed off by them before a 'statement of compliance' can be issued for the proposed development. The offset plan usually needs to include the following:

- Means of calculating the offsets.
- Locations where offsets will be provided.
- Type of offsets to be provided in each location.
- Details of revegetation including number of trees, shrubs and other plants, species mix and density.
- Means of interim protection for newly established vegetation until established.
- Methods of permanent protection for the offsets.
- Persons responsible for implementing and monitoring the offsets.
- Details of any earthworks, drainage and other works.
- Timeframes for implementing the relevant work.

6.4. EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* contains a list of threatened species and ecological communities that are considered to be of national conservation significance. Any impacts on these species considered significant requires the approval of the Australian Minister for the Environment. If there is a possibility of a significant impact on nationally threatened species or communities or listed migratory species, a Referral under the EPBC Act should be considered. The Minister will decide after 20 business days whether the project will be a 'controlled action' under the EPBC Act, in which case it cannot be undertaken without the approval of the Minister. This approval depends on a further assessment and approval process (lasting between three and nine months, depending on the level of assessment).

Two flora species listed as threatened under the EPBC Act; Spiny Rice-flower and Matted Flax-lily, have been recorded within the study area during the current investigations. A total of 224 individual Spiny Rice-flower plants and two individual Matted Flax-lily plants were recorded during the current assessment.

The ecological community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), listed under the Act, was recorded in the study area in the form of Plains Grassland. This amounted to 21.04 hectares.

Two fauna species listed under the EPBC Act were recorded in the study area: Striped Legless Lizard and Growling Grass Frog.

Development of the study area for residential purposes is likely to significantly impact on the following listed matters:

- Natural Temperate Grassland of the Victorian Volcanic Plain
- Spiny Rice-flower
- Growling Grass Frog
- Striped Legless Lizard.

Based on the findings an EPBC Act referral was submitted to the Commonwealth Minister for the Environment. The project was deemed to be a controlled action and would be assessed by preliminary documentation.

6.5. FFG Act

The Victorian *Flora and Fauna Guarantee Act 1988* lists threatened flora and fauna species to provide for their protection and management. The FFG Act has limited direct application to private land. However, Clause 15.09 of the Planning Scheme makes reference to this Act. The local planning authority is likely to consider impacts on FFG Act-listed species and communities when deciding on planning permit applications.

Three flora species listed as threatened under the FFG Act; Spiny Rice-flower, Matted Flax-lily and Tough Scurf-pea, were recorded during the current assessment. Forty-nine individual Tough Scurf-pea plants were recorded during the current assessment.

One ecological community listed as threatened under the FFG Act; the Western (Basalt) Plains Grassland Community was recorded in the study area in the form of Plains Grassland.

Two fauna species listed as threatened under the FFG Act, the Growling Grass Frog and Striped Legless Lizard were observed during the current assessment.

The Responsible Authority is likely to consider impacts on FFG Act-listed species and communities when deciding on the planning application for the project.

6.6. EE Act

Under the *Environment Effects Act 1978*, proponents are required to prepare a Referral to the state minister for Planning, which will determine if an Environment Effects Statement (EES) is required for the project. Criteria related to flora and fauna are:

- Potential clearing of 10 hectares or more of native vegetation from an area with endangered EVC, or vegetation that is or is likely to be, of very high conservation significance according to Victoria's Native Vegetation Management Framework, except where authorised under an approved Forest Management Plan or Fire Protection Plan.
- Potential long-term loss of a significant proportion (1 to 5% depending upon conservation status of species concerned) of known remaining habitat or population of a threatened species in Victoria.

- Potential long-term change to a wetland's ecological character, where that wetland is Ramsar listed, or listed in 'A Directory of Important Wetlands in Australia'.
- Potential major effects upon the biodiversity of aquatic ecosystems over the long term.
- Potential significant effects on matters listed under the *Flora and Fauna Guarantee Act 1988*.

One or a combination of these criteria may trigger a requirement for a Referral to the Victorian Minister for Planning who will determine if an EES is required.

A Referral to the state Minister for Planning will be submitted to determine whether an EES is required.

6.7. DSE advisory lists

Rare and threatened species advisory lists administered by the Department of Sustainability and Environment include flora and fauna species known to be rare or threatened throughout the state. Although the advisory list has no statutory status, the Responsible Authority will consider impacts on any species on the list when assessing a planning application.

Eight flora species from the *Advisory List of Rare and Threatened Plants in Victoria* (DSE 2005) were recorded from the study area during the current investigation. These species and their extent within the study area are listed as follows:

- Spiny Rice-flower (224 individuals)
- Matted Flax-lily (2 individuals)
- Tough Scurf-pea (49 individuals)
- Arching Flax-lily (772 individuals)
- Rye Beetle-grass (7 individuals)
- Slender Bindweed (3 individuals)
- Slender Tick-trefoil (2 individuals)
- Basalt Tussock-grass (Occurring commonly throughout).

Two fauna species from the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2007b), the Growling Grass Frog and Striped Legless Lizard, were recorded during the targeted surveys.

The Responsible Authority will consider impacts on these above listed values when assessing the planning application for the project.

7. PROPOSED MITIGATION MEASURES AND OFFSETS

7.1. Mitigation Measures

A Construction Management Plan has been prepared for the site and includes the following measures to protect environmentally sensitive areas:

- Environmentally sensitive areas will be securely fenced at two metres from the perimeter and appropriately signed. All machinery and earthworks are to be excluded from these areas.
- Any tree pruning will be undertaken by an experienced arborist to prevent disease or unnecessary damage to the tree or disturbance to understorey vegetation during tree trimming.
- Any stockpiling will occur outside of environmentally sensitive areas.
- All machinery will enter and exit works sites along defined routes that do not impact on native vegetation or cause soil disturbance and weed spread.
- All machinery brought on site will be weed and pathogen free. This is important for environmental and agricultural protection. Soil borne pathogens such as Cinnamon Fungus and livestock diseases can be easily transported by machinery.
- All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas.

7.2. Salvage, Translocation and Offsets

As previously mentioned offsets will be required for the removal of the following:

- 24.24 hectares (10.64 habitat hectares) of native vegetation including 21.04 hectares of Natural Temperate Grassland of the Victorian Volcanic Plains)
- Removal of habitat and loss of individuals for the following listed species:
 - Spiny Rice-flower
 - Matted Flax-lily
 - Tough Scurf-pea
 - Arching Flax-lily
 - Rye Beetle-grass
 - Slender Bindweed
 - Slender Tick-trefoil
 - Basalt Tussock-grass
 - Striped Legless Lizard

A third-part offset site will need to be identified to offset the removal of native vegetation.

In addition to this a Spiny Rice-flower propagation trial is proposed to offset for the removal of the Spiny Rice-flower population. The trial has been developed by BL&A and Deborah Reynolds, a member of the Spiny Rice-flower Recovery Team. The trial would involve furthering research into the species to increase knowledge on propagation. The trial would be implemented in collaboration with Victoria University. The trial would be

deemed a success when a comparable Spiny Rice-flower population has been established at a number of different sites and is known to be producing viable seed and germinants. Once this is achieved the population in the reserve will be removed.

In relation to Striped Legless Lizard, a salvage and translocation protocol will be developed and implemented prior to construction activities. The salvage protocol will follow the Striped Legless Lizard Salvage and Translocation Protocol (the 'Protocol') produced by the DSE (DSE 2011a and DSE 2011b).

The methods are summarised below.

- **Location of salvage:** Areas of Priority 1 habitat identified using the Protocol will be salvaged for the species. It is expected that Priority 1 habitat will coincide with the areas of uncultivated land containing *Heavier-soils* Plains Grassland – the precise area will be determined in a Salvage and Translocation Plan for the species, prepared to the satisfaction of DSE. The Protocol identifies that no salvage is required for recently cultivated land – this applies to the balance of the land outside the *Heavier-soils* Plains Grassland patches.
- **Licences:** An appropriate licence will be applied for from the DSE for the suitably qualified ecologist to undertake the salvage protocol.
- **Timing:** It is recommended that the salvage work be undertaken between October and March inclusive when the species is active. If the salvage work is undertaken outside the species' activity season identified animals will need to be housed at Melbourne Zoo, as discussed below.
- **Salvage method:** The ecologist will be present at all times when the vegetation is being removed in the salvage area (Figure 1). A minimum depth of 300 millimetres will be ripped. The ecologist will examine all of the soil which has been ripped. If a Striped Legless Lizard is observed it will be removed and its location will be marked with a marker.

Once the salvage phase has been completed, marked areas will be surveyed more intensively in 20 by 20 metre search plots. In these areas the machine operator will dig the surface layer to approximately 300 millimetres into the bucket. The bucket will then be slowly emptied using a jerky motion while the ecologist searches for Striped Legless Lizard. Each rock will be lifted by the ecologist to located and capture any Striped Legless Lizards.

- **If a Striped Legless Lizard is identified:** The individual will be placed in a securely tied cloth bag, with one individual per bag. These will be kept in a cool and secure location. All uninjured individuals will be released in a designated salvage location or at Melbourne Zoo if the work is undertaken in winter. Advice from DSE will be sought. Injured specimens will be transferred to Melbourne Zoo and the zoo will be notified whether any veterinary attention is required.

The exact location of the salvaged individuals will be recorded with a hand-held GPS. Habitat requirements at that location will also be noted. A report of methods used, date, salvage effort, salvage method and surface area of habitat disturbed will be prepared. This report will be submitted to DSE once the salvage plan has been completed.

The salvage and translocation protocol will be supervised by experienced ecologist with support from DSE. Reporting structure will be consistent with DSE's requirements (DSE 2011a and DSE 2011b).

8. CONCLUSIONS

8.1. Conclusions

The implications below would pertain to the current development proposal:

- A planning permit is required for vegetation removal under State and local planning provisions.
- The current proposal triggers a referral to DSE due to the proposed removal of more than 0.5 hectares of an endangered EVC.
- The following offset targets, meeting like-for-like rules, would be required for the removal of native vegetation (ultimate proposal):
 - 20.54 habitat hectares for the removal of 10.5 habitat hectares (23.87 hectares) of Very High conservation significance *Heavier soils* Plains Grassland (EVC 132_61)
 - 0.29 habitat hectares for the removal of 0.14 habitat hectares (0.37 hectares) of Very High conservation significance Escarpment Shrubland (EVC 895).
- This offset target cannot be achieved within the study area. A third party offset site would need to be identified through discussions with the Responsible Authority or with the DSE BushBroker coordinator.
- The project has been referred to the Commonwealth and is deemed to be a 'controlled action' that will be assessed by preliminary documentation.
- The Responsible Authority is likely to consider impacts on FFG Act-listed species and communities and DSE-listed species when deciding on the planning application for the project.
- As more than 10 hectares native vegetation of an endangered EVC is proposed to be removed for the development, a Referral to the state Minister for Planning on whether and Environment Effects Statement (EES) is being submitted.

9. REFERENCES

- Bates, RJ 1994, 'Prasophyllum', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 2: Ferns and Allied Plants, Conifers and Monocotyledons*, Inkata Press, Melbourne, pp. 869-886.
- Carr, GW and Horsfall, PF 1995, 'Studies in Phormiaceae (Lilaceae) 1: New Species and Combinations in *Dianella* Lam. Ex Juss.', *Muelleria: an Australia Journal of Botany* Vol 8 pp. 365 – 378, National Herbarium of Victoria.
- Clemann N and Gillespie GR 2004. 'Recovery Plan for *Litoria raniformis* 2004 – 2008. Department of Environment and Heritage, Canberra.
- Cogger, H 2000, *Reptiles and Amphibians of Australia*, Reed Books, Australia.
- Cogger, H. 1996, *Reptiles and Amphibians of Australia* Reed Books, Australia
- Department of Environment, Water, Heritage and the Arts (DEWHA) 2009, 'Background Paper to EPBC Act Policy Statement 3.12 – Nationally Threatened Species and Ecological Communities. Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (*Synemon plana*)'.
- Department of Natural Resources and Environment 1997, *Victoria's Biodiversity – Our Living Wealth*. Department of Natural Resources and Environment, Victoria.
- Department of Natural Resources and Environment 2002, *Victoria's Native Vegetation Management – a Framework for Action*, Department of Natural Resources and Environment, Victoria.
- Department of Sustainability and Environment 2004, *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3)*. Department of Sustainability and Environment, East Melbourne, Victoria.
- Department of Sustainability and Environment 2005, *Advisory List of Rare or Threatened Plants in Victoria*. Department of Sustainability and Environment, East Melbourne, Victoria.
- Department of Sustainability and Environment 2007a, *Native Vegetation: Guide for assessment of Referred Planning Permit Applications*. Department of Sustainability and Environment, East Melbourne, Victoria.
- Department of Sustainability and Environment 2007b, *Advisory List of Threatened Vertebrate Fauna in Victoria*. Department of Sustainability and Environment, East Melbourne, Victoria.
- Department of Sustainability and Environment 2009a, *Ecological Vegetation Class (EVC) Benchmarks by Bioregion*, Department of Sustainability and Environment, East Melbourne, Victoria, viewed March 2010, <<http://www.dse.vic.gov.au>>.
- Department of Sustainability and Environment 2009b, *Biodiversity Interactive Map 2.0*. Department of Sustainability and Environment, East Melbourne, Victoria, viewed January 2012, <<http://www.dse.vic.gov.au>>.
- Department of Sustainability and Environment 2010 *Biodiversity Precinct Structure Planning Kit*, State of Victoria, Department of Sustainability and Environment

- Department of Sustainability, Environment, Water, Populations and Communities 2012, *Environmental Protection and Biodiversity Conservation Act 1999, Protected Matters Search Tool*. Department of Sustainability, Environment, Water, Populations and Communities, Canberra, viewed January 16th 2012, <<http://www.environment.gov.au>>.
- DSE 2004b. Action Statement No. 109 - Plump Swamp Wallaby-grass *Amphibromus pithogastrus*. Department of Sustainability and Environment, East Melbourne.
- DSE 2004c. Action Statement No. 200 - Purple Diuris *Diuris punctata* var. *punctata*. Department of Sustainability and Environment, East Melbourne.
- Emission, WB, Beardsell, CM, Norman, FI, Loyn, RH, & Bennett, SC 1987, *Atlas of Victorian Birds*. Department of Conservation, Forests and Lands & Royal Australasian Ornithologists Union, Melbourne.
- Entwisle, TJ 1994, 'Orchidaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 2: Ferns and Allied Plants, Conifers and Monocotyledons*, Inkata Press, Melbourne, pp. 740-901.
- Entwisle, TJ 1996, 'Casuarinaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne, pp. 90-101.
- Entwisle, TJ 1996, 'Thymelaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne, pp. 912-930.
- Flora and Fauna Guarantee – Scientific Advisory Committee (1999), Preliminary Recommendation on a Nomination for Listing – *Litoria raniformis*.
- Higgins, PJ & Davies, SJJF (eds) 1996, *Handbook of Australian, New Zealand & Antarctic Birds*, Volume 3 Snipe to Pigeons, Oxford University Press, Melbourne.
- Higgins, PJ & Peter, JM (eds) 2002, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 6: Pardalotes to Shrike-thrushes, Oxford University Press, Melbourne.
- Higgins, PJ (ed) 1999, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 4: Parrots to Dollarbird, Oxford University Press, Melbourne.
- Higgins, PJ, Peter, JM & Steele, WK (eds) 2001, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 5: Tyrant-flycatchers to Chats, Oxford University Press, Melbourne.
- Jeanes J and Backhouse G 2006, *Wild Orchids of Victoria*, Australia, Aquatic Photographics, Seaford, Australia.
- Jeanes, J.A. 1999. *Ixiolaena* in Walsh, N.G. and Entwisle, T.J. (eds) *Flora of Victoria* vol. 4: Dicotyledons, Cornaceae to Asteraceae. Inkata Press, Melbourne.
- Jeanes, JA 1996a, 'Fabaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 3: Dicotyledons Winteraceae to Myrtaceae*, Inkata Press, Melbourne, pp. 663-829.
- Jeanes, JA 1999, 'Asteraceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae*, Inkata Press, Melbourne, pp. 652-984.
- Jones, DL 2006, *A Complete Guide to Native Orchids of Australia Including the Island Territories*, Reed New Holland, Sydney.
- Kennedy, SJ & Tzaros, CL 2005, 'Foraging ecology of the Swift Parrot *Lathamus discolor* in the Box-ironbark forests and woodlands of Victoria', *Pacific Conservation Biology* 11, 158 – 173.

- Marchant, S & Higgins, PJ (eds) 1990, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 1: Ratites to Ducks', Oxford University Press, Melbourne.
- Marchant, S & Higgins, PJ (eds) 1993, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 2, Raptors to Lapwings, Oxford University Press, Melbourne.
- Menkhorst, P 1995, *Mammals of Victoria*, Oxford University Press, Melbourne.
- Naarding, J.A. 1983. Latham's Snipe in Southern Australia. Wildlife Division Technical Report 83/1. Tasmania National Parks and Wildlife Service.
- NRE 2000, Threatened Vertebrate Fauna in Victoria - 2000, Department of Natural Resources & Environment, Victoria
- Organ, A. 2002, Survey for the Warty Bell Frog *Litoria raniformis*, at the Western Treatment Plant, Werribee, Victoria, Biosis Research, Victoria.
- Parkes, D, Newell, G, & Cheal, D 2003, 'Assessing the Quality of Native Vegetation: The 'habitat hectares' approach'. *Ecological Management and Restoration*, vol. 4, supplement, pp. 29-38.
- Soderquist, TR, Lowe, KW, Loyn, RH & Price R 2002, Habitat quality in Powerful Owl (*Ninox strenua*) territories in the Box-Ironbark forest of Victoria, Australia.' In, I Newton, R Kavanagh, J Olsen and I Taylor (eds), *Ecology and Conservation of Owls*, CSIRO Publishing, Melbourne, pp. 91-99.
- Tyler, M. J. 1997. The Action Plan for Australian Frogs. Environment Australia. Canberra, Australia.
- Tzaros, C 2005, *Wildlife of the Box-Ironbark Country*. CSIRO Publishing, Melbourne.
- Viridans Biological Databases 2010a, Victorian Flora Information System, Viridans Pty Ltd, Bentleigh East, Victoria.
- Viridans Biological Databases 2011a, Victorian Flora Information System, Viridans Pty. Ltd., Bentleigh East, Victoria.
- Viridans Biological Databases 2011b, Atlas of Victorian Wildlife, Viridans Pty. Ltd., Bentleigh East, Victoria.
- Walsh, NG 1994, 'Poaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 2: Ferns and Allied Plants, Conifers and Monocotyledons*, Inkata Press, Melbourne, pp. 356-627.
- Walsh, NG 1999, 'Polygalaceae', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae*, Inkata Press, Melbourne, pp. 130-137.
- Walsh, NG 1999, 'Senecio', in NG Walsh & TJ Entwisle (eds), *Flora of Victoria - Volume 4: Dicotyledons Cornaceae to Asteraceae*, Inkata Press, Melbourne, pp. 941-965.
- Wilson, S & Swan G 2003, *A Complete Guide to Reptiles of Australia*. Reed New Holland, Sydney.

Appendix 1: Flora species recorded in the study area and threatened species known (or with the potential) to occur in the search region

Origin	Common Name	Scientific Name	Family Name	EPBC	FFG	DSE	Recorded
*	African Box-thorn	<i>Lycium ferocissimum</i>	Solanaceae				X
*	Annual Meadow-grass	<i>Poa annua</i>	Poaceae				X
	Arching Flax-lily	<i>Dianella sp. aff. longifolia (Benambra)</i>	Hemerocallidaceae			v	X
*	Artichoke Thistle	<i>Cynara cardunculus</i>	Asteraceae				X
	Austral Crane's-bill	<i>Geranium solanderi var. solanderi s.s.</i>	Geraniaceae			v	
	Austral Toad-flax	<i>Thesium australe</i>	Santalaceae	V	f	v	
	Austral Tobacco	<i>Nicotiana suaveolens</i>	Solanaceae			r	
	Austral Trefoil	<i>Lotus australis var. australis</i>	Fabaceae			k	
	Basalt Podolepis	<i>Podolepis sp. 1</i>	Asteraceae			e	
	Basalt Sun-orchid	<i>Thelymitra gregaria</i>	Orchidaceae		f	e	
	Basalt Tussock-grass	<i>Poa labillardierei var. (Volcanic Plains)</i>	Poaceae			k	X
	Bedstraw	<i>Galium sp.</i>	Rubiaceae				X
*	Bent	<i>Agrostis sp.</i>	Poaceae				X
	Berry Saltbush	<i>Atriplex semibaccata</i>	Chenopodiaceae				X
*	Big Heron's-bill	<i>Erodium botrys</i>	Geraniaceae				X
	Black Cotton-bush	<i>Maireana decalvans</i>	Chenopodiaceae				X
	Black Wattle	<i>Acacia mearnsii</i>	Mimosaceae				X
	Black-anther Flax-lily	<i>Dianella revoluta s.l.</i>	Hemerocallidaceae				X
	Blue Devil	<i>Eryngium ovinum</i>	Apiaceae				X
	Blue Grass-lily	<i>Caesia calliantha</i>	Hemerocallidaceae				X
	Blue Heron's-bill	<i>Erodium crinitum</i>	Geraniaceae				X
	Blushing Bindweed	<i>Convolvulus erubescens</i>	Convolvulaceae				X
	Brackish Plains Buttercup	<i>Ranunculus diminutus</i>	Ranunculaceae			r	
	Branching Groundsel	<i>Senecio cunninghamii var. cunninghamii</i>	Asteraceae			r	
*	Bridal Creeper	<i>Asparagus asparagoides</i>	Asparagaceae				X
*	Brome	<i>Bromus sp.</i>	Poaceae				X
	Brown-back Wallaby-grass	<i>Austrodanthonia duttoniana</i>	Poaceae				X
	Buloke	<i>Allocasuarina luehmannii</i>	Casuarinaceae		f		
	Buttercups	<i>Ranunculus sp.</i>	Ranunculaceae				X
	Button Wrinklewort	<i>Rutidosis leptorhynchoides</i>	Asteraceae	E	f	e	
*	Canary Grass	<i>Phalaris spp.</i>	Poaceae				X
*	Cape Weed	<i>Arctotheca calendula</i>	Asteraceae				X
*	Catchfly	<i>Silene sp.</i>	Caryophyllaceae				X
*	Cat's Ear	<i>Hypochoeris radicata</i>	Asteraceae				X
*	Centaury	<i>Centaurium sp.</i>	Gentianaceae				X
*	Clover	<i>Trifolium spp.</i>	Fabaceae				X
	Clover Glycine	<i>Glycine latrobeana</i>	Fabaceae	V	f	v	
*	Clustered Dock	<i>Rumex conglomeratus</i>	Polygonaceae				X
*	Cocksfoot	<i>Dactylis glomerata</i>	Poaceae				X
	Common Everlasting	<i>Chrysocephalum apiculatum</i>	Asteraceae				X
*	Common Peppergrass	<i>Lepidium africanum</i>	Brassicaceae				X

Origin	Common Name	Scientific Name	Family Name	EPBC	FFG	DSE	Recorded
*	Common Prickly-pear	<i>Opuntia stricta</i>	Cactaceae				X
	Common Reed	<i>Phragmites australis</i>	Poaceae				X
	Common Spike-rush	<i>Eleocharis acuta</i>	Cyperaceae				X
	Common Wallaby-grass	<i>Austrodanthonia caespitosa</i>	Poaceae				X
	Common Woodruff	<i>Asperula conferta</i>	Rubiaceae				X
	Corkscrew Spear-grass	<i>Austrostipa setacea</i>	Poaceae			r	X
	Cotton Fireweed	<i>Senecio quadridentatus</i>	Asteraceae				X
	Cudweed	<i>Euchiton spp.</i>	Asteraceae				X
	Cumbungi	<i>Typha domingensis</i>	Typhaceae				X
	Curly Sedge	<i>Carex tasmanica</i>	Cyperaceae	V	f	v	
	Curved Rice-flower	<i>Pimelea curviflora</i>	Thymelaeaceae				X
	Cut-leaf Goodenia	<i>Goodenia pinnatifida</i>	Goodeniaceae				X
	Drooping Cassinia	<i>Cassinia arcuata</i>	Asteraceae				X
	Feather Heads	<i>Ptilotus macrocephalus</i>	Amaranthaceae				X
*	Fescue	<i>Vulpia spp.</i>	Poaceae				X
	Fireweed	<i>Senecio sp.</i>	Asteraceae				X
	Flat Spike-sedge	<i>Eleocharis plana</i>	Cyperaceae			v	
*	Flax-leaf Broom	<i>Genista linifolia</i>	Fabaceae				X
*	Four-leaved Allseed	<i>Polycarpon tetraphyllum</i>	Caryophyllaceae				X
	Fragrant Leek-orchid	<i>Prasophyllum suaveolens</i>	Orchidaceae	E	f	e	
	Fragrant Saltbush	<i>Rhagodia parabolica</i>	Chenopodiaceae			r	
*	Galenia	<i>Galenia pubescens var. pubescens</i>	Aizoaceae				X
*	Giant Mustard	<i>Rapistrum rugosum</i>	Brassicaceae				X
	Grassland Crane's-bill	<i>Geranium retrorsum s.l.</i>	Geraniaceae				X
	Grassland Wood-sorrel	<i>Oxalis perennans</i>	Oxalidaceae				X
	Grassy Bindweed	<i>Convolvulus remotus</i>	Convolvulaceae				X
	Grey Spike-sedge	<i>Eleocharis macbarronii</i>	Cyperaceae			k	
	Grey Tussock-grass	<i>Poa sieberiana</i>	Poaceae				X
	Hairy Panic	<i>Panicum effusum</i>	Poaceae				X
*	Hare's-foot Clover	<i>Trifolium arvense var. arvense</i>	Fabaceae				X
	Heath Spear-grass	<i>Austrostipa exilis</i>	Poaceae			r	
	Kangaroo Grass	<i>Themeda triandra</i>	Poaceae				X
	Kidney-weed	<i>Dichondra repens</i>	Convolvulaceae				X
*	Large Quaking-grass	<i>Briza maxima</i>	Poaceae				X
	Large-headed Fireweed	<i>Senecio macrocarpus</i>	Asteraceae	V	f	e	
	Leafless Bluebush	<i>Maireana aphylla</i>	Chenopodiaceae			k	
	Lemon Beauty Heads	<i>Calocephalus citreus</i>	Asteraceae				X
*	Lesser Quaking-grass	<i>Briza minor</i>	Poaceae				X
	Long-hair Plume-grass	<i>Dichelachne crinita</i>	Poaceae				X
	Maroon Leek-orchid	<i>Prasophyllum frenchii</i>	Orchidaceae	E	f	e	
	Matted Flax-lily	<i>Dianella amoena</i>	Hemerocallidaceae	E		e	X
	Milky Beauty-heads	<i>Calocephalus lacteus</i>	Asteraceae				X
	Narrow Plantain	<i>Plantago gaudichaudii</i>	Veronicaceae				X

Origin	Common Name	Scientific Name	Family Name	EPBC	FFG	DSE	Recorded
	Narrow Rock-fern	<i>Cheilanthes sieberi subsp. sieberi</i>	Adiantaceae				X
*	Narrow-leaf Clover	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Fabaceae				X
	Native Flax	<i>Linum marginale</i>	Linaceae				X
	Native Peppergrass	<i>Lepidium pseudohyssopifolium</i>	Brassicaceae			k	
	Nodding Saltbush	<i>Einadia nutans subsp. nutans</i>	Chenopodiaceae				X
*	Onion Grass	<i>Romulea rosea</i>	Iridaceae				X
*	Ox-tongue	<i>Helminthotheca echioides</i>	Asteraceae				X
	Pale Plover-daisy	<i>Leiocarpa leptolepis</i>	Asteraceae		f	e	
	Pale Spike-sedge	<i>Eleocharis pallens</i>	Cyperaceae			k	
	Pale Swamp Everlasting	<i>Helichrysum aff. rutidolepis (Lowland Swamps)</i>	Asteraceae			v	
	Pale-flower Crane's-bill	<i>Geranium sp. 3</i>	Geraniaceae			r	
*	Paterson's Curse	<i>Echium plantagineum</i>	Boraginaceae				X
*	Pimpernel	<i>Anagallis arvensis</i>	Primulaceae				X
	Plains Joyweed	<i>Alternanthera sp. 1 (Plains)</i>	Amaranthaceae			k	
	Plump Swamp Wallaby-grass	<i>Amphibromus pithogastrus</i>	Poaceae		f	e	
*	Prairie Grass	<i>Bromus catharticus</i>	Poaceae				X
	Prickly Woodruff	<i>Asperula scoparia</i>	Rubiaceae				X
*	Prostrate Knotweed	<i>Polygonum aviculare</i>	Polygonaceae				X
	Proud Diuris	<i>Diuris X fastidiosa</i>	Orchidaceae			e	
	Purple Diuris	<i>Diuris punctata var. punctata</i>	Orchidaceae		f	v	
	Red Gum	<i>Eucalyptus camaldulensis</i>	Myrtaceae				X
*	Ribwort	<i>Plantago lanceolata</i>	Veronicaceae				X
	River Club-sedge	<i>Schoenoplectus tabernaemontani</i>	Cyperaceae				X
	River Swamp Wallaby-grass	<i>Amphibromus fluitans</i>	Poaceae	V			
	Rough Burr-daisy	<i>Calotis scabiosifolia</i>	Asteraceae				X
	Ruby Saltbush	<i>Enchylaena tomentosa var. tomentosa</i>	Chenopodiaceae				X
	Rush	<i>Juncus spp.</i>	Juncaceae				X
	Rye Beetle-grass	<i>Tripogon loliiformis</i>	Poaceae			r	X
*	Rye Grass	<i>Lolium spp.</i>	Poaceae				X
*	Serrated Tussock	<i>Nassella trichotoma</i>	Poaceae				X
	Sheep's Burr	<i>Acaena echinata</i>	Rosaceae				X
	Short-stem Sedge	<i>Carex breviculmis</i>	Cyperaceae				X
	Slender Bindweed	<i>Convolvulus angustissimus subsp. omnigracilis</i>	Convolvulaceae			k	X
*	Slender Knotweed	<i>Persicaria decipiens</i>	Polygonaceae				X
	Slender Speedwell	<i>Veronica gracilis</i>	Veronicaceae				X
	Slender Tick-trefoil	<i>Desmodium varians</i>	Fabaceae			k	X
	Slender Wallaby-grass	<i>Austrodanthonia racemosa</i>	Poaceae				X
	Small Golden Moths	<i>Diuris basaltica</i>	Orchidaceae	E	f	v	
	Small Milkwort	<i>Comesperma polygaloides</i>	Polygalaceae		f	v	
	Small Scurf-pea	<i>Cullen parvum</i>	Fabaceae		f	e	
	Small St John's Wort	<i>Hypericum gramineum</i>	Clusiaceae				X
	Small-flower Mat-rush	<i>Lomandra micrantha</i>	Xanthorrhoeaceae				X
	Smooth Rice-flower	<i>Pimelea glauca</i>	Thymelaeaceae				X

Origin	Common Name	Scientific Name	Family Name	EPBC	FFG	DSE	Recorded
	Spear Grass	<i>Austrostipa</i> spp.	Poaceae				X
*	Spear Thistle	<i>Cirsium vulgare</i>	Asteraceae				X
	Spiny Rice-flower	<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Thymelaeaceae	C	f	e	X
	Spreading Crassula	<i>Crassula decumbens</i> var. <i>decumbens</i>	Crassulaceae				X
	Streaked Arrowgrass	<i>Triglochin striata</i>	Juncaginaceae				X
	Sun-orchid	<i>Thelymitra</i> sp.	Orchidaceae				X
	Sunshine Diuris	<i>Diuris fragrantissima</i>	Orchidaceae	E	f	e	
	Swamp Diuris	<i>Diuris palustris</i>	Orchidaceae		f	v	
	Swamp Water-starwort	<i>Callitriche palustris</i>	Veronicaceae			k	
*	Sweet Briar	<i>Rosa rubiginosa</i>	Rosaceae				X
	Sweet Bursaria	<i>Bursaria spinosa</i>	Pittosporaceae				X
	Tall Spear-grass	<i>Austrostipa bigeniculata</i>	Poaceae				X
	Tangled Lignum	<i>Muehlenbeckia florulenta</i>	Polygonaceae				X
	Tangled Shrub-violet	<i>Meliccytus</i> sp. aff. <i>dentatus</i> (Volcanic Plain variant)	Violaceae				X
	Tough Scurf-pea	<i>Cullen tenax</i>	Fabaceae		f	e	X
	Tree Violet	<i>Meliccytus dentatus</i> s.l.	Violaceae				X
	Tufted Bluebell	<i>Wahlenbergia communis</i>	Campanulaceae				X
	Variable Glycine	<i>Glycine tabinica</i>	Fabaceae				X
	Variable Plantain	<i>Plantago varia</i>	Veronicaceae				X
	Wallaby-grass	<i>Austrodanthonia setacea</i>	Poaceae				X
	Wattle Mat-rush	<i>Lomandra filiformis</i> ssp. <i>filiformis</i>	Xanthorrhoeaceae				X
	Weeping-grass	<i>Microlaena stipoides</i>	Poaceae				X
	Wetland Blown-grass	<i>Lachnagrostis filiformis</i> var. 2	Poaceae			k	
*	Wild Oats	<i>Avena barbata</i>	Poaceae				X
*	Wild Radish	<i>Raphanus raphanistrum</i>	Brassicaceae				X
	Windmill-grass	<i>Chloris truncata</i>	Poaceae				X
	Wingless Bluebush	<i>Maireana enchylaenoides</i>	Chenopodiaceae				X
	Wiry Dock	<i>Rumex dumosus</i>	Polygonaceae				X
	Yellow Rush-lily	<i>Tricoryne elatior</i>	Hemerocallidaceae				X

NOTE: Appendix 1 includes flora species recorded during initial (2002 – 2004) and updated assessments (2010); * = introduced species; # = native species occurring outside of natural range; f = listed as threatened; **EPBC** = status under EPBC Act; **DSE** = status under DSE's Advisory List; **C** = critically endangered; **E, e** = endangered; **V, v** = vulnerable; **R, r** = rare; **k** = insufficiently known

Appendix 2: Detailed habitat scoring results

Habitat Zone			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
EVC Number			132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	132_61	895	132_61	132_61	
Total area of Habitat Zone (Ha)			0.413	2.598	1.585	0.634	0.293	2.372	0.123	1.14	0.761	0.440	4.361	1.054	0.175	1.592	2.909	1.237	0.372	1.588	0.598	
Site Condition	Large Old Trees	/10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	Tree Canopy Cover	/5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA	NA	
	Lack of Weeds	/15	4	7	4	4	7	7	4	4	7	13	9	4	7	13	4	2	7	4	0	
	Understorey	/25	20	10	10	15	10	15	15	10	10	15	15	15	10	15	15	10	15	10	10	
	Recruitment	/10	6	3	3	3	0	3	10	6	3	3	3	6	3	6	3	3	3	5	3	3
	Organic Matter	/5	5	5	4	5	3	5	5	5	5	3	3	5	5	3	5	3	3	3	3	2
	Logs	/5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Site Condition subtotal*			48	34	29	37	27	41	46	34	34	46	41	41	34	50	37	24	35	27	20	
Landscape Context	Patch Size	/10	-	-	-	-	-	-	-	-	-	6	6	-	-	6	6	6	-	-	-	
	Neighbourhood	/10	4	6	6	4	8	8	4	4	8	2	2	8	8	2	2	1	4	8	4	
	Distance to Core	/5	-	-	-	-	-	-	-	-	-	1	1	-	-	1	1	1	-	-	-	
Total Habitat Score			52	40	35	41	35	49	50	38	42	55	50	49	42	59	46	32	39	35	24	
Habitat score out of 1			0.52	0.40	0.35	0.41	0.35	0.49	0.50	0.38	0.42	0.55	0.50	0.49	0.42	0.59	0.46	0.32	0.39	0.35	0.24	
Habitat Hectares in Habitat Zone#			0.21	1.04	0.55	0.26	0.10	1.16	0.06	0.43	0.32	0.24	2.17	0.51	0.07	0.94	1.33	0.40	0.14	0.56	0.15	
Area of Habitat Zone to be removed (ha)			0.41	2.60	1.59	0.63	0.29	2.37	0.12	1.14	0.76	0.44	4.36	1.05	0.18	1.59	2.91	1.24	0.37	1.59	0.60	
Habitat Hectares to be removed#			0.21	1.04	0.55	0.26	0.10	1.16	0.06	0.43	0.32	0.24	2.17	0.51	0.07	0.94	1.33	0.40	0.14	0.56	0.15	
Bioregion			VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	VVP	
EVC Bioregional Conservation Status			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	
Conservation Significance	Conservation Status x Habitat Score		Very high	Very high	High	Very high	High	Very high	Very high	High	Very high	Very high	Very high	Very high	Very high	Very high	Very high	High	High	High	High	
	Threatened Species Rating		Very High	Very High	Very High	Very High	Very High	Very High	Very High	Low	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High	Very High
	Other Site Attribute Rating		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
	Overall Conservation Significance (highest)**		Very high	Very high	Very High	Very high	Very High	Very high	Very high	Very high	Very High	Very high	Very High	Very high	Very high	Very High	Very High	Very High	Very High	Very High	Very High	Very High
No. Large Old trees in Habitat Zone																						
No. Large Old trees to be removed from Habitat Zone																						

* Scoring for treeless vegetation for Plains Grassland and 1.15 for Escarpment Shrubland ^Habitat hectares = habitat score/100 X area of vegetation unit or area to be removed (ha), # Threatened species rating based on results of Best/50% remaining habitat assessment updated in 2010.

Appendix 3: Best / Remaining 50% habitat

Species	Rare/Threatened Species	EVC	Habitat Zones	Assessment Process	Outcome	Conservation significance	Justification
Arching Flax-lily	Threatened	Heavier soils Plains Grassland (EVC 132_61)	H, I, K, Q-S	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			A-C, E-G	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
		Escarpment Shrubland (EVC 895)	J	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
Matted Flax-lily	Threatened	Heavier soils Plains Grassland (EVC 132_61)	S	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
			A - C, E, F, H, K - M, O - P, T	A, D, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
Rye Beetle-grass	Rare	Heavier soils Plains Grassland (EVC 132_61)	A - C, E, F, H, K - M, O - P, S	A, D, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
			T	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
Spiny Rice-flower	Threatened	Heavier soils Plains Grassland (EVC 132_61)	A - C, E, F, H, K - M, O - P, S	A, D, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
			G, Q, R, T	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.

Species	Rare/Threatened Species	EVC	Habitat Zones	Assessment Process	Outcome	Conservation significance	Justification
Striped Legless Lizard	Threatened	Heavier soils Plains Grassland (EVC 132_61)	A – C, E – H, K – M, O-Q, T	A, D, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
			R, S	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
Tough Scurf-pea	Threatened	Heavier soils Plains Grassland (EVC 132_61)	B – C, E, H, K - M, O - P, S	A, D, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.
			D, I, N	A, D, F, Yes	Best 50% of habitat	Very High	The presence of this listed species results in an increase in conservation significance from high to very high.
		Escarpment Shrubland (EVC 895)	J	A, B, E, F, Yes	Best 50% of habitat	Very High	The conservation significance of these habitat zones was already assessed as being very high. Therefore, the presence of this species does not alter the conservation significance.

Notes: For habitat zones refer to Figure 3; Assessment process refers to Table 2 in the Guide for Assessment of referred planning permit applications (DSE 2007)

Appendix 4: Vertebrate terrestrial fauna species that occur or are likely to occur in the study area

Origin	Common Name	Scientific Name	Conservation status			Recorded
			EPBC	FFG	DSE	
Birds						
	Australasian Grebe	<i>Tachybaptus novaehollandiae</i>				
	Australasian Pipit	<i>Anthus novaeseelandiae</i>				X
	Australian Hobby	<i>Falco longipennis</i>				
	Australian Magpie	<i>Gymnorhina tibicen</i>				X
	Australian Raven	<i>Corvus coronoides</i>				X
	Australian White Ibis	<i>Threskiornis molucca</i>				
	Australian Wood Duck	<i>Chenonetta jubata</i>				X
	Banded Lapwing	<i>Vanellus tricolor</i>				
	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>				
	Black Falcon	<i>Falco subniger</i>			NT	
	Black-fronted Dotterel	<i>Euseiornis melanops</i>				
	Black-shouldered Kite	<i>Elanus axillaris</i>				X
	Black-winged Stilt	<i>Himantopus himantopus</i>				
	Brown Falcon	<i>Falco berigora</i>				X
	Brown Goshawk	<i>Accipiter fasciatus</i>				
	Brown Songlark	<i>Cincloramphus cruralis</i>				X
	Buff-banded Rail	<i>Gallirallus philippensis</i>				
	Chestnut Teal	<i>Anas castanea</i>				
	Clamorous Reed Warbler	<i>Acrocephalus stentoreus</i>				X
*	Common Blackbird	<i>Turdus merula</i>				X
*	Common Myna	<i>Acridotheres tristis</i>				X
*	Common Starling	<i>Sturnus vulgaris</i>				X
	Crested Pigeon	<i>Ocyphaps lophotes</i>				X
	Crimson Rosella	<i>Platycercus elegans elegans</i>				
	Dusky Moorhen	<i>Gallinula tenebrosa</i>				X
	Eastern Rosella	<i>Platycercus eximius</i>				
	Eurasian Coot	<i>Fulica atra</i>				
*	European Goldfinch	<i>Carduelis carduelis</i>				X
*	European Greenfinch	<i>Carduelis chloris</i>				X
*	European Skylark	<i>Alauda arvensis</i>				X
	Flame Robin	<i>Petroica phoenicea</i>				X
	Galah	<i>Eolophus roseicapilla</i>				X
	Golden-headed Cisticola	<i>Cisticola exilis</i>				X
	Great Cormorant	<i>Phalacrocorax carbo</i>				
	Grey Fantail	<i>Rhipidura albiscarpa</i>				
	Grey Teal	<i>Anas gracilis</i>				X
	Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>				X
	Horsfield's Bushlark	<i>Mirafra javanica</i>				
*	House Sparrow	<i>Passer domesticus</i>				X
	Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>				X
	Little Grassbird	<i>Megalurus gramineus</i>				X
	Little Lorikeet	<i>Glossopsitta pusilla</i>				
	Little Pied Cormorant	<i>Microcarbo melanoleucos</i>				X
	Little Raven	<i>Corvus mellori</i>				X
	Magpie-lark	<i>Grallina cyanoleuca</i>				X
	Masked Lapwing	<i>Vanellus miles</i>				
	Musk Lorikeet	<i>Glossopsitta concinna</i>				
	Nankeen Kestrel	<i>Falco cenchroides</i>				X
	New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>				X
	Pacific Barn Owl	<i>Tyto javanica</i>				
	Pacific Black Duck	<i>Anas superciliosa</i>				X
	Peregrine Falcon	<i>Falco peregrinus</i>				
	Purple Swamphen	<i>Porphyrio porphyrio</i>				
	Purple-crowned Lorikeet	<i>Glossopsitta porphyrocephala</i>				
	Red Wattlebird	<i>Anthochaera carunculata</i>				X
	Red-browed Finch	<i>Neochmia temporalis</i>				
	Red-rumped Parrot	<i>Psephotus haematonotus</i>				
*	Rock Dove	<i>Columba livia</i>				X
	Sacred Kingfisher	<i>Todiramphus sanctus</i>				
	Silvereye	<i>Zosterops lateralis</i>				

Origin	Common Name	Scientific Name	Conservation status			Recorded
			EPBC	FFG	DSE	
	Spotted Harrier	<i>Circus assimilis</i>			n	
*	Spotted Turtle-Dove	<i>Streptopelia chinensis</i>				X
	Straw-necked Ibis	<i>Threskiornis spinicollis</i>				
	Striated Fieldwren	<i>Calamanthus fuliginosus</i>				
	Striated Pardalote	<i>Pardalotus striatus</i>				
	Stubble Quail	<i>Coturnix pectoralis</i>				X
	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>				
	Superb Fairy-wren	<i>Malurus cyaneus</i>				X
	Swamp Harrier	<i>Circus approximans</i>				X
	Welcome Swallow	<i>Hirundo neoxena</i>				X
	Whistling Kite	<i>Haliastur sphenurus</i>				
	White-browed Scrubwren	<i>Sericornis frontalis</i>				
	White-faced Heron	<i>Egretta novaehollandiae</i>				
	White-fronted Chat	<i>Epthianura albifrons</i>				X
	White-necked Heron	<i>Ardea pacifica</i>				
	White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>				X
	Willie Wagtail	<i>Rhipidura leucophrys</i>				X
	Yellow Thornbill	<i>Acanthiza nana</i>				
	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>				
	Zebra Finch	<i>Taeniopygia guttata</i>				
Mammals						
*	Black Rat	<i>Rattus rattus</i>				
*	Cat	<i>Felis catus</i>				X
	Common Brushtail Possum	<i>Trichosurus vulpecula</i>				
	Dingo/Dog (feral)	<i>Canis lupus</i>				
	Eastern Grey Kangaroo	<i>Macropus giganteus</i>				X
*	European Hare	<i>Lepus europeus</i>				X
*	European Rabbit	<i>Oryctolagus cuniculus</i>				X
	Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>			n	
*	House Mouse	<i>Mus musculus</i>				X
*	Red Fox	<i>Vulpes vulpes</i>				X
	Water Rat	<i>Hydromys chrysogaster</i>				
	White-striped Freetail Bat	<i>Tadarida australis</i>				
Reptiles						
	Common Blue-tongued Lizard	<i>Tiliqua scincoides</i>				
	Common Long-necked Turtle	<i>Chelodina longicollis</i>				
	Eastern Brown Snake	<i>Pseudonaja textilis</i>				
	Garden Skink	<i>Lampropholis guichenoti</i>				
	Little Whip Snake	<i>Suta flagellum</i>				X
	Marbled Gecko	<i>Christinus marmoratus</i>				X
	Red-bellied Black Snake	<i>Pseudechis porphyriacus</i>				
	Striped Legless Lizard	<i>Delma impar</i>	f	V	e	
	Tiger Snake	<i>Notechis scutatus</i>				X
	Tussock Skink	<i>Pseudemoia pagenstecheri</i>				
Frogs						
	Common Froglet	<i>Crinia signifera</i>				
	Common Spadefoot Toad	<i>Neobatrachus sudelli</i>				
	Growling Grass Frog	<i>Litoria raniformis</i>	f	V	e	X
	Southern Bullfrog	<i>Limnodynastes dumerilii</i>				X
	Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>				X
	Striped Marsh Frog	<i>Limnodynastes peronii</i>				

DSE – Status from DSE Advisory List; EPBC – Status under EPBC Act; FFG – Status under FFG Act; CE – Critically endangered; EN – Endangered; VU – Vulnerable; NT – Lower risk near threatened; DD = data deficient; L – Listed under FFG Act; * = introduced species; X = recorded

Appendix 5: Striped Legless Lizard targeted survey report (2003)

A TARGETED SURVEY FOR THE
STRIPED LEGLESS LIZARD (*Delma impar*)
AT “THE POINT”, BURNSIDE.



prepared for

Brett Lane & Associates Pty. Ltd.

by

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A targeted survey for the Striped Legless Lizard (*Delma impar*) at “The Point”, Burnside.

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Cover Illustration: **Striped Legless Lizard** (*Delma impar*) - Derrimut, Victoria.
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EXECUTIVE SUMMARY

Brett Lane & Associates Pty. Ltd. commissioned Wildlife Profiles Pty. Ltd. to advise upon the potential suitability of the remnant grassland habitat at 'The Point' to support a population of the endangered Striped Legless Lizard (*Delma impar*), and to subsequently undertake a survey for the species in this area.

We inspected the study area on 8th December, 2002. Extensive and dense Kangaroo Grass (*Themeda*) dominated grasslands present on the site appeared to have considerable potential as habitat for the Striped Legless Lizard.

Consequently, a targeted trapping program was undertaken, using a pitfall trap / drift fence technique which elsewhere has proven appropriate for this species.

Ten pitfall buckets (each 10 litres) were buried to ground level in a 50 metre line, at five metre intervals, with a 15 cm high mesh fence erected across and joining all of the buckets in the line, to guide animals into the traps. Ten such trap lines were employed at the study site, located so as to sample the range of soil and vegetation variability apparent in the *Themeda* grasslands.

Trap lines were installed on 9th, 10th and 11th of December, 2002, and were inspected daily for any captures between 12th and 23rd December, with the trap lines removed on 23rd December. Consequently, trapping effort was 1200 trap-days.

Weather conditions during the trapping period were suitable for activity of the Striped Legless Lizard, however seasonal conditions were exceptionally dry.

No Striped Legless Lizards were detected on site. The only reptiles found (all in pitfall traps) were one juvenile Tiger Snake (*Notechis scutatus*) and two Marbled Geckos (*Christinus marmoratus*). These capture rates are considered extremely low for this habitat type, and may be a consequence of the abnormally dry season reducing the opportunities for reptile activity.

Based upon the survey results, with a considerable survey effort, I would consider it unlikely that the Striped Legless Lizard occurs on site. However, this endangered species is often found at low densities, and, with the dry conditions, its activity may have been suppressed. Consequently, one cannot discount the possibility that the species could occur within the study area, but may not have been detected during the survey for these reasons.

1. INTRODUCTION

1.1 Background

Potential remnant grassland habitat for the Striped Legless Lizard (*Delma impar*) has been identified in an area of a proposed development at 'The Point', Burnside. Because the Striped Legless Lizard is recognised as threatened nationally, it was considered necessary to determine the current status of the species in the remnant grassland. Consequently, Brett Lane & Associates Pty. Ltd. commissioned Wildlife Profiles Pty. Ltd. to advise upon the potential suitability of the remnant grassland habitat at 'The Point' to support a population of the endangered Striped Legless Lizard (*Delma impar*), and to subsequently undertake a survey for the species in this area.

1.2 Study Area

The study area is located to the south of Kororoit Creek, west of Melbourne, approximately between 144°44'58" and 144°45'40", and between 37°44'22" and 37°44'58". See Appendix 1 for a diagram of the study area. The habitats of the study area have been described elsewhere (Lane 2002), as has an assessment of their current condition. The approximate extent of Kangaroo Grass (*Themeda triandra*) dominated western plains grassland in high to moderate condition, representing the most likely habitat for the Striped Legless Lizard, is also shown in Appendix 1.

1.3 The Striped Legless Lizard

Delma impar (Fischer 1882), the Striped Legless Lizard, is a member of the family Pygopodidae, the legless or flap-footed lizards (Cogger 2000). As with other members of the legless lizard family, *D. impar* lacks forelimbs and has only very reduced hind limbs - these hind limbs are apparent only as small flaps on either side of the vent. The tail, when unbroken, is about twice the length of the body. The species reaches a maximum total length of about 300 mm, with a maximum snout-vent length of about 120 mm and a weight of about 8 g. While it shows considerable variation in colour and pattern, *D. impar* is usually pale grey-brown above and cream on the ventral surface, with a series of stripes along the length of the body, becoming diagonal bands on the tail (see cover illustration).

The Striped Legless Lizard is recognised as threatened in all Australian States in which it occurs – in Victoria, it is now considered to be endangered (NRE 2003).

Delma impar is a grassland specialist, being found only in areas of native grassland and nearby grassy woodland and exotic pasture. Natural temperate grassland is one of Australia's most threatened ecological communities. It is the loss and degradation of native grassland, through a variety of processes, that is primarily responsible for the decline of *D. impar* (Smith and Robertson 1999).

1.4 Purpose of Study

To determine the extent of likely habitat of the Striped Legless Lizard at The Point, Burnside and to undertake a survey for the species in this habitat, such that an opinion can be offered as to the potential importance of the area for the conservation of the species.

1.5 Project Tasks

1. Undertake a field inspection of the study area to determine the extent and quality of potential habitat for the Striped Legless Lizard.
2. Undertake a pitfall trapping survey throughout the areas of habitat considered most likely to support the species.
3. Present the results of the survey in a written report, with an interpretation of their implications.

2. METHODOLOGY

2.1 Previous Information

All previous records of *D impar* from the vicinity of the study area were obtained from the Atlas of Victorian Wildlife (AVW). All records from an area of 10 minutes of latitude by 10 minutes of longitude (with the study area at the centre) were examined to gain an indication of the local status of the species.

2.2 Field Survey

We inspected the study area on 8th December, 2002. Extensive and dense Kangaroo Grass (*Themeda triandra*) dominated grasslands present on the site appeared to have considerable potential as habitat for the Striped Legless Lizard. The area of better quality grassland was selected for more intensive survey.

Consequently, a targeted trapping program was undertaken, using a pitfall trap / drift fence technique which elsewhere has proven appropriate for this species. Ten pitfall buckets (each 10 litres) were buried to ground level in a 50 metre line, at five metre intervals, with a 15 cm high mesh fence erected across and joining all of the buckets in the line, to guide animals into the traps. Ten such trap lines were employed at the study site, located so as to sample the range of soil and vegetation variability apparent in the better quality *Themeda* grasslands. The locations of all trap lines are shown in Table 1 and Appendix 1.

Trap lines were installed on 9th, 10th and 11th of December, 2002, and were inspected daily between 12th and 23rd December for any captures, with the trap lines removed on 23rd December. Total trapping effort was 1200 trap-days. Note that the grassland surrounding trap line one was burnt on the 13th December.

Table 1. Location of pitfall trap lines.

Site No.	Easting	Northing	Easting	Northing
1	0302293	5820385	0302285	5820339
2	0302409	5820465	0302442	5820430
3	0302482	5820483	0302479	5820522
4	0302588	5820656	0302556	5820623
5	0302594	5820611	0302617	5820570
6	0302659	5820499	0302665	5820455
7	0302583	5820468	0302552	5820490
8	0302550	5820362	0302508	5820361
9	0302348	5820079	0302366	5820116
10	0302445	5820263	0302429	5820301

Weather conditions during the trapping period were generally suitable for activity of the Striped Legless Lizard, however seasonal conditions were exceptionally dry. Daily weather conditions when traps were checked are shown in Table 2.

Table 2. Weather conditions during the survey period.

Date	Temp.	Notes
9-11 Dec		Traps installed, opened on 11 Dec.
12 Dec	19	Cool, south-west breeze, full cloud cover
13 Dec	20	Cool, south-west breeze, 80% cloud cover
14 Dec	25	Mild, no cloud
15 Dec	37	North-west breeze, no cloud
16 Dec	26	North breeze, 10% cloud
17 Dec	33	Sunny, south breeze
18 Dec	29	South breeze
19 Dec	31	North breeze, no cloud
20 Dec	20	Mild, full cloud cover
21 Dec	24	North breeze, no cloud
22 Dec	19	South-west wind, cool change during afternoon, 25% cloud
23 Dec		Traps removed

In addition to the trapping program, hand-searching under superficial cover (rocks, vegetation and other debris) was undertaken opportunistically during the course of the survey, particularly in the northern area of weed-dominated rocky grassland close to Kororoit Creek, where the nature of the substrate precluded pitfall trap installation. All tracks, scats, sloughs and other signs of reptiles were recorded.

Note that all Australian Map Grid (AMG) coordinates used herein are in “Australian Geo. '66” map datum. A hand-held GPS (Garmin 12XL) was used to accurately determine the position all sites.

2.3 Nomenclature

Nomenclature for scientific names and common names used in this report follows that of the Atlas of Victorian Wildlife (Anon 2002). The taxonomy is that of Cogger (2000).

2.4 Limitations of the study

Although the survey was undertaken at a time of year usually suitable for activity (and hence ‘trappability’) of the Striped Legless Lizard, using techniques considered optimal for the species, during weather conditions suitable for its activity, and for a duration normally considered adequate to enable its detection, the abnormally dry seasonal conditions may have suppressed lizard activity. Consequently, it is possible that the species was present, but less active than normal during the period of the survey, thus escaping detection.

3. RESULTS

3.1 Previous records

The Atlas of Victorian Wildlife holds records of many individual Striped Legless Lizards found near the study area, although none have been recorded from within the study area. Those records occurring within the two minute latitude by two minute longitude grid cell which includes the study area are presented in Appendix 2.

The species has been observed near Kororoit Creek less than one kilometre downstream from the study area. The Cairnlea/VUT grasslands (approximately 2 km east of the study area) have been known to support one of the densest populations of *D. impar* recorded, in variable quality basalt plains grasslands dominated in some areas by *Themeda*, but variously disturbed in other areas.

3.2 Records from this survey

No Striped Legless Lizards, or signs of their presence, were recorded during the survey.

3.2.1 Other reptile species

All reptiles observed during the survey were recorded – these are shown below.

<i>Notechis scutatus</i>	Tiger Snake	Trap line 4 (1 individual)
<i>Christinus marmoratus</i>	Marbled Gecko	Trap line 2 (2 individuals)

Neither of these species are included within the NRE list of species considered threatened within Victoria (NRE 2003).

3.3 Distribution and extent of potential habitat

The *Themeda*-dominated remnant native grasslands in the study area extend over approximately 15.7 hectares (see Appendix 1, as ‘high to moderate quality SLL habitat’ - eastern patch) – these represent the most likely habitat for the Striped Legless Lizard in the study area, and are similar in quality to areas from which the species has previously been recorded nearby (see Appendix 2).

Additional areas of degraded, but not cultivated, native grassland occupy a further 6.9 ha hectares (see Appendix 1, as ‘moderate to low quality SLL habitat’ – eastern patches), and there is another 11.2 ha of rocky weed-dominated grassland closer to Kororoit Creek (see Appendix 1, as ‘high to moderate quality SLL habitat’ - northern patch, and ‘moderate to low quality SLL habitat’ – western patch) – both of these categories are also potential habitat for the species, although, if present, it would be expected to occur there in lower densities than in the adjacent higher-quality *Themeda* areas. The extensive recently-cultivated areas are unlikely to comprise Striped Legless Lizard habitat.

4. DISCUSSION

Based upon the survey results, which were obtained after a considerable survey effort, it would appear unlikely that the Striped Legless Lizard is extant in the study area.

However, this species is often found at low densities, and, with the unusually dry seasonal conditions, its activity may have been suppressed. The low capture rates of other reptiles detected during the survey, and the complete lack of small skinks, which are often abundant in similar rocky grassland habitat, would suggest that reptile activity and/or numbers are likely to have been greatly reduced this summer.

Consequently, one cannot discount the possibility that the Striped Legless Lizard could occur within the study area, but may not have been detected during the survey for these reasons.

The historical records of the Striped Legless Lizard immediately downstream from the study area suggest that the species is likely also to have been present in the study area at that time (10 years ago), as the habitats at both sites were similar (PR personal observation). Frequent (*i.e.* annual) fire is thought to disadvantage and possibly eliminate the lizard (ARAZPA 1996), while proximity to suburban areas is thought to place the lizard under increased predation pressure (ARAZPA 1996). Both of these factors may have contributed to a local decline of the species.

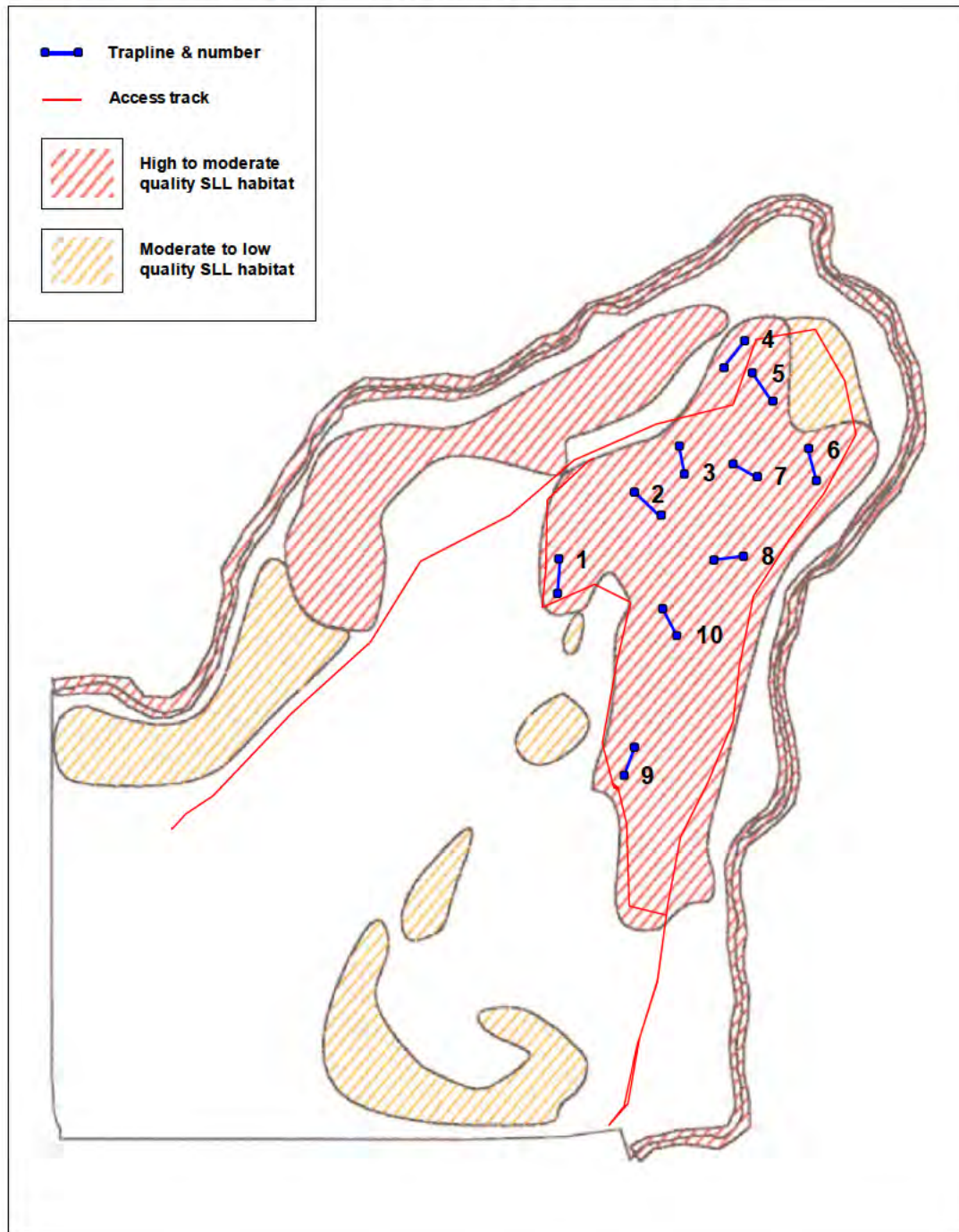
Nevertheless, the habitats within the study area do appear to be currently suitable for the species. The Striped Legless Lizard has been recorded throughout its range at densities estimated between 10 and 40 individuals per hectare (ARAZPA 1996). Consequently, it is considered that the 15.7 hectares of high quality *Themeda* grassland in the study area would be adequate to support a viable population of the species, provided that this habitat was carefully managed to control threatening processes. The additional rocky areas of degraded grassland may provide some additional habitat, as the species has been recorded in similar degraded or secondary grassland elsewhere (*e.g.* see Dorrough 1995). The dense streamside vegetation along the margins of Kororoit Creek is not considered to be likely habitat of the Striped Legless Lizard.

REFERENCES

- Anon (2002) Atlas of Victorian Wildlife (Unpublished database held at Arthur Rylah Institute, Department of Natural Resources and Environment, Victoria).
- ARAZPA (1996) *Population and Habitat Viability Assessment (PHVA) for the Striped Legless Lizard (Delma impar)*. Based on a workshop held in Canberra, Australia. 30 July - 2 August 1996. Published by the Australasian Regional Association of Zoological Parks & Aquaria, ACT Parks & Conservation Service, Striped Legless Lizard Working Group, and Conservation Breeding Specialist Group (SSC/IUCN).
- Cogger, H.G. (2000). *Reptiles and Amphibians of Australia*. 6th edn. Reed Books, NSW.
- Dorrough, J. (1995). *Past and present habitat of the Striped Legless Lizard, Delma impar (Pygopodidae), in the Australian Capital Territory*. Unpublished report to the Australian Capital Territory Parks and Conservation Service.
- Lane, B. (2002). *"The Point" Burnside, Assessment of native grassland remnants*. Brett Lane & Associates Pty. Ltd., Report No. 2002.35C(2.4).
- NRE. (2003). *Threatened Fauna in Victoria – 2003*. Department of Natural Resources and Environment, Victoria.
- Smith, W.J.S. & P. Robertson (1999). *National Recovery Plan for the Striped Legless Lizard (Delma impar): 1999-2003*. Unpublished report to Environment Australia, Canberra.

Appendix 1. Map of study area, showing location of pitfall trap lines.

'Burnside Point' - pitfall trap lines, December 2002



Note that the shaded area along Kororoit Creek is not considered to comprise Striped Legless Lizard habitat.

Appendix 2. *Delma impar* records from the 2' x 2' grid cell including the study area.
(courtesy Atlas of Victorian Wildlife, DSE)

Shaded records are within one kilometre of the study area, to the south and south-east.

Date	lat.	long.	Map no.	AMG	Locality
0/10/1986	3745	14445	7822	023179	corner of Robinsons road & Western Highway
0/9/1990	3745	14445			3 km NNW of Deer Park Railway Station
14/10/1990	3745	14445	7822	023180	2 km NNW of Deer Park Railway Station
8/02/1992	3745	14445	7822	023184	Kororoit Creek
8/02/1992	3745	14445	7822	023185	Kororoit Creek
8/02/1992	3745	14445	7822	023186	Kororoit Creek
4/12/1998	3745	14445			Denton avenue Grasslands, St Albans
5/05/1999	3745	14446	7822	042181	Cairnlea Estate, Deer Park (former Albion Explosiv
6/05/1999	3745	14446	7822	041182	Cairnlea Estate, Deer Park (former Albion Explosiv
14/05/1999	3745	14446	7822	042181	Cairnlea Estate, Deer Park (former Albion Explosiv
30/07/1999	3745	14446	7822	046189	Cairnlea Estate, Deer Park (former Albion Explosiv
2/08/1999	3745	14446	7822	045187	Cairnlea Estate, Deer Park (former Albion Explosiv
2/08/1999	3745	14446	7822	045187	Cairnlea Estate, Deer Park (former Albion Explosiv
2/08/1999	3745	14446	7822	046187	Cairnlea Estate, Deer Park (former Albion Explosiv
3/08/1999	3745	14446	7822	045187	Cairnlea Estate, Deer Park (former Albion Explosiv
6/08/1999	3745	14446	7822	046189	Cairnlea Estate, Deer Park (former Albion Explosiv
17/08/1999	3745	14446	7822	042184	Cairnlea Estate, Deer Park (former Albion Explosiv
2/09/1999	3745	14446	7822	044186	Cairnlea Estate, Deer Park (former Albion Explosiv
13/09/1999	3745	14446	7822	045187	Cairnlea Estate, Deer Park (former Albion Explosiv
7/12/1999	3745	14446	7822	042193	Cairnlea Estate, Deer Park (former Albion Explosiv
7/12/1999	3745	14446	7822	044195	Cairnlea Estate, Deer Park (former Albion Explosiv
7/12/1999	3745	14446	7822	044193	Cairnlea Estate, Deer Park (former Albion Explosiv
9/12/1999	3745	14446	7822	044193	Cairnlea Estate, Deer Park (former Albion Explosiv
9/12/1999	3745	14446	7822	045192	Cairnlea Estate, Deer Park (former Albion Explosiv
9/12/1999	3745	14446	7822	042192	Cairnlea Estate, Deer Park (former Albion Explosiv
10/12/1999	3744	14446	7822	045196	Cairnlea Estate, Deer Park (former Albion Explosiv
10/12/1999	3745	14446	7822	044191	Cairnlea Estate, Deer Park (former Albion Explosiv
17/02/2000	3745	14446	7822	047184	Cairnlea Estate, Deer Park (former Albion Explosiv
18/02/2000	3745	14446	7822	047184	Cairnlea Estate, Deer Park (former Albion Explosiv
23/06/2000	3745	14446	7822	042192	Cairnlea Estate, Deer Park (former Albion Explosiv
8/11/2000	3745	14446	7822	046189	Cairnlea Estate, Deer Park (former Albion Explosiv

Appendix 6: EVC Benchmarks

- Victorian Volcanic Plain:
 - *Heavier soils* Plains Grassland (EVC 132_61)
 - Escarpment Shrubland (EVC 895).

EVC/Bioregion Benchmark for Vegetation Quality Assessment Victorian Volcanic Plain bioregion

EVC 132_61: *Heavier-soils* Plains Grassland

Description:

Treeless vegetation mostly less than 1 m tall dominated by largely graminoid and herb life forms. Occupies fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least 500 mm annual rainfall.

Life Forms:

Life form	#Spp	%Cover	LF code
Large Herb	2	5%	LH
Medium Herb	12	20%	MH
Small or Prostrate Herb	4	5%	SH
Large Tufted Graminoid	1	5%	LTG
Medium to Small Tufted Graminoid	13	40%	MTG
Medium to Tiny Non-tufted Graminoid	4	5%	MNG
Bryophytes/Lichens and Soil Crust*	na	20%	BL

* Note: treat as one life form in this EVC

LF Code	Species typical of at least part of EVC range	Common Name
SS	<i>Pimelea humilis</i>	Common Rice-flower
LH	<i>Rumex dumosus</i>	Wiry Dock
MH	<i>Calocephalus citreus</i>	Lemon Beauty-heads
MH	<i>Acaena echinata</i>	Sheep's Burr
MH	<i>Leptorhynchus squamatus</i>	Scaly Buttons
MH	<i>Eryngium ovinum</i>	Blue Devil
SH	<i>Solenogyne dominii</i>	Smooth Solenogyne
SH	<i>Lobelia pratioides</i>	Poison Lobelia
LTG	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
LTG	<i>Dichelachne crinita</i>	Long-hair Plume-grass
MTG	<i>Themeda triandra</i>	Kangaroo Grass
MTG	<i>Austrodanthonia caespitosa</i>	Common Wallaby-grass
MTG	<i>Elymus scaber</i> var. <i>scaber</i>	Common Wheat-grass
MTG	<i>Schoenus apogon</i>	Common Bog-sedge
MNG	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
MNG	<i>Thelymitra pauciflora</i> s.l.	Slender Sun-orchid
MNG	<i>Microtis unifolia</i>	Common Onion-orchid
SC	<i>Convolvulus erubescens</i>	Pink Bindweed

Recruitment:

Episodic/Fire or Grazing. Desirable period between disturbances is 5 years.

Organic Litter:

10% cover

EVC 132_61: *Heavier-soils* Plains Grassland - Victorian Volcanic Plain bioregion

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
LH	<i>Plantago lanceolata</i>	Ribwort	high	low
LH	<i>Cirsium vulgare</i>	Spear Thistle	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Leontodon taraxacoides</i> ssp. <i>taraxacoides</i>	Hairy Hawkbit	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
MH	<i>Plantago coronopus</i>	Buck's-horn Plantain	high	low
MH	<i>Trifolium striatum</i>	Knotted Clover	high	low
MH	<i>Trifolium dubium</i>	Suckling Clover	high	low
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Briza minor</i>	Lesser Quaking-grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Lolium rigidum</i>	Wimmera Rye-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	low
MTG	<i>Nassella neesiana</i>	Chilean Needle-grass	high	high
MNG	<i>Cynosurus echinatus</i>	Rough Dog's-tail	high	low
MNG	<i>Juncus capitatus</i>	Capitate Rush	high	low

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EVC/Bioregion Benchmark for Vegetation Quality Assessment Victorian Volcanic Plain bioregion

EVC 895: Escarpment Shrubland

Description:

Occurs on rocky escarpments in steep valleys or gorges, associated with limestone or basalt. Sites have moderate to high fertility, are well-drained but subject to regular summer drought due to shallow soils. Eucalypt woodland to 15 m tall or non-eucalypt shrubland to 8 m tall, with occasional eucalypts; lichen-covered rock outcrops are common.

+ eucalypt woodland only components (ignore when assessing shrubland areas and standardise site condition score as required)

Large trees⁺:

Species	DBH(cm)	#/ha
<i>Eucalyptus</i> spp.	70 cm	15 / ha

Tree Canopy Cover:

%cover	Character Species	Common Name
15%	<i>Acacia implexa</i> <i>Allocasuarina verticillata</i> <i>Acacia mearnsii</i> <i>Bursaria spinosa</i> <i>Eucalyptus viminalis</i> ssp. <i>viminalis</i>	Lightwood Drooping Sheoak Black Wattle Sweet Bursaria Manna Gum

Understorey:

Life form	#Spp	%Cover	LF code
Immature Canopy Tree ⁺		5%	IT
Understorey Tree or Large Shrub ⁺	3	10%	T
Medium Shrub	3	10%	MS
Small Shrub	2	5%	SS
Large Herb	3	5%	LH
Medium Herb	4	10%	MH
Small or Prostrate Herb	5	5%	SH
Large Tufted Graminoid	1	5%	LTG
Large Non-tufted Graminoid	1	5%	LNG
Medium to Small Tufted Graminoid	9	25%	MTG
Medium to Tiny Non-tufted Graminoid	3	5%	MNG
Ground Fern	1	5%	GF
Scrambler or Climber	1	5%	SC
Bryophytes/Lichens	na	10%	BL
Soil Crust	na	10%	S/C

LF Code	Species typical of at least part of EVC range	Common Name
MS	<i>Rhagodia parabolica</i>	Fragrant Saltbush
MS	<i>Hymenathera dentata</i> s.l.	Tree Violet
SS	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush
LH	<i>Wahlenbergia communis</i> s.l.	Tufted Bluebell
MH	<i>Oxalis perennans</i>	Grassland Wood-sorrel
MH	<i>Maireana enchylaenoides</i>	Wingless Bluebush
MH	<i>Einadia nutans</i> ssp. <i>nutans</i>	Nodding Saltbush
SH	<i>Chamaesyce drummondii</i>	Flat Spurge
SH	<i>Dichondra repens</i>	Kidney-weed
LTG	<i>Austrostipa bigeniculata</i>	Knead Spear-grass
MTG	<i>Austrodanthonia racemosa</i> var. <i>racemosa</i>	Stiped Wallaby-grass
MTG	<i>Austrodanthonia setacea</i>	Bristly Wallaby-grass
MNG	<i>Panicum effusum</i>	Hairy Panic
GF	<i>Cheilanthes distans</i>	Bristly Cloak-fern
SC	<i>Clematis microphylla</i>	Small-leaved Clematis
SC	<i>Convolvulus erubescens</i> spp. agg.	Pink Bindweed

EVC 895: Escarpment Shrubland - Victorian Volcanic Plain bioregion

Recruitment:

Continuous

Organic Litter:

20 % cover

Logs:

15 m/0.1 ha⁺.

5 m/0.1 ha. (note: large log class does not apply)

Weediness:

LF Code	Typical Weed Species	Common Name	Invasive	Impact
T	<i>Schinus molle</i>	Pepper Tree	high	high
MS	<i>Lycium ferocissimum</i>	African Box-thorn	high	high
MS	<i>Genista monspessulana</i>	Montpellier Broom	high	high
SS	<i>Marrubium vulgare</i>	Horehound	high	high
LH	<i>Sonchus oleraceus</i>	Common Sow-thistle	high	low
LH	<i>Helminthotheca echinoides</i>	Ox-tongue	high	high
LH	<i>Lactuca serriola</i>	Prickly Lettuce	high	low
LH	<i>Sisymbrium officinale</i>	Hedge Mustard	high	high
LH	<i>Sonchus asper</i> s.l.	Rough Sow-thistle	high	low
LH	<i>Verbascum thapsus</i> ssp. <i>thapsus</i>	Great Mullein	high	high
LH	<i>Echium plantagineum</i>	Paterson's Curse	high	high
LH	<i>Centaureum tenuiflorum</i>	Slender Centaury	high	low
LH	<i>Foeniculum vulgare</i>	Fennel	high	high
MH	<i>Hypochoeris radicata</i>	Cat's Ear	high	low
MH	<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover	high	low
MH	<i>Trifolium subterraneum</i>	Subterranean Clover	high	low
MH	<i>Trifolium campestre</i> var. <i>campestre</i>	Hop Clover	high	low
MH	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover	high	low
MH	<i>Lotus suaveolens</i>	Hairy Bird's-foot Trefoil	high	low
MH	<i>Cerastium glomeratum</i> s.l.	Common Mouse-ear Chickweed	high	low
SH	<i>Medicago polymorpha</i>	Burr Medic	high	low
SH	<i>Trifolium glomeratum</i>	Cluster Clover	high	low
SH	<i>Modiola caroliniana</i>	Red-flower Mallow	high	low
SH	<i>Aptenia cordifolia</i>	Heart-leaf Ice-plant	high	high
LTG	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	high	high
LNG	<i>Holcus lanatus</i>	Yorkshire Fog	high	high
LNG	<i>Avena fatua</i>	Wild Oat	high	low
MTG	<i>Nassella trichotoma</i>	Serrated Tussock	high	high
MTG	<i>Ehrharta longiflora</i>	Annual Veldt-grass	high	low
MTG	<i>Briza maxima</i>	Large Quaking-grass	high	low
MTG	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>	Soft Brome	high	low
MTG	<i>Sporobolus africanus</i>	Rat-tail Grass	high	high
MTG	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	high	low
MTG	<i>Romulea rosea</i>	Onion Grass	high	low
MTG	<i>Pentstemon airoides</i> ssp. <i>airoides</i>	False Hair-grass	high	low
MTG	<i>Lolium perenne</i>	Perennial Rye-grass	high	high
MTG	<i>Dactylis glomerata</i>	Cocksfoot	high	high
MTG	<i>Vulpia myuros</i>	Rat's-tail Fescue	high	low
MTG	<i>Bromus rubens</i>	Red Brome	high	low
MTG	<i>Avena barbata</i>	Bearded Oat	high	low
MTG	<i>Aira caryophylla</i>	Silvery Hair-grass	high	low
SC	<i>Vicia sativa</i> ssp. <i>sativa</i>	Common Vetch	high	low

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Appendix 7: Striped Legless Lizard Survey weather conditions

Visit number	Date	Sun	Wind strength	Wind direction	Cloud cover (%)	Rain	Grid number	Time	Tambient (°c)	Hambient (%)	Tbelow (°c)	Hbelow (%)	Tcontact (°c)
1	28/09/2010	Yes	Moderate	W-NW	35	No	7	8:44	15.6	53	18.2	87	18.1
		No	Moderate	W-NW	100	No	4	9:02	13.5	58	14.4	HH	14.3
		No	Moderate	W-NW	100	No	5	9:30	13.3	60	15.8	HH	15.1
		Patchy	Moderate	W-NW	80	No	6	9:45	13.1	62	13.1	HH	15.4
		Patchy	Moderate	W-NW	80	No	3	10:12	20.7	42	16.5	71	18
		No	Moderate	W-NW	100	Yes	2	10:28	11.3	65	13.9	HH	11.9
		Patchy	Moderate	W-NW	80	No	1	10:53	14.6	76	15.1	HH	17.4
		Patchy	Moderate	W-NW	80	No	8	11:08	18.4	66	17.6	HH	17.5
2	13/10/2010	0	Light	0	Full	Light	6	9:00	13.5	HH	16.4	HH	13.6
		0	Light	0	Full	Light	4	9:20	14.3	HH	16.7	HH	14.8
		0	Light	0	Full	Light	5	9:35	14.3	HH	16.7	HH	14.5
		0	Light	0	Full	Light	7	10:15	14.9	HH	17.1	HH	15
		0	Light	0	Full	Light	8	10:30	14.2	HH	16.8	HH	15.3
		0	Light	0	Full	Light	5	9:35	14.3	HH	16.7	HH	14.5
		0	Light	0	Full	Light	2	11:00	16.1	HH	17	HH	15.7
		0	Light	0	Full	Light	3	11:15	15.9	HH	17.8	HH	15.9
3	26/10/2010	Patchy	Moderate	W	60	0	1	9:45	24	53	19	84	26
		Patchy	Moderate	W	60	0	2	9:55	24	60	23	HH	26
		Patchy	Moderate	W	60	0	4	10:05	24	45	20	57	25
		Patchy	Moderate	W	60	0	3	10:30	25	51	22	78	26
		Patchy	Moderate	W	60	0	5	10:50	23	53	23	50	26
		Patchy	Moderate	W	60	0	8	11:15	29	47	24	56	30
		Full	Strong	NW	0	0	6	9:14	20	HH	17	HH	20
		Full	Strong	NW	0	0	7	9:45	22	64	20	84	25
4	8/11/2010	Full	Strong	NW	0	0	7	9:45	22	64	20	84	25
		Patchy	0	0	75	0	4	8:00	18.7	87	16.8	HH	18.3
		Patchy	0	0	75	0	5	8:20	17.9	89	16.3	HH	19.9
		Patchy	0	0	75	0	2	8:45	18.1	86	19.2	HH	18.3
		Patchy	0	0	75	0	1	8:59	17.8	70	18.3	HH	17.8
		Patchy	0	0	75	0	8	9:32	19.7	73	23.8	HH	21.9
		Patchy	0	0	75	0	7	9:51	22.7	63	20.4	HH	30.1
		Patchy	0	0	75	0	6	10:16	23.6	60	19.8	HH	28.5
5	25/11/2010	Patchy	0	0	75	0	3	10:40	24.1	57	24.5	HH	31.2
		0	0	0	100	Light	7	9:40	20.7	HH	21.7	HH	21.9
		0	0	0	100	Light	6	10:05	24.9	HH	24.4	HH	23.5
		0	0	0	100	Light	8	10:30	22.5	HH	24.7	HH	25.7
		0	0	0	100	Heavy	3	11:00	22.8	HH	22.4	HH	21.5
		0	0	0	100	Heavy	4	11:20	25.3	HH	21.7	HH	21.2
		0	0	0	100	Heavy	5	11:40	24.7	HH	22.3	HH	22.7
		0	0	0	100	Heavy	1	12:10	24.8	HH	23.2	HH	21.7
6	10/10/2010	Patchy	Light	SW	33	None	8	8:00	15.8	61	18.5	83	21

Visit number	Date	Sun	Wind strength	Wind direction	Cloud cover (%)	Rain	Grid number	Time	Tambient (°c)	Hambient (%)	Tbelow (°c)	Hbelow (%)	Tcontact (°c)
		Patchy	Light	SW	33	None	7	8:30	14.6	59	20.5	87	20.9
		Patchy	Light	SW	33	None	6	8:46	18.1	54	17.7	76	16.9
		Patchy	Light	SW	33	None	5	9:20	18.7	51	19.2	75	22.2
		Patchy	Light	SW	33	None	4	9:43	18.2	49	20	71	21.1
		Patchy	Light	SW	33	None	2	10:18	18.9	53	20.9	72	23.3
		Patchy	Light	SW	33	None	1	10:35	18.2	52	23.7	81	27.2
		Patchy	Light	SW	33	None	3	11:00	19.2	45	26.7	89	29.3

Appendix 8: Weather Conditions during 2010 Striped Legless Lizard tile grid survey

Visit Number	Date	Sun	Wind Strength	Wind Direction	Cloud Cover (%)	Rain	Grid #	Time	T _{ambient} (°C)	H _{ambient} (%)	T _{below} (°C)	H _{below} (%)	T _{contact} (°C)
1	28/09/2010	Yes	Moderate	W-NW	35	no	7	8:44	15.6	53	18.2	87	18.1
		No	Moderate	W-NW	100	no	4	9:02	13.5	58	14.4	HH	14.3
		No	Moderate	W-NW	100	no	5	9:30	13.3	60	15.8	HH	15.1
		Patchy	Moderate	W-NW	80	no	6	9:45	13.1	62	13.1	HH	15.4
		Patchy	Moderate	W-NW	80	no	3	10:12	20.7	42	16.5	71	18
		No	Moderate	W-NW	100	yes	2	10:28	11.3	65	13.9	HH	11.9
		Patchy	Moderate	W-NW	80	no	1	10:53	14.6	76	15.1	HH	17.4
		Patchy	Moderate	W-NW	80	no	8	11:08	18.4	66	17.6	HH	17.5
2	13/10/2010	0	Light	0	Full	Light	6	9:00	13.5	HH	16.4	HH	13.6
		0	Light	0	Full	Light	4	9:20	14.3	HH	16.7	HH	14.8
		0	Light	0	Full	Light	5	9:35	14.3	HH	16.7	HH	14.5
		0	Light	0	Full	Light	7	10:15	14.9	HH	17.1	HH	15
		0	Light	0	Full	Light	8	10:30	14.2	HH	16.8	HH	15.3
		0	Light	0	Full	Light	5	9:35	14.3	HH	16.7	HH	14.5
		0	Light	0	Full	Light	2	11:00	16.1	HH	17	HH	15.7
		0	Light	0	Full	Light	3	11:15	15.9	HH	17.8	HH	15.9
3	26/10/2010	Patchy	Moderate	W	60	0	1	9:45	24	53	19	84	26
		Patchy	Moderate	W	60	0	2	9:55	24	60	23	HH	26
		Patchy	Moderate	W	60	0	4	10:05	24	45	20	57	25
		Patchy	Moderate	W	60	0	3	10:30	25	51	22	78	26
		Patchy	Moderate	W	60	0	5	10:50	23	53	23	50	26
		Patchy	Moderate	W	60	0	8	11:15	29	47	24	56	30
		Full	Strong	NW	0	0	6	9:14	20	HH	17	HH	20
		Full	Strong	NW	0	0	7	9:45	22	64	20	84	25
		Full	Strong	NW	0	0	7	9:45	22	64	20	84	25
4	8/11/2010	Patchy	0	0	75	0	4	8:00	18.7	87	16.8	HH	18.3
		Patchy	0	0	75	0	5	8:20	17.9	89	16.3	HH	19.9
		Patchy	0	0	75	0	2	8:45	18.1	86	19.2	HH	18.3
		Patchy	0	0	75	0	1	8:59	17.8	70	18.3	HH	17.8
		Patchy	0	0	75	0	8	9:32	19.7	73	23.8	HH	21.9
		Patchy	0	0	75	0	7	9:51	22.7	63	20.4	HH	30.1
		Patchy	0	0	75	0	6	10:16	23.6	60	19.8	HH	28.5
		Patchy	0	0	75	0	3	10:40	24.1	57	24.5	HH	31.2
5	25/11/2010	0	0	0	100	Light	7	9:40	20.7	HH	21.7	HH	21.9
		0	0	0	100	Light	6	10:05	24.9	HH	24.4	HH	23.5
		0	0	0	100	Light	8	10:30	22.5	HH	24.7	HH	25.7
		0	0	0	100	Heavy	3	11:00	22.8	HH	22.4	HH	21.5
		0	0	0	100	Heavy	4	11:20	25.3	HH	21.7	HH	21.2
		0	0	0	100	Heavy	5	11:40	24.7	HH	22.3	HH	22.7
		0	0	0	100	Heavy	1	12:10	24.8	HH	23.2	HH	21.7
		0	0	0	100	Heavy	2	12:30	25.2	HH	22.5	HH	23.4
6	10/10/2010	Patchy	Light	SW	33	None	8	8:00	15.8	61	18.5	83	21

Visit Number	Date	Sun	Wind Strength	Wind Direction	Cloud Cover (%)	Rain	Grid #	Time	T _{ambient} (°C)	H _{ambient} (%)	T _{below} (°C)	H _{below} (%)	T _{contact} (°C)
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		Patchy	Light	SW	33	None	6	8:46	18.1	54	17.7	76	16.9
		Patchy	Light	SW	33	None	5	9:20	18.7	51	19.2	75	22.2
		Patchy	Light	SW	33	None	4	9:43	18.2	49	20	71	21.1
		Patchy	Light	SW	33	None	2	10:18	18.9	53	20.9	72	23.3
		Patchy	Light	SW	33	None	1	10:35	18.2	52	23.7	81	27.2
		Patchy	Light	SW	33	None	3	11:00	19.2	45	26.7	89	29.3

*Ta = Ambient Temperature; H ambient = Ambient Humidity; T below = Temperature under tile (HH = High Humidity, over 90%); H below = Humidity under tile; T contact = Temperature on tile

Appendix 2: Spiny Rice-flower Propagation Project

BL&A Report 7045 (4.18) – updated

SPINY RICE-FLOWER PROPAGATION PROJECT



Photo by J. Sullivan

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November 2014

Report No. 7045 (4.18)

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1. EXECUTIVE SUMMARY

In May 2011 DFC (Project Management) Pty. Ltd. engaged Brett Lane and Associates Pty Ltd (BL&A) and Deborah Reynolds (a PhD student at Victoria University and member of the Spiny Rice-flower National Recovery Team) to develop a Spiny Rice-flower Propagation Project at Burnside. The Spiny Rice-flower Propagation Project has been developed to satisfy the offset obligations required to compensate for the proposed staged removal of the Spiny Rice-flower population at Modeina Estate in Burnside and contribute to an improved understanding of conservation and management for the species in the future.

The proposed Modeina Estate development is located in an 88 hectare parcel of land at Burnside, in Melbourne's north, that comprises a mosaic of indigenous and introduced vegetation. The indigenous vegetation supports Spiny Rice-flower, a species listed as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999*, threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and endangered on the Department of Environment and Primary Industries (DEPI) Advisory list for rare and threatened flora. 244 individual Spiny Rice-flower exist within the area proposed for the development of Modeina Estate.

Identification of an appropriate offset to compensate for the proposed removal of all Spiny Rice-flower in Precinct 2 of the Modeina Estate has been guided by the Offset Assessment Guide provided by the Commonwealth Department of the Environment. Namely, the protection and management of 800 Spiny Rice-flower plants elsewhere is considered to adequately offset the removal of 244 plants from Modeina Estate.

Project Aim

The aim of the Spiny Rice-flower Propagation Project is to provide direct offsets for the future proposed removal of Spiny Rice-flower plants at the Modeina Estate in Burnside. Based on the current Commonwealth offset guidelines, it is considered that the propagation and establishment of 800 Spiny Rice-flower plants would satisfy 100% of the offset required for the proposed impacts to this species.

The project will be considered a complete success at the time when the aim of the project has been achieved, namely that a total of 800 Spiny Rice-flower plants are established at the recipient sites, fulfilling the Spiny Rice-flower offset obligations of the Modeina development.

Project Risks and contingencies

The extent to which the project is successful, is highly dependent on the number of seed and germinants produced at the donor site, and the number of germinants obtained from the seed collected. Due to the uncertainties associated with the production of seed and germinant survival, appropriate contingencies have been put in place including:

- Identification of a portion of the proposed development site that would not be cleared of native vegetation and Spiny Rice-flower until the project is deemed successful. This area is 6.3 hectares and supports 175 out of the total 244 Spiny Rice-flower plants at the Modeina Estate.
- Staging of development that would result in minimal removal of Spiny Rice-flower (five plants) in the first six years from the time of approval of the Propagation Project.
- Translocation of adult Spiny Rice-flower as required.

- Further actions to increase the availability of seed including:
 - The use of seed from Isabella Williams Memorial Reserve and
 - The use of soil in translocation of germinants to maintain mycorrhizal associations (where they exist).

Project Methods

Of the 244 Spiny Rice-flower plants that occur at the donor site (Modeina Estate), there are 75 known females, 64 of which are subject to the various treatments of the Propagation Project. The remaining 11 females are being used solely for the purpose of seed collection.

Three treatments will be undertaken at the donor site to determine how Spiny Rice-flower respond to different means of biomass management. The treatments include:

- **Burn** – Spiny Rice-flower plants within this treatment area will be exposed to a controlled burn.
- **Mow** – Spiny Rice-flower plants within this treatment area will be mowed.
- **Control** – Spiny Rice-flower plants within the control treatment area will not be subjected to any biomass management.

Seed collected from the donor site and Isabella Williams Memorial Reserve will then be germinated in the lab, potted up and translocated into three different recipient sites:

- **Recipient Site 1 (Isabella Williams Memorial Reserve):** Site supporting an existing Spiny Rice-flower population.
- **Recipient Site 2 (Quandong Station):** Site not supporting an existing Spiny Rice-flower population, but for which suitable habitat exists.
- **Recipient Site 3 (Quandong Station):** Scraped and ploughed site that is seeded with indigenous forb species.

The same biomass management techniques will be applied at the recipient sites to determine how Spiny Rice-flower propagules respond to different means of biomass management.

Progress to date

Management activities associated with the Propagation Project commenced in June 2012 to assist in meeting the objectives of the project prior to the forecast commencement of development at Precinct 2. Since June 2012, management measures including weeding, placement of weed mats, mowing and ecological burning has been undertaken in the allocated areas at the donor site (Modeina).

Management activities have also been underway at Recipient Sites 2 and 3 (Quandong). No management to date has been undertaken at Recipient Site 1 (Isabella Williams Reserve), as approval from Brimbank Council is reliant upon the Propagation Project being approved by DPCD, DEPI and the Commonwealth Department of the Environment.

To date, the following progress in offset establishment has been achieved.

- Selection of translocation recipient and propagation project sites
- Biomass management treatments at the donor site (Modeina Estate) have commenced

- A total of 2,121 seeds have been collected to date from the donor site (i.e. 951 in 2011, 400 in 2012 and 770 in 2013)
- In 2013, nine germinants were planted at Quandong and currently five are alive.
- Preparation of the two privately owned recipient sites at Quandong Station
- Detailed negotiations with Brimbank Council have occurred to obtain permission to use the publicly owned Isabella Williams Memorial Reserve (proposed Recipient Site 1) for the project.
- A Heads of Agreement has been signed with Victoria University to manage the research project.

In addition to achieving the required Commonwealth offset, this propagation project will add to the current knowledge and understanding of the ways in which the Spiny Rice-flower can be conserved in the wild through propagation and assisting natural recruitment of the species.

2. INTRODUCTION

2.1. Spiny Rice-flower

Spiny Rice-flower (*Pimelea spinescens* subsp. *spinescens*) is a Victorian endemic subshrub commonly found on the basalt plains west of Melbourne, as well as on the Patho plains of North Central Victoria. It mostly occurs in grasslands or grassy woodlands. Spiny Rice-flower blooms in winter, between April and August, producing small creamy yellow flowers. The spine tipped stems distinguishes Spiny Rice-flower from all other *Pimelea* species.

Recent research by Reynolds (2013) which assessed the production, viability and germinability of seed as well as *in situ* germination and survival of the Spiny Rice-flower across 16 populations, found that germinant survival is the critical stage for recruitment success of the species. This research also noted that Spiny Rice-flower has the ability to flower and set seed within the first year following germination.

Spiny Rice-flower seed has a dormancy, and treating the seed with 1% Gibberellic acid was found to consistently germinate seedlings in winter temperatures within an incubator. Environmental and management factors were found to be influencing recruitment stages and require further investigation which this project aims to explore (Reynolds, 2013).

2.2. Background

In May 2011 DFC (Project Management) Pty. Ltd. engaged Brett Lane and Associates Pty Ltd (BL&A) and Deborah Reynolds (a PhD student at Victoria University and member of the Spiny Rice-flower National Recovery Team) to develop a Spiny Rice-flower Propagation Project at Burnside. The Spiny Rice-flower Propagation Project has been developed to satisfy the offset obligations required to compensate for the proposed staged removal of the Spiny Rice-flower population at Modeina Estate in Burnside and contribute to an improved understanding of conservation and management for the species in the future.

An earlier version of this Propagation Project report was provided as part of the original EPBC Act referral for Precinct 2 and also accompanied the draft preliminary documentation (assessment process under the EPBC Act) and EES referral.

The proponent has held various discussions with The Department of the Environment and the Victorian Department of Planning and Community Development (DPCD). Furthermore, this report has been peer reviewed by an independent ecologist at RMIT University, Dr Georgia Garrard (Appendix 4). Comments raised in discussion with the above agencies and within the peer review (See Appendix 5) have since been considered and responses are reflected in this current report version.

Following round table discussion and various revisions to the report, a second round peer review was undertaken by Dr Georgia Garrard to provide further comment on the project. This second round review acknowledged that the issues raised in the initial peer review were appropriately addressed; in particular the concerns raised regarding project risk (Appendix 6). Additional minor matters raised in the second round review will be dealt with following further discussion with the Commonwealth.

The proposed Modeina Estate development is located in an 88 hectare parcel of land at Burnside, in Melbourne's north, that comprises a mosaic of indigenous and introduced

vegetation. The indigenous vegetation supports Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), a listed ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This area supports Spiny Rice-flower, a species listed as critically endangered under the EPBC Act, threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and endangered on the Department of Environment and Primary Industries (DEPI) Advisory list for rare and threatened flora. Targeted flora surveys undertaken within the study area have identified the occurrence of 244 individual Spiny Rice-flower plants.

The proposed development has been divided into two precincts, as detailed below.

- **Precinct 1** (23.2 hectares) is the first phase of the development, comprising 11 stages, and will take three to five years to complete. This precinct is located in the north west of the study area and it does not support any areas of native vegetation. Precinct 1 was Referred in 2004 (Referral No. 2003/1185) and it was decided that this precinct was not a controlled action [particular manner] under the EPBC Act. A planning permit was issued on 3rd July 2013 to allow development of Precinct 1.
- **Precinct 2** (65.4 hectares) makes up the remainder of the Modeina Estate. Precinct 2 supports introduced and indigenous vegetation as well as a number of rare and threatened species including Arching Flax-lily, Matted Flax-lily, Tough Scurf-pea, Rye Beetle-grass, Slender Bindweed, Slender Tick-trefoil, Basalt Tussock-grass, Growling Grass Frog, Striped Legless Lizard and Spiny Rice-flower. A total of 244 Spiny Rice-flower (75 of which are known female plants) occur in Precinct 2 (Figure 1). Native vegetation in this area also supports Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), a listed ecological community.

Of the above listed values, Matted Flax-lily, Spiny Rice-flower, Growling Grass Frog, Striped Legless Lizard and NTGVVP are listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Development of Precinct 2 is not forecast to commence until Precinct 1 is nearing completion. Precinct 2 has been made a Controlled Action under the EPBC Act and requires an assessment by Preliminary Documentation. The Victorian Minister for Planning determined an Environmental Effects Statement (EES) is not required under the *Environment Effect Act 1978*.

2.3. Impacts to Spiny Rice-flower from development of Modeina Estate

No Spiny Rice-flowers will be impacted as a result of development of Precinct 1. All Spiny Rice-flower (244 plants) within Precinct 2 of Modeina Estate are proposed to be progressively removed to allow for the ultimate development of the entire Precinct 2 area. The removal of plants is forecast to occur over a period of 9 or more years as development of the site progresses. The staging plan showing the concept development layout for Modeina Estate is provided in Appendix 3.

The timing of the proposed staging of Modeina Estate in relation to the Spiny Rice-flower population on site is detailed in Table 1 and shown in Figure 2.

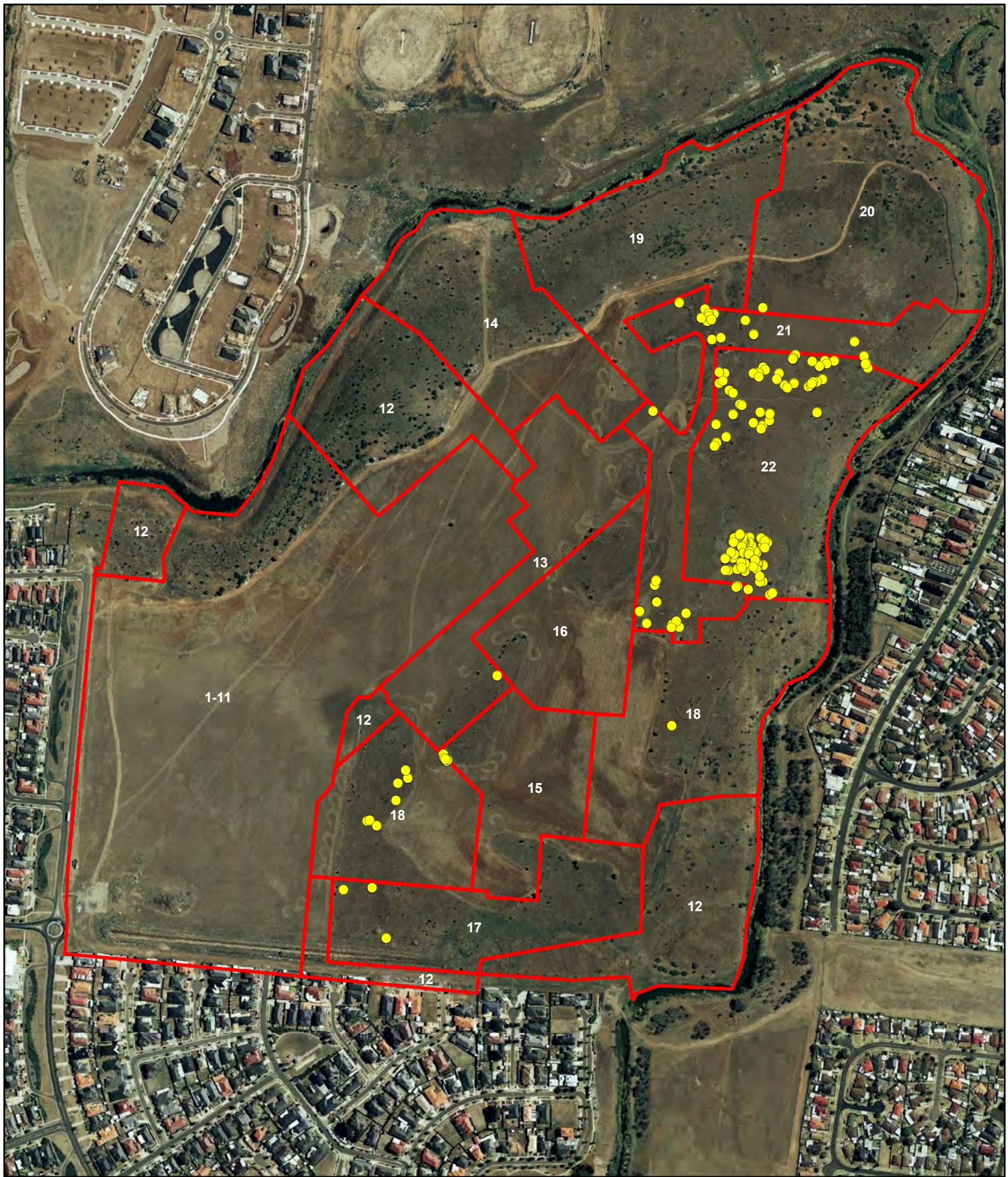
Table 1: Proposed development staging

Precinct	Stage	No Lots	No. Spiny Rice-flower	Timeline (years)
1	1 to 11	260	0	3
2	12	57	0	4
	13	56	1	
	14	58	0	5
	15	47	0	
	16	49	0	6
	17	47	4	
	18 (PS)	0	26	7
	18	49	1	
	19	50	0	
	20	61	1	8
	21	46	36	
22	70	175	9	
Totals		850	244	

*PS = Proposed School

Due to the staging of development at Modeina, significant areas of Precinct 2 are able to be developed with little impact on the population of Spiny Rice-flower at the site. Specifically within Precinct 2, 520 lots can be developed with the progressive removal of 59 Spiny Rice-flowers over a period of 8 years (subject to market conditions). The remaining 175 Spiny Rice-flower plants would be retained in the proposed management area (Stage 22) until after this time, and when the aim of the Propagation Project has been achieved (See Section 3.1).

The proposed staging of Modeina Estate (Figure 2) is therefore considered to provide a suitable period of time to establish and prove the sustainable outcomes of the Propagation Project.



Legend

- Stages
- Spiny Rice-flower

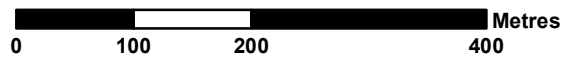


Figure 2: Modeina Staging Plan & Spiny Rice-flower

Project: Modeina		
Client: DFC (Project Management) Pty Ltd		
Project No. 7045	Date: 27/02/2014	Created By: J. Sullivan / M. Ghasemi
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2.4. Offsets required to compensate for impacts to Spiny Rice-flower

Identification of an appropriate offset to compensate for the proposed removal of all Spiny Rice-flower in Precinct 2 of the Modeina Estate has been guided by the Offset Assessment Guide provided by the Department of the Environment (2012). These calculations are presented in Appendix 1.

Figures used for the 'Time Horizon' and 'Confidence in Result' cells were determined following discussions with Ms. Reynolds on 11th April 2013. The 60% Confidence in Result (See Appendix 1) is the best available estimate given the current knowledge of outcomes of Spiny Rice-flower projects that have not been published to date (Reynolds, 2013). Confidence levels are expected to improve as the project progresses.

As such, the protection and management of 800 Spiny Rice-flower plants elsewhere is considered to adequately offset the removal of 244 plants from Precinct 2 (Appendix 1). This would satisfy over 100% of the direct offset requirement. It is therefore proposed that the establishment of 800 new Spiny Rice-flower plants in the recipient sites would provide for 100% of the direct offset for the loss of the Spiny Rice-flower population at Modeina Estate. This offset target forms the aim of the Spiny Rice-flower Propagation Project, as detailed in Section 3.

2.5. Project implementation

The project has been designed by Deborah Reynolds, with statistical input from Neil Diamond (Victoria University) and advice on Spiny Rice-flower genetics from Elizabeth James (Melbourne's Royal Botanical Gardens). DFC (Project Management) Pty. Ltd. will be funding a two year minimum post-doctoral research project and BL&A will be assisting with the day-to-day management and project implementation. This report has been prepared by Gabrielle Graham (Senior Ecologist), Justin Sullivan (Senior Ecologist and Project Manager) and Brett Lane (Director and Principal Consultant) at BL&A, in association with Deborah Reynolds (PhD student) of Victoria University.

3. AIMS AND OBJECTIVES

3.1. Project Aim

The aim of the Spiny Rice-flower Propagation Project is to provide direct offsets for the future proposed removal of Spiny Rice-flower plants at the Modeina Estate in Burnside. Based on the current Commonwealth offset guidelines, it is considered that the propagation and establishment of 800 Spiny Rice-flower plants would satisfy 100% of the offset required for the proposed impacts to this species.

The project will be considered a success at the time when the aim of the project has been achieved, namely that a total of 800 Spiny Rice-flower plants are established at the recipient sites, fulfilling the Spiny Rice-flower offset obligations of the Modeina development.

This will require the following:

- The production of large amounts of viable seed and production of germinants at the donor site
- The production of germinants from the seed collected
- The establishment of a viable and self-sustainable Spiny Rice-flower population at the recipient sites, of at least a total of 800 individuals.

To be considered established, the Spiny Rice-flower population would need to demonstrate:

- The establishment of new plants that are able to flower and set seed
- The production of viable seed
- Approximate even numbers of annually flowering male and female plants
- New germinants recruiting in numbers similar to that in natural populations
- A growing population (i.e. recruitment exceeds mortality)

Once a newly established Spiny Rice-flower plant lives for two years it is then considered likely to be able to survive for 50 or more years. Therefore, translocated Spiny Rice-flower plants must survive for at least two years for it to be considered established, and therefore count towards the overall target.

In addition to achieving the required offset, this propagation project will add to the current knowledge and understanding of the ways in which the Spiny Rice-flower can be conserved in the wild through propagation and assisting natural recruitment of the species.

3.2. Project Objectives and rationale

The project aim will be achieved through the delivery of the project objectives. The main project objective is to evaluate various methods of grassland biomass control management to:

- Maximise seed and germinant production in an established Spiny Rice-flower population; and
- Maximise the survival to reproductive age of generated germinant Spiny Rice-flowers.

Through this broader objective, the project would also aim to answer the following questions (a summary of the monitoring relevant to these questions is provided in Table 6):

1. What are the natural germinant survival rates of Spiny Rice-flower?
The natural germinant survival rate will be determined in the early phase of the project by visiting 16 existing Spiny Rice-flower research quadrats that were established by D. Reynolds in 2009. These sites support Spiny Rice-flower populations and are distributed throughout the species' Victorian range. A benchmark for natural germinant survival will be assessed by D. Reynolds using data sourced from these existing sites and will be used to compare to the results of the Propagation Project.
2. Does biomass control (burning and mowing) significantly increase Spiny Rice-flower flowering and seed production compared with no biomass control?
3. Does biomass control via burning significantly increase Spiny Rice-flower seed production compared with mowing for biomass control?
A proportion of mature flowering plants appear to be affected by biomass management or lack thereof (Reynolds, 2013). Assessing the percentage of flowering and seed production of individual plants receiving different management is an opportunity to increase our knowledge of the immediate and long-term effects of these practices on a Spiny Rice-flower population.
4. Will annual biomass control (burning and mowing) significantly increase the survival of Spiny Rice-flower seedlings compared with no biomass control?
5. Will annual burning significantly increase the survival of Spiny Rice-flower seedlings compared with mowing? (See Section 7.2)
6. What is the threshold level of biomass accumulation that requires management input?
Biomass frequency and the associated effects following biomass removal have been found to be associated with *in situ* germinant production and survival (Reynolds, 2013). Monitoring biomass levels, the availability of bare soil and measures of germinant health in relation to different management practices will inform management when biomass reduction is required. This will also assist in defining which biomass practice is optimal and provide the impetus for convincing councils (managers) to forward plan and allocate funding for management of their Spiny Rice-flower population.
7. What is the threshold level of soil moisture required for Spiny Rice-flower seedling survival?
Of the studied stages of recruitment, *in situ* germination and germinant survival are the most important for the future of a Spiny Rice-flower population (Reynolds, 2013). Cropper (2009) attributed above average rainfall in the seasons of winter, spring and summer to germinant survival at a site on the Victorian Volcanic Plain (southern Victoria) with an increasing Spiny Rice-flower population. Whilst seasonal rainfall appears to have an influence on the germination and survival of Spiny Rice-flower, further investigation is required to describe the nature of the

relationship and to determine the influence of environmental variables (rainfall, temperature, humidity, wind speed, solar radiation and soil moisture).

When germinants are established at recipient sites and flowering later in the project, the following questions could be addressed:

8. What is the optimal time of year (spring versus autumn) for biomass reduction to stimulate Spiny Rice-flower seed production?
9. What is the optimal frequency of burning (yearly, biennially or triennially) for biomass reduction to stimulate Spiny Rice-flower seed production?

As previously mentioned biomass management is important for the germinant stages of recruitment in Spiny Rice-flower populations (Reynolds, 2013). However, the optimal timing and frequency of biomass management is still unknown. If the project is successful at recipient sites, monitoring of seed production of established plants receiving different biomass timing and frequency can be undertaken.

4. PROJECT RISKS AND CONTINGENCIES

4.1. Project Risks

The extent to which the project objectives can be achieved and all the above questions can be addressed, is highly dependent on the number of seed and germinants produced at the donor site (Burnside), and the number of germinants obtained from the seed collected. Due to the lack of *in situ* research involving different management of Spiny Rice-flower, seed and germinant production and the subsequent survival rate of Spiny Rice-flower individuals are not well known. Indeed, these are some of the questions that the Propagation Project aims to determine.

Spiny Rice-flower germination *in situ* has been reported by Foreman (2005, 2011) occurring in July at sites that were recently burnt. Cropper also reported the presence of germinants at an intensively managed site that was regularly burnt, with ongoing weed control and surrounded by a rabbit-proof fence (Cropper, 2007, 2009). These reports suggest that biomass control appears to be associated with the presence of germinants.

From 2009 to 2010 research by Reynolds (2013) found that seed production was occurring at all 16 assessed Spiny Rice-flower populations. This was associated with the prevailing environmental conditions with greater seed produced when conditions were dry and hot, and seed production being reduced with wet and cooler conditions prior to the flowering period. Both seed production and viability was highly variable between plants within each studied population but seed viability did not significantly change between years despite different seed quantities produced.

Germinant production also appears to be strongly associated with the number of female plants and the time since a biomass reduction event (i.e. greater numbers of germinants were found at sites with greater numbers of female plants and less time since a biomass reduction event) (Reynolds 2013).

Therefore the prevailing weather conditions, site demographics and management are likely to impact the annual collection of Spiny Rice-flower seed from the donor site. This presents a certain level of risk for the success of the project.

Due to the uncertainties associated with the production of seed and germinant survival, appropriate contingencies have been put in place to manage the project risks and ensure that the required offset is provided. These contingency measures are discussed in the following section.

4.2. Project Contingencies

4.2.1. Management area

As stated in Section 2.2, all Spiny Rice-flower (244 plants) within Precinct 2 of Modeina Estate are proposed to be progressively removed to allow for the ultimate development of the entire Precinct 2 area. The Propagation Project is to be undertaken as a means of providing a direct offset for this removal, and it is intended that the project will be continued until it is successful in achieving its target of 800 plants.

However, risks associated with the project are acknowledged (Section 4.1). To manage the risks of the project the proponent has identified an area of land (Figures 2 to 4) within Modeina Estate that would be protected as a management area for native vegetation and Spiny Rice-flower until the project is deemed a success. This area is 6.3

hectares and supports 175 out of the total 244 Spiny Rice-flower plants at the Modeina Estate.

Where required, this area would be secured by an Agreement under Section 173 of the *Planning and Environment Act 1987*. This area would be fenced and enclosed by a perimeter road to manage effects from development in adjacent stages.

Once the project has delivered its target of 800 plants approval would be granted to clear the remaining plants and infill development of the management area.

4.2.2. Development timing

As also stated in Section 2.2, the development of Precinct 2 at Modeina is planned to be a staged development. The staging of the development allows for the use of the Spiny Rice-flowers at the site for the Propagation Project for a number of years, before development would occur in these areas. The construction program that will deliver the staged development of the site ensures adequate time is given for research and collection of enough seed required to meet the project aim.

Development timing restrictions are provided below:

- The area of the proposed school site in the south of Precinct 2 may be soon required for development. The Department of Education and Early Childhood Development (DEECD) has long sought to acquire the site subject to resolution of environmental issues. Spiny Rice-flower plants in this area will be retained until DEECD confirm the site is required for development of the school. The development of this area would result in the removal of 26 Spiny Rice-flower plants, 6 of which are female and are being used for seed collection only. This would not affect the results of the Propagation Project, though would result in a loss of potential seed.

As a contingency measure, female Spiny Rice-flowers removed from this area may be translocated into large pots, if required, for continued seed collection. The translocation of individual Spiny Rice-flower plants into pots has occurred in the past at Melbourne's Royal Botanical gardens.

- Female SRF plants that occur outside the SRF Management Area will be retained *in situ* for as long as possible to ensure the adequate amount of available seed, as follows (see Figures 3 and 5):
 - #7 (Stage 13) – at least until August 2015
 - #8 (Stage 18) – at least until September 2018
 - #9–11, 51 & 52 (Stage 21) – at least until August 2019
- All Spiny Rice-flower plants that occur within the designated management area (See Section 4.2.1) will be retained for at least the first five years of the project following approval. This management area comprises almost all the Spiny Rice-flower plants that are subject to the treatments of the Propagation Project. The retention of these plants for a minimum of five years ensures an appropriate amount of time for research and a large availability of seed.

Following the fifth year of the project, assessment will be made to determine if the aims of the project have been met, as outlined in Section 3.1. Where the aims of the project are considered to have been met, at this point only, can the Spiny Rice-flowers in the designated management area be removed and this area developed.

This project is unprecedented and as such has been designed to ensure the research into Spiny Rice-flower recruitment can be fulfilled. The species as a whole will ultimately benefit as at least one new population would be established and an additional population at Isabella William Memorial Reserve will be augmented. Whilst the Project will result in the eventual loss of the source population at Modeina Estate, this will only occur once a self-sustaining population has been established elsewhere.

4.2.3. Mycorrhizal associations

If all germinants fail at the Quandong site but plants survive at the Isabella Williams Memorial Reserve site, it is considered likely that a mycorrhizal association (a symbiotic association between a fungus and roots of a vascular plant) exists that may be relevant to the successful establishment of the germinants. Mycorrhizal associations have been found in three species of *Pimelea* (Bellgard, 1991, Brundrett, 1991 and McGee, 1986). Moreover, successful propagation for many threatened Australian orchids is known to require the presence of a specific mycorrhiza (Reiter, 2014). In the case that mycorrhizal association is observed, soil from the donor site would be incorporated into the potting mix for all germinants. This will ensure that they will be given the best chance to develop the symbiotic association to survive in a new site.

4.2.4. Seed augmentation

Spiny Rice-flower seed will be collected from Burnside throughout the project and the resultant propagules will be used within the trial. However, the lack of quality seed production over an extended time has the potential to undermine the trials ability to gain statistical significance. As such, one of the most vital elements required for the Projects success is the availability of Spiny Rice-flower seed.

Until very recently the genetics of both subspecies of *Pimelea spinescens* was unknown. During 2013, research carried out by Melbourne's Royal Botanical Gardens has found that the fragmentation currently experienced by Spiny Rice-flower populations appears not to have flowed through to their genetic profile (James and Jordan, 2013). The research found that Spiny Rice-flower populations within Melbourne are currently reflecting a previous connectivity which no longer exists. This research encourages management which will maintain gene flow between previously connected Spiny Rice-flower fragments. Restricting genetic flow over time is likely to lead to genetic inbreeding and a reduced capacity to adapt to changing environmental conditions over time (Sgrò, 2011).

The closest Spiny Rice-flower population to the Burnside remnant is the Isabella Williams Memorial Reserve (IWMR) population. This population has been actively managed and observed to be producing quality seed over a period of at least two years. Collection of seed from within this population would be a viable option to obtain greater quantities of seed for the Propagation Project.

Seed collected from the IWMR population would assist the research, improve the translocated population's genetics and bolster numbers of plants within all treatment areas including IWMR. Brimbank Council have indicated approval of the collection of seed from the IWMR and translocation of propagules to all proposed recipient sites, pending the approval of the Propagation Project from DPCD, the Commonwealth Department of the Environment and DEPI.

Collection of seed from other Spiny Rice-flower populations close to the donor or recipient site would also be possible with their custodian's approval. This would further improve the new population's genetic variability (James and Jordan, 2013).

5. LITERATURE REVIEW OF GRASSLAND MANAGEMENT

Spiny Rice-flower is a critically endangered endemic species found in the natural temperate grasslands of Victoria's volcanic plains (AFG 2007). The species is listed as critically endangered under the EPBC Act, threatened under the FFG Act and critically endangered on the DEPI threatened species advisory list.

Spiny Rice-flower has historically and is currently undergoing a reduction in the number and population extent and its geographic distribution is severely fragmented (NSW Parliamentary Counsel's Office (PCO) 2002). Throughout its range it is threatened by a number of factors:

- Ongoing population fragmentation, leading to small populations
- Weed invasion
- Road and rail maintenance activities
- Inappropriate grazing regimes
- Inappropriate fire regimes
- Changing land use (Carter & Walsh 2006).

A contributing factor is that much of the species' populations are located on public land where in some cases lack of funding prevents the implementation of appropriate management measures.

Seventy percent of the sites supporting Spiny Rice-flower are along thin linear road or rail reserves which are subject to high levels of edge effects and therefore have a greater probability of degrading over time (Williams, McDonnell *et al.*, 2005). With only five percent of Spiny Rice-flower populations found in protected or reserved land tenures (Thomas, 2008) the risk of population loss is high (Carter *et al.*, 2006). Incremental losses without replacement can rapidly lead to extinction especially for small and isolated populations (Holsinger, 2000, Burgman, Kieth *et al.*, 2007). Furthermore, there is also the potential for genetic erosion, resulting in the loss of heterozygosity, inbreeding depression, genetic drift and accumulation of deleterious genes (Futuyma, 1986, Gilpin and Soule, 1986, Ellstrand and Elam, 1993, Lynch, Conery *et al.*, 1995, Sherwin and Moritz, 2000, Silvertown and Charlesworth, 2001).

Considering the factors threatening Spiny Rice-flower populations, this proposed research project aims to identify a strategic approach to replace and/or re-establish populations in protected locations.

Known threats to Spiny Rice-flower populations are commonly caused by inappropriate grassland management. This can result in the increase in vegetation biomass which smothers plants and prevents them from flowering, seeding and inhibits germinant survival.

Biomass management in native grasslands

Research has indicated that the reduction in biomass and implementation of appropriate management measures significantly benefits native grassland species diversity. Prior to European settlement, biomass control within the Natural Temperate Grasslands of the Victorian Volcanic Plains would have occurred through periodic fire events, and macropod grazing. Plants occurring in these habitats have therefore adapted to these

conditions and as such currently require biomass reduction to encourage recruitment (Lunt, 1997b, Craigie and Hocking, 1998).

Studies comparing grassland management regimes have found that in the absence of management practices limiting biomass accumulation, the abundance of indigenous species reduces (Stuwe and Parsons, 1977, Lunt, 1997b, a). Furthermore, in the absence of biomass reduction, the dominant species found in Victoria's temperate grasslands, *Themeda triandra* (Kangaroo Grass) can rapidly out-complete other species through abundant leaf litter production (>11 tonnes / hectare over a period of 10 years) (McDougall, 1989), thereby reducing floristic diversity.

These observations are corroborated by Stuwe and Parsons (1977) who identified species-rich rail reserves that had historically been frequently burned. Whilst burning was observed to stimulate species diversity and germination, Morgan (1999) aimed to determine whether burning could result in adverse impacts on grassland. When testing this hypothesis, he found that burning grasslands annually was unlikely to inhibit the species richness or density. Conversely, burning intervals that are greater than triennially, lead to a decline in species diversity.

Biomass management for Spiny Rice-flower

The *in situ* recruitment potential of Spiny Rice-flower population's has recently been found to be promoted by regular biomass reduction events. A long term study of a Spiny Rice-flower population at the Western Water treatment plant found that intensive management including an annual weed control programme and biannual burns allowed the Spiny Rice-flower population to double in a period of five years (Cropper, 2007, 2009). Research by Reynolds (2013) at 16 Spiny Rice-flower populations over a two year period (2009 - 2010) has found that:

- Frequent biomass reduction events are associated with the capacity for the survival and positive growth of Spiny Rice-flower populations;
- Increased numbers of biomass reduction events were associated with a greater proportion of flowering individuals, greater seed viability and a greater density of germinants; and
- The direct effects of biomass reduction events such as increased areas of bare soil, less weed cover, reduced litter and increased site biodiversity, were also found to be associated with a higher rate of germinant survival over the period of a single year following germination.

Many researchers of the Victorian temperate grassland flora have also found that following fire events germination is promoted in many grassland species (Lunt, 1994, 1997b, Morgan, 1998, 2001). This is due to the creation of inter-tussock spaces that can be exploited by new individuals (Silvertown and Charlesworth, 2001). In the absence of these spaces, there are limited opportunities for new seeds to obtain the required nutrients to germinate (Lunt and Morgan, 2002), thereby preventing recruitment (Morgan, 1999b, 2001).

Based on the above, it is considered that native grasslands supporting Spiny Rice-flower require active management to ensure that adequate nutrients are available for successful seed production, and subsequent germination for the species.

As such, the project premise is to manage the donor site (Burnside) to stimulate seed and germinant production of Spiny Rice-flower using different biomass management

methods, as well as increasing the survival rate of the planted and germinated seeds, and translocated germinants at similarly managed recipient sites.

6. MANAGEMENT OF DONOR SITE

Of the 244 Spiny Rice-flower plants that occur at the donor site (Modeina Estate), there are 75 known females, 64 of which are subject to the various treatments of the Propagation Project. Weed matting has been installed around the remaining 11 female plants solely for the purpose of seed collection (Figure 3). The location of all female Spiny Rice-flower plants at Modeina is provided in Figure 2.

The Spiny Rice-flower population is distributed throughout the donor site, with the highest concentration of plants located in the 6.3 hectare proposed management area (175 Spiny Rice-flowers, 62 which are known females).

The grassland structure differs between the northern and southern section of the study area. The southern section was dominated by Kangaroo Grass, although weeds were more abundant. Forb and graminoid diversity was lower than in the northern section.

Three treatments are proposed at the donor site. The purpose of the treatments is to understand how various biomass management techniques promote seed production of Spiny Rice-flower. The three treatments are:

- **Burn** – Spiny Rice-flower plants within this treatment area will be exposed to a controlled burn.
- **Mow** – Spiny Rice-flower plants within this treatment area will be mowed.
- **Control** – Spiny Rice-flower plants within the control treatment area will not be subjected to any biomass management.

The location of these treatments is presented in Figure 2, with more detail in Figures 4 to 6.

Treatment groups will be separated within and outside the proposed management reserve. A total of 20 female Spiny Rice-flower plants will be included in the Burn treatment group, 22 in the Mow treatment group and 22 in the Control. Weed matting has been installed around the remaining 11 female plants solely for the purpose of seed collection.

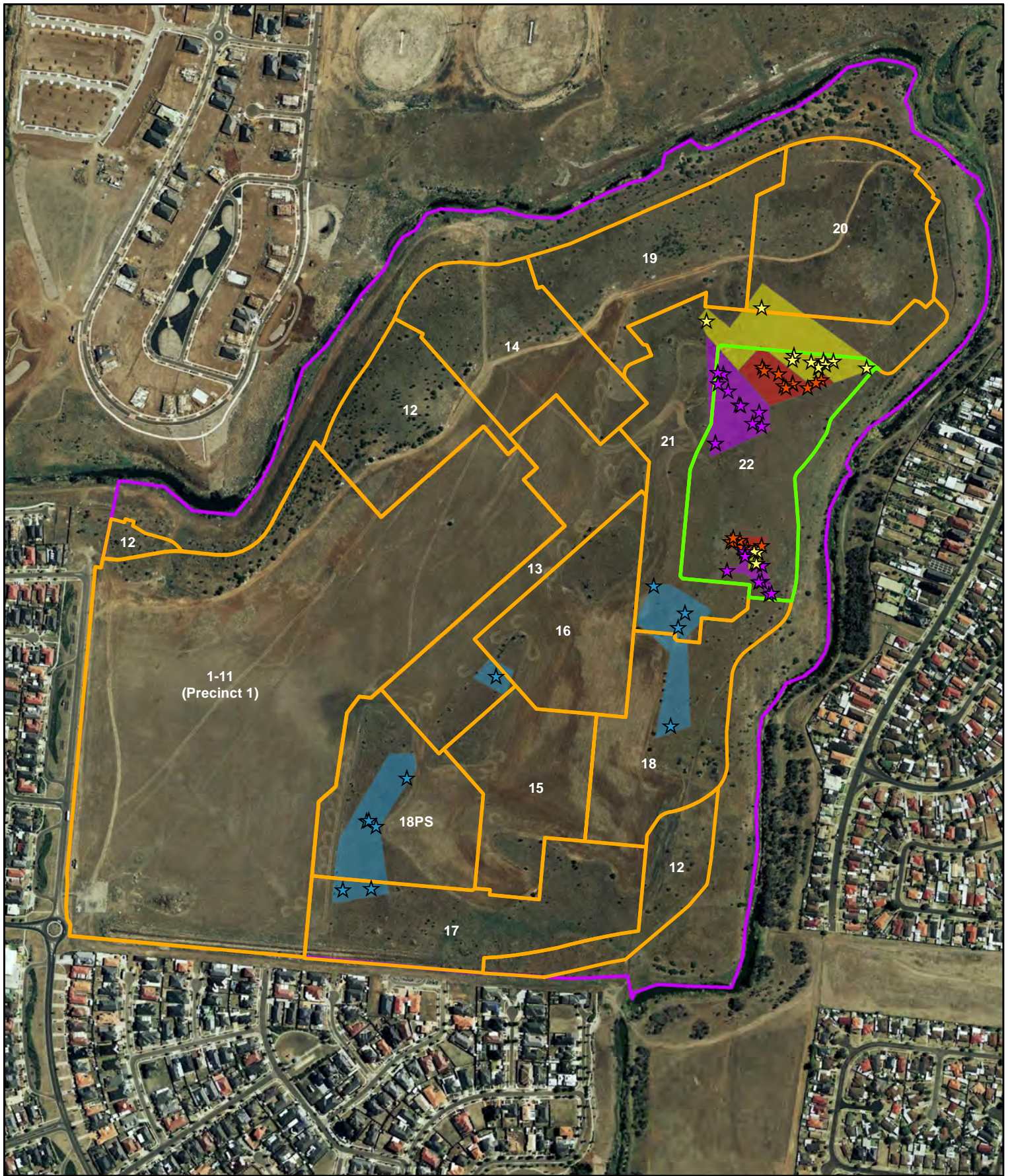
Plant numbers and their treatment are presented in Appendix 2. A power test¹ undertaken for the project indicated that a minimum of seven plants need to be included in each treatment group to get a statistically significant result (Reynolds 2013). The number of plants included in the project is therefore considered suitable to obtain significant results.

The allocation of treatment groups required:

- Manageable areas
- Randomised allocation of treatment.

In order to ensure areas were statistically comparable and manageable, plants located within close proximity to each other were included in the same group. Treatment allocation has been randomised by pulling a treatment type out of a hat. For all treatments, a rabbit and weed control program will be implemented.

¹ Prior to the main research (Reynolds, 2013) a pilot study sampling seeds collected per stem of a Spiny Rice-flower plant obtained a population mean of 34.4 and standard deviation (s²) of 31.7 from data collected across nine populations. Via a power analysis, a ϕ of 6.5 could be achieved by using seven plant samples from nine populations, resulting in a < 1 % chance of making a Type II error (Zar, 1999).



Legend

- Staging Plan
- Property boundary
- SRF Management Zone
- ☆ Female Spiny Rice-flower Plants

Treatment Area

- Burn
- Control
- Mow
- Weed Mat

Seed Collection Only



Figure 2: Female Spiny Rice-flower plants at Modeina

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date: 17/11/2014

Created By: J. Sullivan / M. Ghasemi

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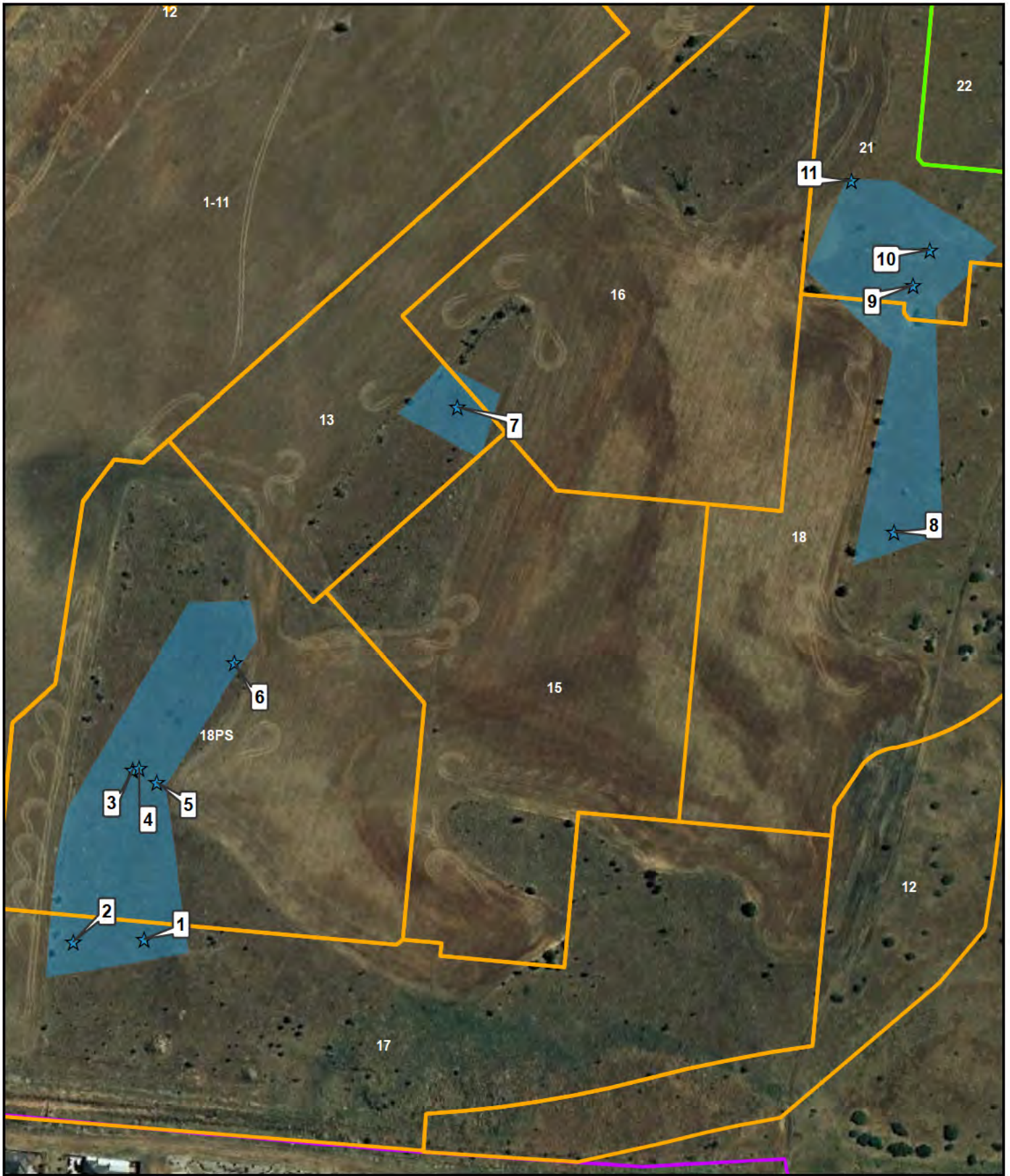
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N





Legend

- Staging plan
- Property boundary
- Spiny Rice-flower Management Area
- ☆ Spiny Rice-flower
- Treatment Area**
- Burn
- Control
- Mow
- Seed Collection Only**
- Weed Mat

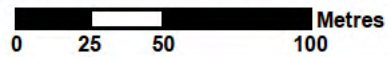


Figure 3: Female Spiny Rice-flower at Modeina (South)

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date: 17/11/2014

Created By G. Graham / M. Ghasemi



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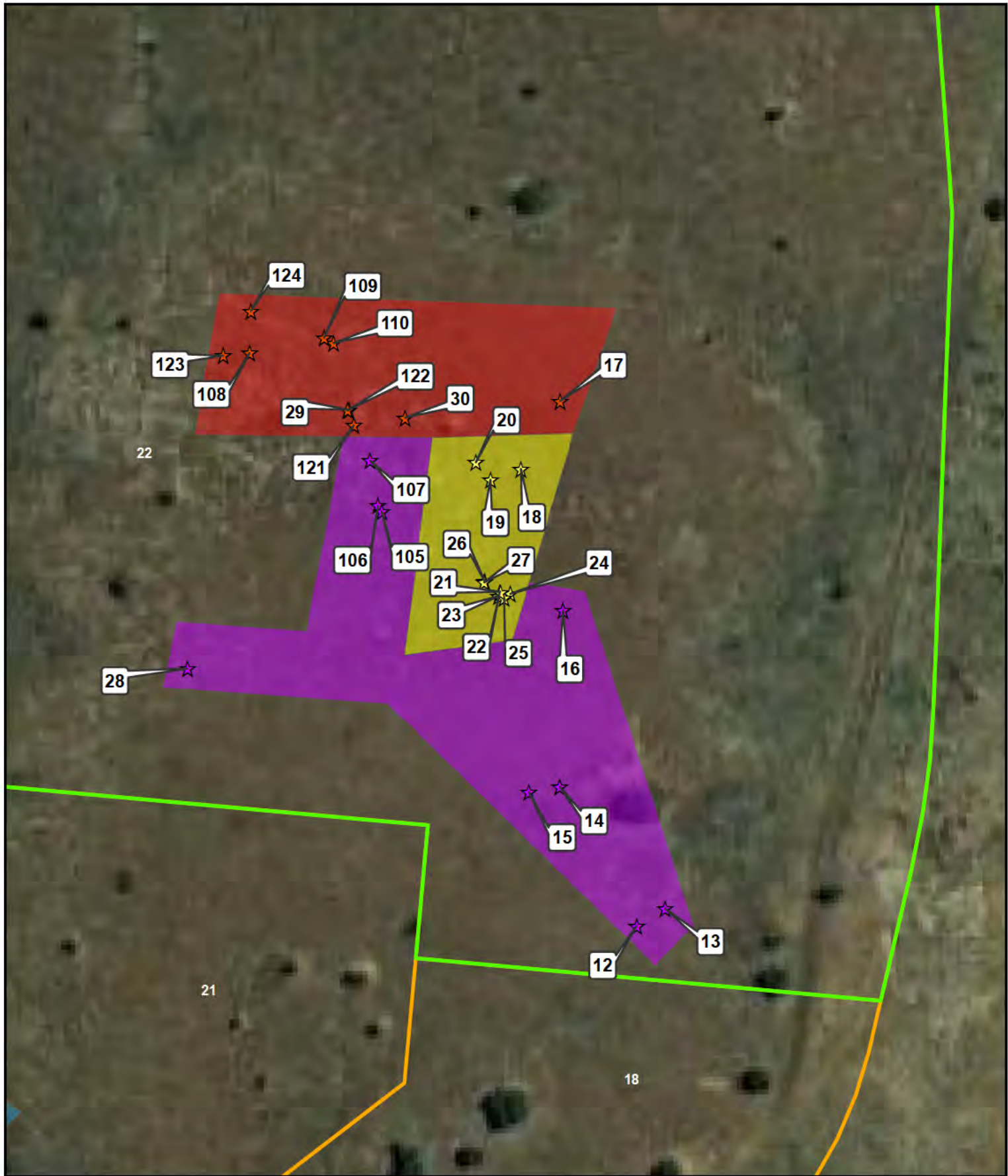
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N





Legend

-  Staging plan
-  Property boundary
-  Spiny Rice-flower Management Area
-  Spiny Rice-flower
- Treatment Area**
-  Burn
-  Control
-  Mow
- Seed Collection Only**
-  Weed Mat

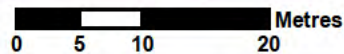


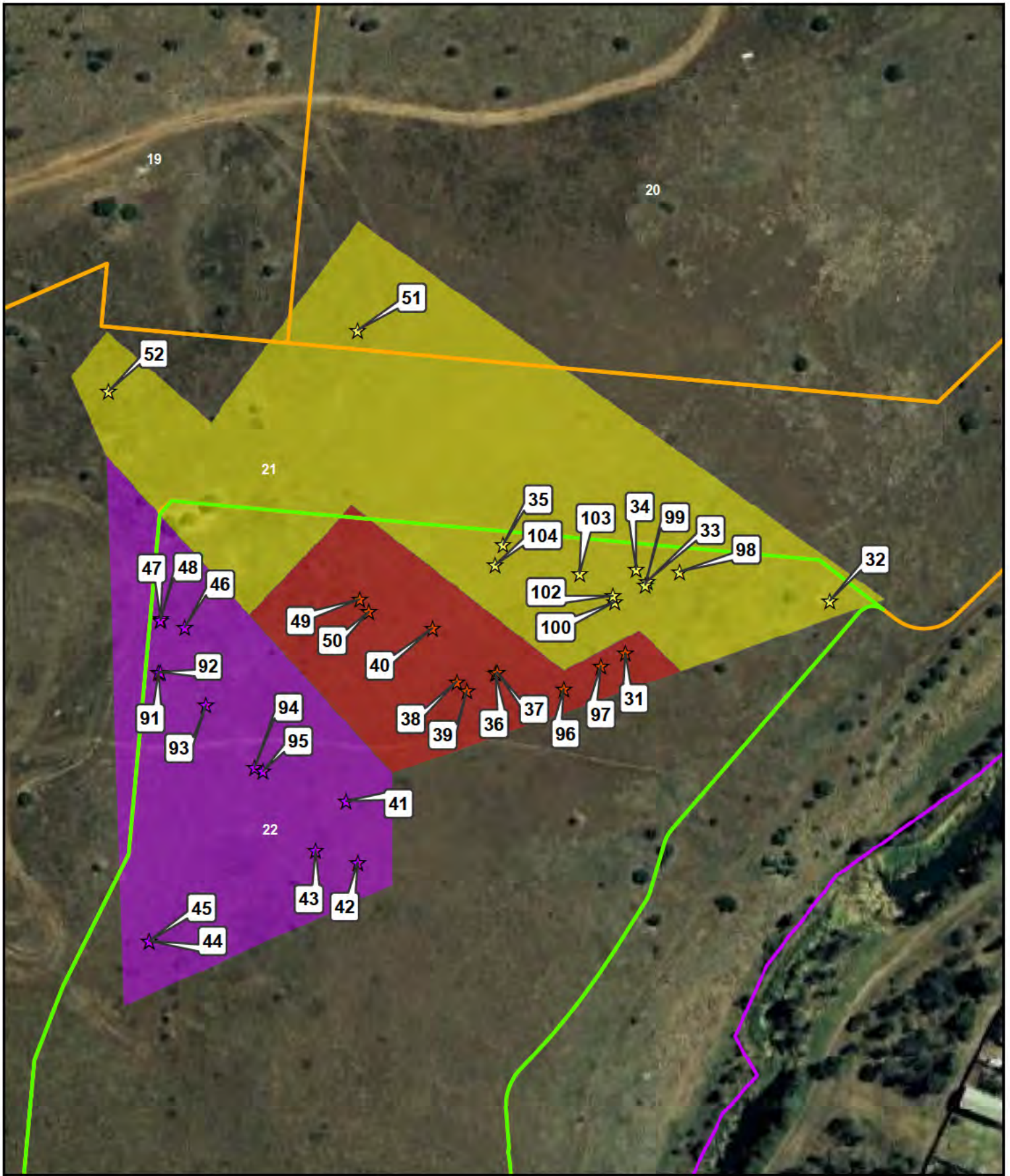
Figure 4: Female Spiny Rice-flower at Modeina (Central)

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045	Date: 17/11/2014	Created By G. Graham / M. Ghasemi
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Legend

- Staging plan
 - Property boundary
 - Spiny Rice-flower Management Area
 - ☆ Spiny Rice-flower
-
- Treatment Area**
 - Burn
 - Control
 - Mow
-
- Seed Collection Only**
 - Weed Mat

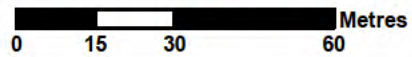


Figure 5: Female Spiny Rice-flower at Modeina (North)

Project: Modeina

Client: DFC (Project Management) Pty Ltd

Project No. 7045

Date: 17/11/2014

Created By G. Graham / M. Ghasemi



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7. RECIPIENT SITES

7.1. Seed Germination

Seed is collected from donor plants in late spring (i.e. November) annually and stored at room temperatures over the summer period. In early February all collected seed is treated with 1% Gibberellic acid and placed in Petri dishes which contained moistened paper discs on top of one layer of kitchen felt sponge, to help maintain moisture. The dishes are then placed in an incubator operating in winter temperatures (5C° (night/lights off) at for 12hrs and 13C° (daylight/lights on) for 12hrs).

7.2. Sample sizes

Based on data collected from Reynolds (2013), the ratio of plant deaths between control and mow/burn treatments has been predicted (Figure 6). A similar prediction has been made comparing the mow and burn treatments (Figure 7).

The total sample size per site is modelled against the death rate of plants and the likelihood of picking up a statistical difference. While, the death rate between treatments is unknown, through the use of the currently available data it can be said that if 50% more plants die in the control than either the mow or burn area, we need approximately 135 plants to be able to see this statistically 80% of the time. If the rate of death is 1.5:1 more samples are required to pick up a difference between the mow and burn treatments.

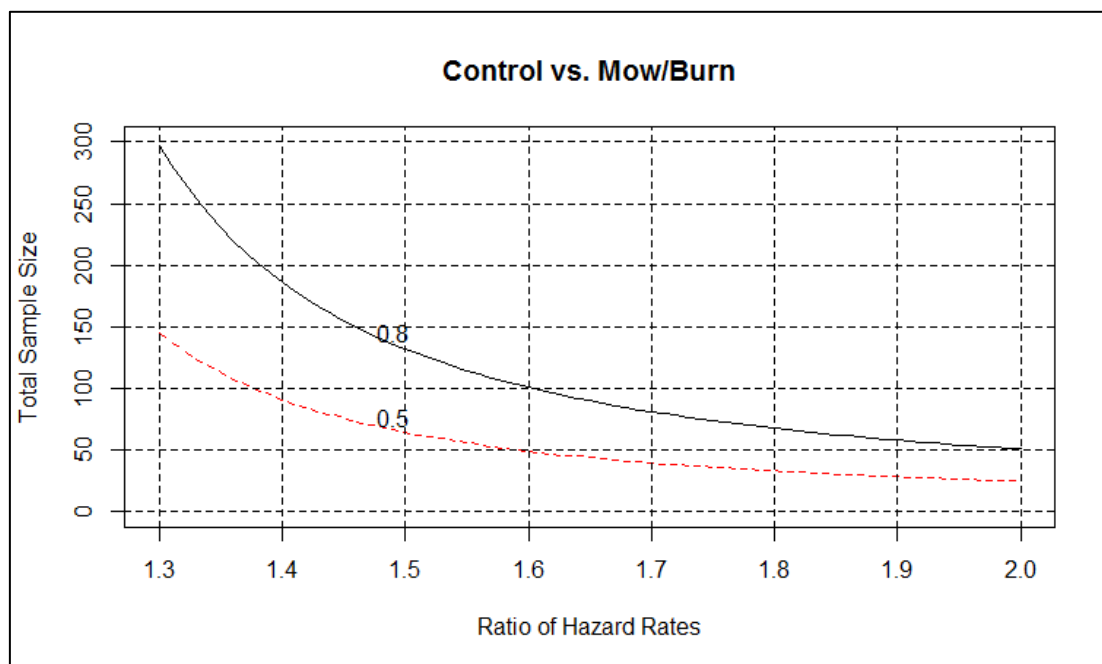


Figure 6: Ratio of plant deaths between control and mow/burn treatments

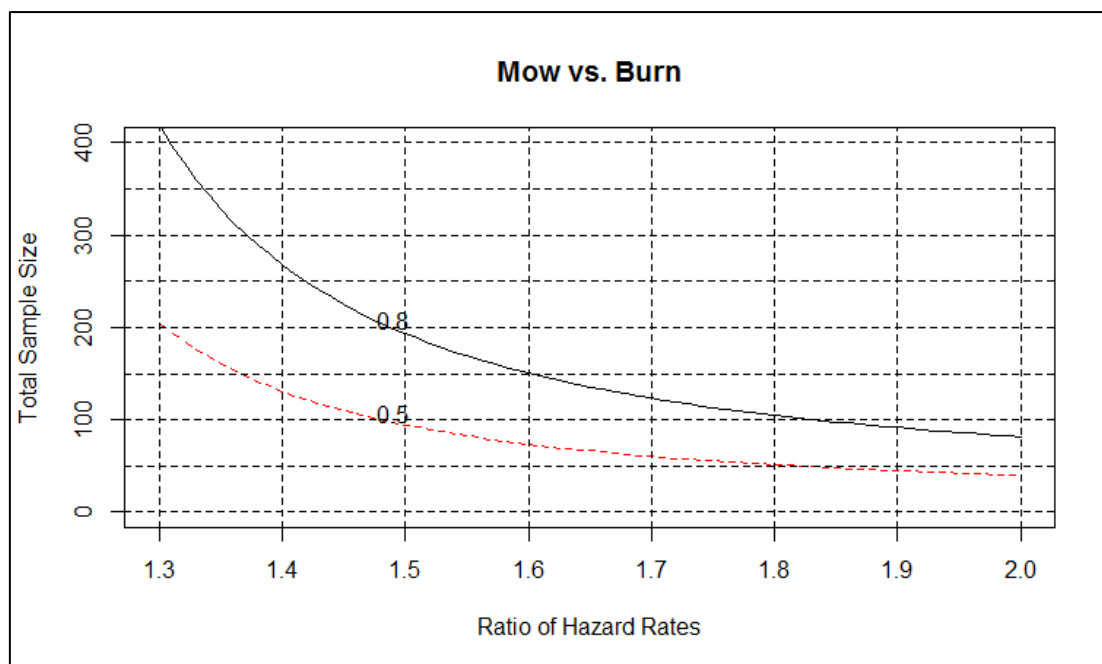


Figure 7: Ratio of plant deaths between mow and burn treatments

The numbers of germinants that will be available annually are an unknown but the aim was to obtain three groups of five per plot in every treatment within each site. That is 45 (15x3) plants per treatment, 135 plants per site and 405 for the whole trial at all recipient sites.

7.3. Germinants

Once the seeds have germinated they will be potted up in mixture of clay and potting mix soil and taken to a nursery where they will be hardened off ready for planting in late autumn or early winter. The germinants will be planted into treated 2mx2m randomly assigned plots as tubestock with a hole being dug out the length of the tube and placed flush with the ground. Watering will occur according to the conditions; at least weekly through to the end of summer the following year. This has occurred during previous plantings (Thomas, 2008) and with assessment of the soil moisture and weather readings, will inform management of the best future practise for a watering regime.

7.4. Selection of recipient sites

The recipient sites were chosen to reflect the most likely environments to support and establish a Spiny Rice-flower population. Seedlings of the species established in the laboratory and germinants found at the donor site will be translocated to the following three recipient sites:

- **Recipient Site 1 (Isabella Williams Memorial Reserve):** Site supporting an existing Spiny Rice-flower population.

Rationale - This site was chosen for the propagation trial because it is close to the donor population and currently supports a Spiny Rice-flower population. There is a possibility that there is a mycorrhizal association which is essential for the success of a Spiny Rice-flower population at a location. Recipient site 2 and 3 do not have a resident Spiny Rice-flower population and therefore may not have the mycorrhiza present to support the establishment of a population.

- **Recipient Site 2 (Quandong Station):** Site not supporting an existing Spiny Rice-flower population, but for which suitable habitat exists.

Rationale - This site was selected as it is reflective of locations which support populations of Spiny Rice-flower; a typical volcanic plains grassland.

- **Recipient Site 3 (Quandong Station):** Scraped and ploughed site that is seeded with indigenous forb species.

Rationale - Research into establishing deep rooted grassland forbs back into soils which have been altered by farming practices have found that the compacted soil is difficult for seedlings to establish and survive in (Reynolds, 2006). Scraping the soil surface to remove the resident weed load (Gibson Roy, 2007) and ploughing the soil creates an environment of friable soil and reduced compaction which has been found to promote the establishment of these deep-rooted forbs (Robinson, 2003). These actions have also been found to promote greater flowering and seed production when compared with forbs established in compacted soils (Reynolds, 2006). Spiny Rice-flower has a deep tap root and appears to need an environment of bare soil to establish (Reynolds, 2013).

Locations of the above three required recipient sites have been identified and set aside for the project. Details of the currently identified recipient sites are provided below. The locations of the recipient sites are provided in Figures 9 and 10.

7.4.1. Recipient Site 1

Discussions have occurred with Brimbank City Council to determine whether it is possible to include the Isabella Williams Memorial Reserve (IWMR) as a recipient site. The grassland in this reserve supports indigenous Plains Grassland with a Spiny Rice-flower population. Half of this grassland reserve was burned in 2011. Council have indicated that their decision on whether to allow the use of Isabella Williams Memorial Reserve for this project is pending the approval of the Propagation Project from DPCD, the Commonwealth Department of the Environment and DEPI. This site is considered to be a suitable recipient site due its close proximity to the donor site.

A baseline population survey was undertaken by BL&A on April 12th 2012, during the peak flowering season. Surveys were undertaken following current best-practice guidelines (DSE 2010). Transects five meters apart were walked throughout the entire reserve. Given the survey was undertaken early in the flowering period of the species, some individuals may not have been flowering at the time of the survey. Nonetheless, sixteen individuals were recorded. These were all located within Management Zone 1 (MZ1).

In 2012 a control burn occurred within MZ1. Following the burn, a large number of additional Spiny Rice-flower plants were recorded in this area by D. Reynolds. A total of 88 mature Spiny Rice-flower plants are now known to occur within the IWMR (Figure 8).

MZ1 is currently being managed by Brimbank Council. Considering this, it will not be considered as a regular offset site, i.e. requiring an offset management plan and a net gain outcome. However, MZ2 and MZ3 (if required) can be considered for offset purposes as they are not currently managed for conservation purposes by Brimbank Council.

Spiny Rice-flower plants, having been germinated from seed collected from the donor site, will be translocated into MZ2 within which no Spiny Rice-flower has been recorded

to date. Where possible, translocated germinants will be planted within the inter-tussock spaces to minimise disturbance to indigenous vegetation.

Experimental plots set up in this recipient site will comprise three treatment groups, namely burn, mow and a control. Plots will be two by two meters in size, and separated by one metre. This will be repeated three times, totalling nine experimental plots in this recipient site. Figure 8 presents the approximate location of the treatment plots.

Management of Zone 1 will be included as part of Council's annual reserve management program, and be carried out by Bushland Recovery (Council's current contractor for the area designated MZ1), albeit under the direction of BL&A. DFC (Project Management) Pty. Ltd. will cover the cost of the experimental plot management, and Council will not have additional reporting as a result of hosting the project.

Should the establishment of the translocated Spiny Rice-flower plants into Recipient Site 1 be unsuccessful, this will not have any implications on Council and the management of the Isabella Williams Reserve will be as per Council objectives.

In addition to the treatments, the recipient site will be controlled for rabbits. Considering the area is regularly used by the public, appropriate fencing will be installed and no baiting will occur. The site requires a rabbit proof fence and an access gate.

Weeding and watering will occur in all of the experimental plots. Chilean Needle-grass, a high threat weed species, has been recorded in this area and will be managed as part of the project. All weeds within all research areas will be managed.



Legend

Management zones

★ Spiny Rice-flower

Proposed treatment

■ Burn

■ Control

■ Mow

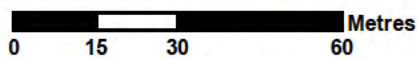


Figure 8: Recipient Site 1 at Isabella Williams Reserve		
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Client: DFC (Project Management) Pty Ltd		
Project No. 7045	Date 20/11/2014	Created By J. Sullivan / M. Ghasemi
Brett Lane & Associates Pty. Ltd. <i>Ecological Research & Management</i>		
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7.4.2. Recipient Site 2

MG Pastoral Pty Ltd, an entity related to DFC (Project Management) Pty. Ltd., owns a large parcel of land (2,875 hectares) at Quandong Station, located 15 kilometres north-west of Werribee, Victoria. This parcel of land is within the proposed area for the Western Grassland Reserve.

Surveys undertaken at Quandong by BL&A in November 2011 identified three areas supporting habitat suitable for Spiny Rice-flower. These areas supported ephemeral wet depressions or drainage lines with grey-black clay loam soils and a low weed threat. Such conditions are considered conducive to Spiny Rice-flower growth (Department of the Environment, 2009).

Later surveying in June 2012 identified one site of 0.23 hectares of suitable grassland habitat to be used as Recipient Site 2 (Figure 9).

Experimental plots set up in this recipient site will comprise the same three treatment groups, namely burn, mow and a control. There will be three plots per treatment (2m x2m in size) which will be selected randomly across the site. A total of nine experimental plots will be used in this recipient site, for which the location will be randomised.

As Quandong Station is private property, securing the treatment plots is easily achievable. The location of this site is shown in Figure 9. Fencing has been installed around the perimeter of this site to limit access by stock and vehicles. Gates have been installed at either end to allow access for those managing the site. Rabbit and weed control has been implemented here.

7.4.3. Recipient Site 3

Recipient Site 3 is also located in Quandong Station (Figure 9). This site is to be subject to ploughing and seeding with indigenous species. In September 2012 the site was scraped to between 50 mm and 200 mm, depending on the soil type and location. The site was then direct seeded with the species presented in Table 2. Direct seeding of Native Bindweed and Bulbine Lily was also undertaken between October and February 2012. Rabbit and weed control will also be implemented at this recipient site.

Experimental plots set up in this recipient site will comprise the same three treatment groups, namely burn, mow and a control. There will be three plots per treatment (2m x2m in size) which will be selected randomly across the site. A total of nine experimental plots will be used in this recipient site.

Table 2: Species for direct seeding in Recipient Site 3

Common Name	Botanical Name
Black-anther Flax-lily	<i>Dianella revoluta</i> var. <i>revoluta</i> s.l.
Bronze Bluebell	<i>Wahlenbergia luteola</i>
Cotton Fireweed	<i>Senecio quadridentatus</i>
Cut-leaf Goodenia	<i>Goodenia pinnatifida</i>
Pink Bindweed	<i>Convolvulus erubescens</i> spp. agg.
Spur Velleia	<i>Velleia paradoxa</i>
Basalt podolepis	<i>Podolepis jaceoides</i>
Blue Devil	<i>Eryngium ovinum</i>
Bulbine Lily	<i>Bulbine bulbosa</i>
Button Wrinklewort	<i>Rutidosis leptorrhynchoides</i>
Common Billy-buttons	<i>Craspedia variabilis</i>
Lemon Beauty-heads	<i>Calocephalus citreus</i>
Narrow Plantain	<i>Plantago gaudichaudii</i>
New Holland Daisy	<i>Vittadinia</i> spp.
Pale Everlasting	<i>Helichrysum rutiolepis</i>
Plains Everlasting	<i>Chrysocephalum</i> sp. 1
Pussy Tails	<i>Ptilotis spathulatus</i> & <i>macrocephalus</i>
Scaly Buttons	<i>Leptorhynchos squamatus</i> subsp. <i>squamatus</i>
Sheep's-burr	<i>Acaena echinata</i>
Smooth Solenogyne	<i>Solenogyne dominii</i>
Variable Plantain	<i>Plantago varia</i>
Yam Daisy	<i>Microceris lanceolata</i>



Legend

- Proposed Fencing
- ✕ Gates



Figure 10: Recept sites 2 & 3 at Quandong		
Project: Modeina		
Client: DFC (Project Management) Pty Ltd		
Project No. 7045	Date 11/02/2014	Created By: D. Coppolino/ M. Ghasemi
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7.5. Experimental treatments at the recipient sites

The following three experimental treatments, similar to that being undertaken at the donor site, is proposed to occur at the recipient sites:

- Burn
- Mow
- Control.

These treatments have been selected as Spiny Rice-flower recruitment is thought to be dependent (at least in part) upon biomass reduction events and/or fire, which would be natural ecological processes within the species’ habitat. Although mowing is not a natural phenomenon, it provides a practical substitute for natural biomass reduction events such as grazing. Fire and mowing are also commonly used management practices employed by councils and their land management contractors.

The proposed initial treatments are presented in Table 3. Further experiments can be included depending on the number of successful germinants (Table 4).

Table 3: Summary of initial treatment program

Treatment number	Type of treatment	Weed control	Method
1	Burn 1	Biannual	Annual late autumn burn
2	Mow 1		Annual late autumn mow
3	Control		No treatment

Table 4: Summary of future treatment program

Treatment number	Type of treatment	Weed control	Method
4	Burn 2	Biannual	Annual late spring burn
5	Mow 2		Annual late spring mow
6	Control		No treatment


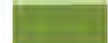



To further the understanding of the species’ requirements and maintain comparable conditions at all recipient sites, soil moisture levels will be monitored at all recipient sites including experimental and control plots.

The proposed treatment plan is provided in Table 5.

Table 5: Propagation Project Plan

Treatment number	Task Type	Year 1 (2012)												Year 2 (2013)												Year 3 (2014)												Year 4 (2015)														
		Summer			Autumn			Winter			Spring			Summer			Autumn			Winter			Spring			Summer			Autumn			Winter			Spring																	
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
1	Burn type 1																																																			
2	Mowing Type 1																																																			
3	Control																																																			
4	Burn type 2																																																			
5	Mowing Type 2																																																			
6	Control																																																			

Table Legend:

-  Planting translocated germinants
-  Planting seedling germinants
-  Burn
-  Weed control
-  Mow

8. DATA ANALYSIS

8.1. Flowering

Following treatments each individual female's annual percentage flowering will be assessed in June. An analysis of variance (ANOVA) will be used to detect differences between treatments.

8.2. Seed production

Following treatments each individual female's annual seed production will be counted. An ANOVA will be used to detect differences between treatments.

8.3. Biomass assessment

8.3.1. Donor site

Following treatments and at the end of each growing season (winter) three 25 x 25cm quadrats will be randomly selected from within each treatment area at the donor site. All biomass (alive or dead) in this area will be cut to ground level, labelled and then placed in an oven at 80C° for 48 hours (Schultz, 2011). The dry weight of 25 x 25cm will then be scaled up (multiplied by 16) to determine the dry weight of 1m² (gm/m²). An ANOVA will be used to detect differences between treatments.

8.3.2. Recipient sites

Following treatments and at the end of each season (summer, autumn, winter spring) one 25 x 25cm quadrat will be randomly selected from within each treatment plot at each recipient site. All biomass (alive or dead) in this area will be cut to ground level, labelled and then place in an oven at 80C° for 48 hours (Schultz *et al.*, 2011). The dry weight of 25 x 25cm will then be scaled up (multiplied by 16) to determine the dry weight of 1m² (gm/m²). An ANOVA will be used to detect differences between treatments at each recipient site.

Biomass levels in each treatment plot at all recipient sites will be correlated using Microsoft Excel against identified germinant health indicators (Table 6) for possible associations. Bivariate analyses will be conducted using the statistical analysis software package SPSS Statistics (Version 18) to assess the direction and strength of any associations².

8.4. Soil moisture and weather readings

Soil moisture within the profile in each treatment plot at all recipient sites will be correlated using Microsoft Excel against identified germinant health indicators (Table 6) for possible associations. A paired sample t test (statistical hypothesis test) will be used to compare the influence of the annual rainfall between years. Bivariate analyses will be conducted similarly as stated for the assessment of biomass (Section 8.3.2).

² Where data does not conform to the requirements of normality, data transformations will be conducted according to Zar (1999). If the data obtained is logarithmic and includes zero values a value of one will be added to the raw data before log¹⁰ transformation. Data that is normally distributed will undergo a Pearson's product-movement correlation (r) and all other data will undergo a Spearman's rho analysis (r^s).

Table 6: Monitoring Plan

Site	Question addressed	Item/s monitored	Monitor number/timing	Indicator	Parameters	Measure		
16 Spiny Rice-flower Populations	1	Germinants found in 2009 and 2010	Once	Survival of germinants	Numbers alive	Visual		
Donor Site - Resident Burnside Population	2	Plant flowering	Annually in winter	% of flowers produced	0% to 100% flowering	Visual		
		Seed production	Annually	Number of seed produced	0 to ∞ seed	3 measured branches (cm)		
	3	Biomass within treatment plots	Annually in winter	Level of biomass produced	0 to ∞	Weight (gm/m ²)		
		Seed production	Annually	Number of seed produced	0 to ∞ seed	3 measured branches (cm)		
All Recipient Sites	4, 5 & 6	Biomass within all treatment plots	Seasonally (end of summer, autumn, winter and spring)	Level of biomass produced	0 to ∞	Weight (gm/m ²)		
				Available bare ground	0 to 100%	Visual		
		Transplanted germinant health	Weekly following planting	A. Germinant stem length	0 to ∞	cm		
				B. Germinant length of stem leaf cover	0 to ∞	cm		
				C. Germinant condition	Good, fair, poor or dead	Visual		
		7	Soil moisture at 4 levels of the soil profile at every treatment plot	Continuously via an automated system	Soil moisture % at each level in the soil profile		0 to ∞	%
	Weather				Continuously via an automated system	Temperature, wind speed, humidity, solar radiation, rainfall, evaporation rate		0 to ∞
			Transplanted germinant health	Weekly following planting		A. Germinant stem length	0 to ∞	cm
						B. Germinant length of stem leaf cover	0 to ∞	cm
						C. Germinant condition	Good, fair, poor or dead	Visual
	8 & 9		Biomass within all treatment plots	Seasonally (end of summer, autumn, winter and spring)	Level of biomass produced	0 to ∞	Weight (gm/m ²)	
		Available bare ground			0 to 100%	Visual		
		Seed production	Annually	Number of seed produced	0 to ∞ seed	3 measured branches (cm)		

9. REPORTING

9.1. Progress reporting

Seasonal data collected for the project as detailed in Table 6, will also be used to inform an annual report prepared for the Commonwealth Department of the Environment, DEPI and the Spiny Rice-flower Recovery Team. The report will include the information gathered during monitoring and an analysis of the management measures and progress towards establishing a viable population of the species. The annual report will include information on the following:

- Flowering and seed production rates in female plants at the donor site.
- The number and location of natural germinants generated from the translocated plants.
- The number and location of translocated plants which have *not* survived the project.
- The number and location of translocated plants which *have* survived the project.

In addition, the report will provide direction on the interim need for retention and timing of eventual removal of the Burnside population. If agreed, the results will be published to contribute towards the knowledge on the propagation of Spiny Rice-flower.

As part of the post-doctoral requirements, results will be published in peer-reviewed journals. The information will therefore be made available to the public to ensure that the knowledge gained is used to further the conservation of the species throughout all sectors.

It is also intended that eventually an offset management guide is prepared which could be used by councils and offset site managers to assist in determining the optimal management methods to simulate the production and secure the survival of Spiny Rice-flower seeds and germinants.

10. PROGRESS TO DATE

Management activities associated with the Propagation Project commenced in June 2012 to assist in meeting the objectives of the project prior to the forecast commencement of development at Precinct 2. Since June 2012, management measures including weeding, placement of weed mats, mowing and ecological burning has been undertaken in the allocated areas at the donor site (Modeina). The objective of these initial management measures was to stimulate seed production for collection. Australian Ecosystems, an experienced bush management contractor, was selected to undertake the management measures at Modeina Estate in Burnside.

Management activities have also been underway at Recipient Sites 2 and 3 (Quandong), with Greening Australia having undertaken the works. No management to date has been undertaken at Recipient Site 1 (Isabella Williams Reserve), as approval from Brimbank Council is reliant upon the Propagation Project being approved by DPCD, DEPI and the Commonwealth Department of the Environment.

To date, the following progress in offset establishment has been achieved.

- Selection of translocation recipient and propagation project sites
- Biomass management treatments at the donor site (Modeina Estate) have commenced
- A total of 2,121 seeds have been collected to date from the donor site (i.e. 951 in 2011, 400 in 2012 and 770 in 2013)
- In 2013, nine germinants were planted at Quandong and currently five are alive.
- Preparation of the two privately owned recipient sites at Quandong Station
- Detailed negotiations with Brimbank Council have occurred to obtain permission to use the publicly owned Isabella Williams Memorial Reserve (proposed Recipient Site 1) for the project.
- A Heads of Agreement has been signed with Victoria University to manage the research project.

Table 7 below indicates the propagation project activities have been completed to date. Some of the activities that have not been achievable to date (e.g. purchase and installation of expensive water moisture monitoring equipment and obtaining agreement from Brimbank Council to use Isabella Williams Memorial Reserve) are pending Commonwealth approval of the project.

The proponent has indicated that further commitment to the project cannot be made without agency approval or endorsement. Delays in project approval or endorsement will also critically impact the ability to make progress on the propagation trial at the most appropriate times (e.g. for site preparation, seed collection, etc.).

11. REFERENCES

- Bellgard, S. 1991. Mycorrhizal associations of plant species in Hawkesbury sandstone vegetation. *Australian Journal of Botany*, 39, 357 - 364.
- Brundrett, M. C. 1991. Roots of jarrah forest plants. I. Mycorrhizal associations of shrubs and herbaceous plants. *Australian Journal of Botany*, 39, 445 - 457.
- Burgman, M. A., Kieth, D., Widyatmoko, D. & Drill, C. 2007. Threat syndromes and conservation of Australian flora *Biological Conservation*, 73 - 82.
- Carter, O. & Walsh, N. 2006. National Recovery Plan for the Spiny Rice-flower *Pimelea spinescens* subspecies *spinescens*. Victoria: Department of Sustainability and Environment.
- Craigie, V. & Hocking, C. 1998. Introduction. In: CRAIGIE, V. & HOCKING, C. (eds.) *Down to Grass Roots*. Proceedings of a conference on management of grassy ecosystems. St Albans, Melbourne: Victoria University.
- Cropper, S. 2007. A census of the *Pimelea spinescens* ssp. *spinescens* (Spiny Rice-flower) population on Lake Borrie Spit in 2007 and comparison with the previous census in 2003 that was conducted prior to active management being initiated on site. Sunshine, Victoria: prepared for Melbourne Water by Botanicus Australia Pty Ltd.
- Cropper, S. 2009. Monitoring of *Pimelea spinescens* ssp. *spinescens* (Spiny Rice-flower) on Lake Borrie Spit in 2008 and a discussion on the appropriate management of the population. Sunshine, Victoria: prepared for Melbourne Water by Botanicus Australia Pty Ltd.
- Department of the Environment (then DSEWPC) 2009. Significant impact guidelines for the critically endangered spiny rice-flower (*Pimelea spinescens* subsp. *spinescens*), EPBC Act policy statement 3.11, Department of the Environment, Canberra.
- Ellstrand, N. C. & Elam, R. 1993. Population genetic consequences of small population size: implications for plant conservation *Annual Review of Ecology and Systematics*, 217 - 242.
- Foreman, P. 2005. Spiny Rice-flower, *Pimelea spinescens* subsp. *spinescens* Rye. Habitat condition and demographic structure of 16 selected populations from The Victorian Riverina and Volcanic Plains. Report No: 1 Spiny Rice-flower Recovery Plan Working Group. Warrnambool: Department of Sustainability and Environment.
- Foreman, P. 2011. Assessment of the Spiny Rice-flower populations at 16 sites on Victoria's northern and volcanic plains in 2004 and 2009. Castlemaine, Victoria: Blue Devil Consulting.
- Gibson Roy, P., Delpratt, J. & Moore, G. 2007. Restoring the Western (Basalt) Plains Grassland. 2. Field emergence, establishment and recruitment following direct seedling. *Ecological Management and Restoration*, 8, 123 - 132.

- Gilpin, M. & Soule, M. 1986. Minimum viable populations: processes of species extinction. In: SOULE, M. (ed.) Conservation Biology The science of Scarcity and Diversity. Sunderland, Massachusetts: Sinauer Associates Inc.
- Holsinger, K. 2000. Demography and extinction in small populations. In: YOUNG, A. & CLARKE, G. (eds.) Genetics, Demography and Viability of Fragmented Populations. United Kingdom: Cambridge University Press.
- James, E. A. & Jordan, R. 2013. Limited structure and widespread diversity suggest potential buffers to genetic erosion in a threatened grassland shrub *Pimelea spinescens* (Thymelaeaceae). Conservation Genetics.
- Lunt, I. D. & Morgan, J. W. 2002. The role of fire regimes in temperate lowland grasslands of Southern Australia. In: BRADSTOCK, R., WILLIAMS, J. & GILL, M. (eds.) Flammable Australia The fire Regimes and Biodiversity of a Continent. United Kingdom: Cambridge University Press.
- Lunt, I. D. 1994. Variation in flower production of nine grassland species with time since fire, and implications for grassland management and restoration. Pacific Conservation Biology, 81, 359-366.
- Lunt, I. D. 1997a. Effects of long-term vegetation management on remnant grassy forests and anthropogenic native grasslands in south-eastern Australia. Biological Conservation, 81, 287-297.
- Lunt, I. D. 1997b. A multivariate growth-form analysis of grassland and forest forbs in South-eastern Australia. Australian Journal of Botany, 45, 691-705.
- Lynch, M., Conery, J. & Burgger, R. 1995. Mutational meltdowns in sexual populations. Evolution, 49, 1067 - 1080.
- McDougall, K. 1989. The re-establishment of Themeda triandra (Kangaroo grass): Implications for the restoration of grassland. Arthur Rylah Institute for the environmental Research Technical Report Series No 89. Victoria: Department of Conservation, Forests and Lands.
- McGee, P. 1986. Mycorrhizal associations of plant species in a semiarid community. Australian Journal of Botany, 34, 585 - 593.
- Morgan, J. 1999a. Defining grassland fire events and the response of perennial plants to annual fire in temperate grasslands of south-eastern Australia. Plant Ecology, 144, 127 - 144.
- Morgan, J. W. 1998. Importance of canopy gaps for recruitment of some forbs in Themeda triandra- dominated grasslands in South-eastern Australia. Australian Journal of Botany, 46, 609-627.
- Morgan, J. W. 1999b. Effects of population size on seed production and germinability in an endangered, fragmented grassland plant. Conservation Biology, 13, 266-273.
- Morgan, J. W. 2001. Seedling recruitment patterns over four years in an Australian perennial grassland community with different fire histories. Journal of Ecology, 89, 908-919.
- NSW Parliamentary Counsel's Office 2002. Threatened Species Conservation Regulation 2002. In: NEW SOUTH WALES GOVERNMENT (ed.). Internet:

<http://www.legislation.nsw.gov.au/viewtop/inforce/subordleg+1012+2002+FIRST+0+N>.

- Reiter, N. 2014. Native Orchid germination success [Online]. Australian Network for Plant Conservation, Media release from 27th February 2014. [Accessed 4th of March 2014].
- Reynolds, D. 2006. The ecological importance of soil disturbance on the recruitment, growth and reproduction of temperate lowland grassland forbs and implications for rehabilitation. Honours, Victoria University of Technology.
- Reynolds, D. M. 2013. Factors affecting recruitment in populations of Spiny Rice-flower (*Pimelea spinescens* Rye subspecies *spinescens*) in Victoria's natural temperate grasslands: relationships with management practices, biological and ecological characteristics. Under submission Doctor of Philosophy, Victoria University.
- Robinson, R. 2003. Natural recruitment of native forbs in the grassy ecosystems of South-eastern Australia. Master of Science, Victoria University of Technology.
- Schultz, N. L., Morgan, J. W. & Lunt, I. D. 2011. Effects of grazing exclusion on plant species richness and phytomass accumulation vary across a regional productivity gradient. *Journal of Vegetation Science*, 22, 130 - 142.
- Sgro, C. 2011. Building evolutionary resilience for conserving biodiversity under climate change. *Evolutionary Applications*, 4, 326 - 337.
- Sherwin, W. & Moritz, C. 2000. Managing and monitoring genetic erosion. In: YOUNG, A. & CLARK, T. W. (eds.) *Genetics, Demography and Viability of Fragmented Populations*. United Kingdom: University of Cambridge.
- Silvertown, J. & Charlesworth, D. 2001. *Introduction to Plant Population Biology*, Great Britain, Blackwell Science.
- Stuwe, J. & Parsons, R. F. 1977. Themedia australis grasslands on the Basaltic Plains, Victoria: floristics and management effects. *Australian Journal of Ecology*, 2, 467-476.
- Thomas, B. 2008. (Draft) Translocation Plan for the introduction of *Pimelea spinescens* subsp *spinescens* (Spiny Rice-flower) to the Terrick Terrick National Park (Finn's Paddock). Victoria: Department of Sustainability.
- Williams, N., McDonnell, M. J. & Seager, E. J. 2005. Factors influencing the loss of an endangered ecosystem in an surpassing landscape: A case study of native grasslands from Melbourne, Australia. *Landscape and Urban Planning*, 71, 35-49.
- Zar, H. 1999. *Biostatistical Analysis*, New Jersey, Simon and Schuster.

Appendix 1: Offset calculations using the Offset Assessment Guide

Matter of National Environmental Significance																	
Name		SRF															
EPBC Act status		Critically Endangered															
Annual probability of extinction Based on IUCN category definitions		6.8%															
Impact calculator																	
Impact calculator	Protected matter attributes				Attribute relevant to case?			Description		Quantum of impact			Units		Information source		
	<i>Threatened species</i>																
	Number of individuals e.g. Individual plants/ animals				Yes			Spiny Rice-flower at Burnside		244			Count		BL&A Reports 7045 (2.6) and 7045 (22.1)		
Offset calculator																	
Offset calculator	Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value	% of impact offset	Minimum (90%) direct offset requirement met?	Cost (\$ total)	Info. source
	<i>Threatened species</i>																
	Number of individuals e.g. Individual plants/ animals	Yes	244	Count	SRF propagation project, involving establishment of translocated and germinated plants.	10	0	0	800	800	60%	480	248.62	101.89%	Yes	N/A	N/A
Summary																	
Summary	Protected matter attributes				Quantum of impact			Net present value of offset			% of impact offset		Direct offset adequate?			Direct Offset Cost (\$)	
	Number of individuals				244			248.62			101.89%		Yes			0	

Appendix 2: Female Spiny Rice-flower Plant Numbers at Modeina

Plant number	Area	Treatment Group	Located in potential retention zone?
1	Weed mat	Weed matting	No
2	Weed mat	Weed matting	No
3	Weed mat	Weed matting	No
4	Weed mat	Weed matting	No
5	Weed mat	Weed matting	No
6	Weed mat	Weed matting	No
7	Weed mat	Weed matting	No
8	Weed mat	Weed matting	No
9	Weed mat	Weed matting	No
10	Weed mat	Weed matting	No
11	Weed mat	Weed matting	No
12	Central	Mow	Yes
13	Central	Mow	Yes
14	Central	Mow	Yes
15	Central	Mow	Yes
16	Central	Mow	Yes
17	Central	Burn	Yes
18	Central	Control	Yes
19	Central	Control	Yes
20	Central	Control	Yes
21	Central	Control	Yes
22	Central	Control	Yes
23	Central	Control	Yes
24	Central	Control	Yes
25	Central	Control	Yes
26	Central	Control	Yes
27	Central	Control	Yes
28	Central	Mow	Yes
29	Central	Burn	Yes
30	Central	Burn	Yes
31	Northern	Burn	Yes
32	Northern	Control	Yes
33	Northern	Control	Yes
34	Northern	Control	Yes
35	Northern	Control	Yes
36	Northern	Burn	Yes
37	Northern	Burn	Yes
38	Northern	Burn	Yes
39	Northern	Burn	Yes
40	Northern	Burn	Yes
41	Northern	Mow	Yes
42	Northern	Mow	Yes
43	Northern	Mow	Yes
44	Northern	Mow	Yes
45	Northern	Mow	Yes
46	Northern	Mow	Yes
47	Northern	Mow	Yes
48	Northern	Mow	Yes
49	Northern	Burn	Yes
50	Northern	Burn	Yes
51	Northern	Control	No
52	Northern	Control	No
91	Northern	Mow	Yes
92	Northern	Mow	Yes
93	Northern	Mow	Yes
94	Northern	Mow	Yes
95	Northern	Mow	Yes
96	Northern	Burn	Yes
97	Northern	Burn	Yes
98	Northern	Control	Yes
99	Northern	Control	Yes
100	Northern	Control	Yes
102	Northern	Control	Yes
103	Northern	Control	Yes
104	Northern	Control	Yes
105	Central	Mow	Yes
106	Central	Mow	Yes
107	Central	Mow	Yes
108	Central	Burn	Yes
109	Central	Burn	Yes
110	Central	Burn	Yes
121	Central	Burn	Yes
122	Central	Burn	Yes
123	Central	Burn	Yes
124	Central	Burn	Yes

Note: 75 plants are listed in this table (females only). Plant ID numbering includes both male and female plants, numbered 1 through 244. The numbers in this table therefore skip numbers allocated to male plants.












Appendix 3: Modeina Estate Staging Plan

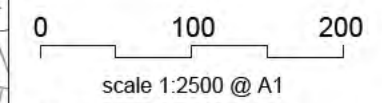
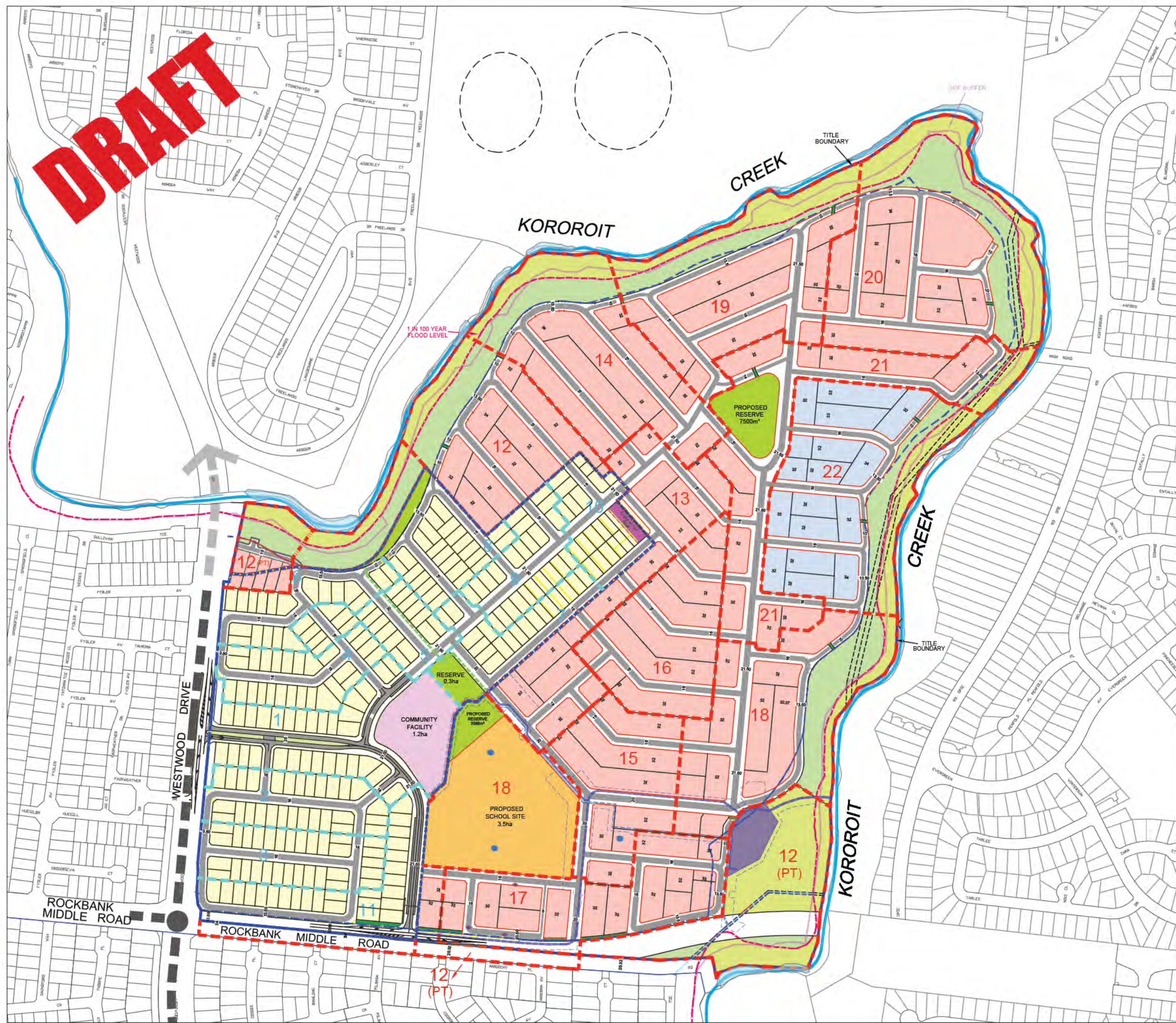
DRAFT

LEGEND:

 Precinct 1
22.82ha

 Precinct 2
65.49ha

-  FLOODLINE 1 IN A 100
-  UNENCUMBERED RESERVE
-  ENCUMBERED RESERVE
-  RESERVE
-  LANDSCAPE RESERVE
-  COMMUNITY CENTRE
-  OUTFALL EASEMENT
-  DPM SEWERAGE ALIGNMENT
-  DPM DRAINAGE ALIGNMENT
-  SUPERLOT SET ASIDE AS A MANAGED AREA TO BE DEVELOPED FOR RESIDENTIAL PURPOSES WHEN THE PROPAGATION PROJECT CONCLUDES
-  GGF BUFFER



DATE: 11 July 2014
REF: 29743 001
DWG: 2974300AH(V2)

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Appendix 4: Peer Review

Review: Spiny Rice-flower Propagation Project, BL&A

Review prepared by Dr Georgia Garrard, RMIT University

15th December, 2013

General comments and summary

This report outlines a proposed propagation project to fulfill offset requirements for the loss of *Pimelea spinescens* populations at the Burnside North site to be developed by DFC Pty Ltd.

Development of Precinct 2 at Burnside North will incur impact on *P. spinescens*, including the eventual loss of 224 individual plants at the site. The proposed project outlines how the direct offset requirements of 721 *P. spinescens* may be achieved at 3 recipient sites in Melbourne's west. It is also hoped that the project will result in critical knowledge gains that will contribute to improved understanding of conservation and management of the species in the future.

The stated aim of the proposed project is to "evaluate the current biomass methods to:

- Maximise seed and germinant production from the established Burnside North Spiny Rice-flower population;
- Maximise the survival to reproductive age of the generated germinant Spiny Rice-flower plants in the recipient sites."

Additional questions to be addressed include:

- "What is the threshold level of biomass accumulation that requires management input?"; and
- "What is the threshold level of soil moisture required for Spiny Rice-flower seedling survival?"; and potentially:
- "What is the optimal time of year (spring versus autumn) to reduce biomass?"; and
- "What is the appropriate frequency of burning (yearly, biennially or triennially)?"

Having read the proposed project, I highlight two main areas of concern: first, that the theoretical causal link between the project aims and the anticipated outcomes is not thoroughly established; and second, that it is not clear how uncertainty and risk of project failure will be mitigated. **I think some further development of the project proposal is necessary to demonstrate that the outcomes of the project will satisfy the direct offset requirements.** I discuss this further below. I have also attached an annotated copy of the project proposal that may provide more insight to my thinking.

Project aims, design and monitoring

The overall objective of the project is to evaluate how available biomass management methods (burning, and mowing (and weed mats?)) influence seed and germinant production, and survival of germinants to reproductive age, with a view to identifying the management conditions that maximize these key life history attributes. I believe that reproduction in *P. spinescens* is relatively poorly understood, and I have no doubt that identifying conditions that are conducive to germination and survival will make a valuable contribution to the management of this species. The report contains some discussion of the role that biomass accumulation and removal plays in maintaining species diversity in native grasslands. **However, this project requires some specific discussion about the role (either established or potential) of biomass removal for promoting seed production, germination and survival in *P. spinescens*.** This is addressed briefly in the discussion of treatments in recipient sites, but warrants earlier attention, as establishing the link between biomass removal actions, seed production, germination and survival is key to determining the scientific merit of the proposed study. Such a discussion might include information such as:

- what is currently known about seed production, germination and survival of *P. spinescens*?
- theoretical or established models of the role of burning, mowing and weed control on seed production, germination and survival of *P. spinescens*; and
- any other variables that might influence seed production, germination or survival of the species.

Successful implementation of the proposed project will fulfill the direct offset requirements for the loss of the *P. spinescens* at the Burnside North property. It therefore seems reasonable that a primary objective of the study is to establish a secure offset population of the species that satisfies the minimum offset requirements. The proposal includes many different numbers of germinants that are required (For example, 810 (p. 22), 448 (p. 27), 721 (p. 31)), but it is not clear exactly what each of the numbers mean. **It would be useful if the minimum requirements for the direct offset is identified early in the project proposal.** This would also help with the evaluation of risk management in the project (see below).

I have some concerns about the amount of inter-site variation and replication in the recipient sites. The level of replication in the recipient sites is not clear. At site 1, it seems that each of the 3 treatments (2 treatments and 1 control) will be replicated 3 times, but it is not clear how many individual plants will be in each group. There is less information about the level of replication in sites 2 and 3. A trade-off exists between the level of replication within and across sites. There is obviously some risk management benefit to having multiple recipient sites, however, there is significant variation between sites and it is not clear that the level of replication is ample to allow the identification of differences between treatments. The authors have reported the results of a power analysis when determining sample sizes in the donor site. **Can the authors please provide more information about the level of replication in the recipient sites and the power of this project design to provide answers to the overall project objectives?**

The report identifies a number of additional objectives (listed above). It is not clear how some of these questions can be answered by the project as described. For

example, there is no mention of soil moisture or biomass measurements in monitoring strategy described on page 24. In additions, there is some discrepancy within the report about the level of monitoring. On page 24, it suggests that monitoring will occur in spring and autumn, but it is only planned for spring according to the table on page 23. **Can the authors please elaborate on the monitoring strategy to demonstrate that project objectives can be evaluated?**

Management of uncertainty and risk

Uncertainty and risk is inherent in this project. As the project is designed to fulfill the offset requirements and the existing population is projected to be completely removed from the donor site, **a more thorough discussion of project risks and contingencies is warranted.**

It is my understanding that little is known about reproductive success in this species (although author Reynolds is certainly an expert in this area). For example, until recently very few populations were thought to be naturally reproducing from seed, and time to reproductive age is not known. In addition, I believe that there is little evidence of high translocation success rates in this species.

There is an implicit acknowledgement of uncertainty and risk in certain aspects of this project. For example, the requirement for 900 seeds to produce 6 germinants, of which 1 will survive to become an adult plant indicates a certain level of risk at each life stage transition. In addition, the consideration paid to ensuring a management zone is protected in the donor site until such time as the project is deemed successful in the recipient sites implies that the authors and regulators recognize that project success is uncertain. However, it is not clear in this project proposal that the authors have considered the range of risks to the project and how they affect the potential outcomes.

A useful discussion of uncertainty and risk might include:

- identification of potential risks and uncertainties in the project;
- their impact on the project objectives;
- the probability of the risk occurring; and
- steps taken to mitigate the risk/manage uncertainty.

Finally, the report makes mention of the safety net provided by the 5.77 ha management area in the Burnside North site, which will be maintained until some offset success can be demonstrated. It is not clear what will happen if the offset project is unsuccessful after the 5-7 years it takes to fully develop the rest of the site. Can this be clarified?

Further specific comments

p. 10. Is the project long enough to determine the survival of individuals to reproductive age? My reading of the limited literature available indicates that reproductive age is uncertain, but probably about 3 years.

p. 10. WRT project contingencies – what are they? What happens if seed production and germination is not successful? How long will the management zone in Precinct 2 be protected?

pp. 16- 19. How were the recipient sites chosen?

p. 16. Can you provide more details about the methods for introducing *P. spinescens* to recipient sites? My reading is that they will only be introduced as germinants? What methods will be used to germinate seedlings from seeds?

p. 17. What constitutes success (or not) of the project?

p. 17. What is appropriate fencing in this instance? What is it designed to do?

p. 17. Do you mean all *Nassella* species? Does this mean that they need to be actively managed?

p. 19. Recipient sites 2 and 3 are extremely small. What population size can sites of this size support? Will they be large enough to support the minimum population required for the direct offset? How will the risks to these small sites be managed? Are the sites to be managed as part of a larger site?

p. 20. What is the point of this table?

p. 25. What is the success rate of translocation into pots for continued seed collection?

p. 25 and 27. Regarding the wording of 'any' translocation site. Is there a preference for single or multiple new populations of the species?

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CONTACT INFORMATION

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QUALIFICATIONS

2010 Doctor of Philosophy, RMIT University
2002 Bachelor of Arts (Honours – Geography)/Bachelor of Science (Environmental Sci.), University of Melbourne

ACADEMIC EXPERIENCE

September, 2012 – Present: *Postdoctoral Research Fellow, School of Global, Urban and Social Studies, RMIT University*

I am currently employed as a research fellow on a project entitled “Reimagining the Suburb: Planning for biodiversity in the urban fringe”. This project, funded by The Myer Foundation, aims to improve prospects for biodiversity conservation within housing developments and investigate urban development scenarios that mitigate impacts on remnant biodiversity, with a particular focus on native grasslands.

November, 2009 – September, 2012: *Postdoctoral Research Fellow, School of Botany, University of Melbourne*

During my first two years at the School of Botany, I worked as a research fellow on an ARC Discovery Project investigating the use and influence of informative Bayesian priors in ecology. For the last year, I have been working as a post-doctoral research fellow in the National Environmental Research Program (NERP) Environmental Decisions Hub. My research in these roles covered a range of topics, including bird dispersal and response to landscape change, and the development of trait-based models for estimating defensible priors. My NERP research has been focussed on issues associated with imperfect detectability in threatened species policy and environmental impact assessment processes. In this role, I have had opportunities to further develop my quantitative skills, participate in collaborative monitoring and management workshops, and facilitate structured decision making workshops.

February, 2005 – November, 2009: *PhD Candidate: School of Global Studies, Social Science and Planning, RMIT University.*

My PhD research topic was *Issues of imperfect detectability in plant conservation* and was undertaken as part of the *Biodiversity Planning in Urban Fringe Landscapes* project at RMIT University, Melbourne. My PhD focused on the detectability of plant species during flora surveys and the development of appropriate survey standards for environmental impact assessment. In my research, I used ecological models to estimate species' detection probabilities and the minimum length of time needed to detect the species with reasonable certainty. In this research, I had the opportunity to investigate ways in which science can be better harnessed to inform environmental policy and legislation, an area that is of particular interest to me. The field component of my PhD research was undertaken in native grasslands in Melbourne's urban fringe. These vegetation communities are critically endangered and face continuing threat from urban development. They contain a number of difficult to detect endangered species, and a subject to a large number of environmental impact assessments, making them an ideal case study system for my research.

TEACHING & SUPERVISION

2010 – 2012: *Subject co-ordinator: Graduate Seminar in Environmental Science, University of Melbourne*

This Masters subject examines current topics in the discipline of environmental science. I have co-ordinated this subject since its introduction in 2010.

2006 – 2009: *Sessional Tutor, RMIT University*

During this period, I tutored in subjects within the Environment and Planning program at RMIT, including:

- *Biodiversity: Society and Environment:* 2006, 2007 (1st year Undergraduate)
- *Rural Resources and Environment:* 2006, 2007 (2nd year Undergraduate)
- *Natural Resource Management:* 2007, 2008 (Postgraduate; Including Online Course Co-ordination 2008)
- *Ecosystems and Human Impacts,* 2010 (Postgraduate)

Supervision of Research Students

Hannah Pearson (PhD, UoM): *Investigation of uncertainty and expert elicitation in ecological decision-making (TBC)*

Martha Lucia Suarez Carvajal (PhD, RMIT): *Analysis of biodiversity conservation planning policy in urban areas (TBC)*

Elizabeth Martin (Masters, UoM): *Use of co-occurrence data for improving distribution models for rare species*

Wan-Jou Lin (Masters, UoM): *An experimental test of an optimal resource allocation model (Completed Aug 2012)*

Lucy Arrowsmith (Hons, UoM): *Improving occupancy models for a threatened grassland plant (Completed Nov 2012)*

DISCIPLINARY SKILLS

- Statistical packages, including R and OpenBUGS
- Structured decision making
- Workshop facilitation experience
- Planning and management of field research
- Effective presentation skills
- Excellent written communication skills
- Media experience, including television and radio (pre-recorded & live-to-air).

PUBLICATIONS

Journal Articles

Kendal, D., Hauser, C. E., **Garrard, G. E.**, Jellinek, S., Giljohann, K. M., & Moore, J. L. (2013). Quantifying Plant Colour and Colour Difference as Perceived by Humans Using Digital Images. *PloS one*, *8*(8), e72296.

Garrard, G. E., McCarthy, M. A., Williams, N. S. W., Bekessy, S. A. & Wintle, B. A. (2012) A general model of detectability using species traits. *Methods in Ecology and Evolution*. doi: [10.1111/j.2041-210x.2012.00257.x](https://doi.org/10.1111/j.2041-210x.2012.00257.x)

McCarthy, M.A., Moore, J.L., Morris, W.K., Parris, K.M., **Garrard, G. E.**, Vesk, P.A., Rumpff, L., Giljohann, K., Camac, J., Bau, S.S., Friend, T., Harrison, B. & Yue, B. (2012) The influence of abundance on detectability. *Oikos*. doi: [10.1111/j.1600-0706.2012.20781.x](https://doi.org/10.1111/j.1600-0706.2012.20781.x)

Garrard, G. E., McCarthy, M. A., Vesk, P. A., Radford, J. Q. & Bennett, A. F. (2012) A predictive model of avian natal dispersal distance provides prior information for investigating response to landscape change, *Journal of Animal Ecology*, **81**: 14-23.

McCarthy, M. A., **Garrard, G. E.**, Moore, A. L., Parris, K. M., Regan, T. J. & Ryan, G. E. (2011) The SAFE index should not be used for prioritization. *Frontiers in Ecology and the Environment* **9**: 486–487.

Garrard, G. E., Bekessy, S.A., McCarthy, M.A. & Wintle, B.A. (2008) When have we looked hard enough? A novel method for setting minimum survey effort protocols for flora surveys. *Austral Ecology*, **33**: 986-998.

Peer-reviewed Conference Proceedings

Hauser, C.E., Moore, J.L., Giljohann, K.M., **Garrard, G.E.** & McCarthy, M.A. (2012) Designing a detection experiment: tricks and trade-offs. In Eldershaw, V. (ed). *Proceedings of the 18th Australasian Weeds Conference*. Weed Society of Victoria, October 2012, pp. 267–272.

Articles in preparation

Garrard, G. E., McCarthy, M.A., Bekessy, S. A. & Wintle, B. A. (In prep) Determining optimal survey effort for a threatened plant species.

Book Chapters

Garrard, G. E. & Bekessy, S. A. (In Press) Landscapes and Landuse Planning. In Byrne, J. *et al.* (Eds) *Australian Environmental Planning: Challenges and Future Prospects*, Routledge.

Hauser, C. E., **Garrard, G. E.** & Moore, J.L. (In Review) Estimating Detection Rates. In Jarrad, F. *et al.* (Eds) *Biosecurity surveillance: quantitative approaches*, CABI.

Reports

Garrard, G.E. & Wintle, B.A. (2011) *Minimum survey effort requirements for impact assessments under the EPBC Act 1999: A review of methods for estimating and managing detectability in biological surveys*. A Report to the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC).

Garrard, G., Bekessy, S. & Wintle, B. (2009) *Determining necessary survey effort to detect invasive weeds in native vegetation communities*, Australian Centre of Excellence for Risk Analysis Project 0906.

Others

Garrard, G. & Rumpff, L. (2011) Science the loser in Victoria's alpine grazing trial, *The Conversation*, [online publication](#).

Garrard, G. (2009) How hard do we need to look to find threatened species? *Decision Point*, 34, 3-5.

I have reviewed articles for *Journal of Ecology*, *Methods in Ecology and Evolution*, *Conservation Biology*, *Diversity and Distributions*, *Austral Ecology*, *Ecological Management and Restoration* and *Australian Journal of Botany*.

GRANTS/PRIZES

- ACERA Research Project 0906: *Determining necessary survey effort for detecting invasive weeds in native vegetation communities*. \$57,000.
- Runner-up, Best Student Oral Presentation, Ecological Society of Australia Annual Conference, Sydney, 2008.
- Australian Postgraduate Award 2005-2008
- Holsworth Wildlife Research Scholarship 2005
- JJ Wood Memorial Scholarship for Undergraduate Geography 2002

OTHER PROFESSIONAL ROLES & MEMBERSHIPS

- *Member, Technical Advisory Group, Western Grassland Reserves*
Two large (total 15,000 ha) grassland reserves are to be established to offset losses of native grassland remnants within Melbourne's expanded urban growth boundary. Victoria's Department of Sustainability and Environment is responsible for the acquisition, restoration and management of land within these reserves over a ten-year period beginning in 2011. The Technical Advisory Group is to provide technical advice and expertise to assist the implementation of the management plan for the reserves over this period.
- *Participant, Theo Murphy High Flyers Think Tank 2011 – Stressed Ecosystems: Better Decisions for Australia's Future.*
- *Facilitator, Structured Decision Making Workshop, NERP/SEWPaC, Canberra, 2012*
- *Member, Local Organising Committee, Ecological Society of Australia Conference 2012*
- *Member, Ecological Society of Australia, Society for Conservation Biology*
- *Advisory Board Member, Moral Fairground, Australia*
- *Member, Evans St Grassland Management Committee, 2007-2011*
- January, 2003 – December, 2004: *Environmental Scientist, Earth Systems Pty Ltd, Melbourne*

Appendix 5: Responses to Peer Review

Peer Review Main Topics	Action Required	Response Provided in current version
Biomass accumulation and removal	Provide reference for importance of this in grasslands and provide specific reference to this for Spiny Rice-flower.	Literature review (Chapter 5) has been amended to provide further information on this topic.
Successful implementation	Success of the project should be measured by the production (no.) of Spiny Rice-flower in line with offset target. State aims early in the report.	Aims of project detailed clearly. Measure of success discussed in detail in Chapter 3.
Replication	Provide more information as to why sites have been given the current no. of replicates. Discuss power analysis.	Replicates discussed further in Chapter 6. Results of power analysis provided including graphs and power measures in Chapter 7.
Monitoring	Clarify discrepancies. State how monitoring will assist in evaluating objectives.	Data collection, analysis and monitoring detailed and tabulated in Chapter 8.
Uncertainty and Risk	Risks should be further discussed. State what will happen if project is unsuccessful.	Risks and associated contingencies are discussed in detail in Chapter 4.
Spiny Rice-flower management reserve		

Appendix 6: Second round Peer Review

Review: Spiny rice-flower propagation project (Revised)

Review undertaken by Dr Georgia Garrard (RMIT University) for Brett Lane and Associates in association with Deborah Reynolds (Victoria University)

14th March 2014

I originally reviewed the project proposal in December, 2013. At that time, I highlighted a number of concerns relating to the specification of project aims, management of project risks and experimental replication.

Having reviewed the updated project proposal, I believe that most of the issues I raised have been satisfactorily addressed by the authors. In particular, my concerns regarding mitigation of project risks have been addressed in significant detail in the revised document.

I have identified a number of scientific issues in the revised document, which I believe require some clarification, however these are only minor:

- p. 13. The authors state that survival of *Pimelea spinescens* is thought to be relatively certain once the individual has reached 1 – 2 years of age, yet translocated individuals are considered established after surviving for 1 year. **It seems reasonable to request that individuals be considered established only after surviving for at least two years to minimize the risk of project failure.**
- p. 9-11. The proponents have made considerable effort to ensure that the majority of *Pimelea spinescens* plants are not removed until a successful offset population is established. Stage 22 is to be retained until such time that the project is deemed successful. **However, can the proponents demonstrate that the viability of the individuals in Stage 22 will not be adversely affected by the development of adjacent Stages** (in particular, by the development of Stage 18, which is very close to a large population in Stage 22)?
- p. 17. Development timing. The authors state that plants 7-11 and 51-52 will be retained for 3 years for seed collection. Does this mean the plants will be retained *in situ* or transplanted to pots? I have assumed it means retained *in situ*, which obviously involves less risk than transplantation.
- Recipient sites (p. 30-33). *Isabella Williams Reserve*: It is not clear in the proposal that the establishment of individuals in MZ2 constitutes a 'new' population for the purposes of offsetting. Can this be further clarified? *Quandong sites*: These sites are both extremely small (<0.3 ha). It is not clear to me that these sites are large enough to support a viable population of the size required to meet the offset requirements. Can the authors please

clarify how these sites will be managed to ensure that viable populations of *Pimelea spinescens* of the size required for offsetting will be achieved?

A key failing of many offset policies is that losses are often incurred on the assumption that gains will accrue in the future, but these gains are usually uncertain. In principle, I support projects such as this, which aim to establish suitable, viable offsets prior to the loss of the existing populations. In this case, this is based on the understanding that the insurance population in Stage 22 will be protected (and managed to ensure long-term viability) until such time as the offset population is successfully established and demonstrated to be viable in the long-term. If this cannot be guaranteed, the risk of failure of the project to deliver a sufficient offset population should be considered much larger.

A handwritten signature in black ink that reads "Georgia Garrard". The signature is written in a cursive, flowing style.

Dr Georgia Garrard
14/3/14

Appendix 3: Stormwater drainage for Modeina – Overall (prepared by DPM)



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STORMWATER DRAINAGE FOR "MODEINA" – OVERALL

July 2014

STORMWATER DRAINAGE FOR MODEINA

July, 2014

1. GENERAL

The natural terrain is quite variable with essentially flat terrain along the existing ridge line that runs in the direction southwest to northeast, but also with more hilly terrain as the ridge line “rolls over” to the Kororoit Creek around the perimeter of the site. The entire northern section comprises of steep terrain for a length of approximately 100 metres from the ridge to the creek itself, the entire eastern section very different, in that the steeper terrain exists for an extensive length from the ridge line for approximately 400-500 metres to the creek. Existing grades, range from 1 in 150 – 1 in 300 in the vicinity of the ridge to around 1 in 12 – 1 in 50 elsewhere.

A schematic overall drainage catchment plan at the back of this report, Attachment “A”, shows that the intention of the drainage system is to have the majority of lots in this area drained towards the southeast corner of the site, where a wetlands reserve in the order of 2 Ha is to be provided. This report details typical drainage catchments to the wetlands but also directly to the creek and their treatment prior to discharge.

There is an external drainage catchment for underground 1 in 5 years piped flows that picks up stormwater runoff from approximately 130 lots west of Westwood Drive and north of Rockbank Middle Road. This is shown in Attachment “A”. This was known as the Modeina section. The outlet pipe from this area terminates approximately on the northeast corner of Rockbank Middle Road and Westwood Drive Intersection. This report includes commentary of treatment of this drainage also.

There is no further external drainage, as all the residential area south of Rockbank Middle Road have already been provided with drainage for all the lots within it. Therefore there are separate discharge points to the Kororoit Creek south of this property.

There is also an external, 1 in 100 overland flowpath along the Rockbank Middle Road coming from the west from the Caroline Springs development. This will be continued eastwards towards the Kororoit Creek. This report addresses this as well.

2. STAGING OF THE WORKS

Precinct 1 (26Ha): An interim wetland arrangement (as per Attachment 'C', sheet 1) is required to treat stormwater from the approximate 26 Ha catchment that will be contributing to the wetland location. The interim arrangement will be maintained by the developer until the ultimate asset is provided. This wetland will ultimately be upsized to cater for the full 65 Ha catchment indicated in Attachment 'A'. The ultimate wetland has been designed and approved by Melbourne Water and is attached as Attachment 'C', sheet 2.

Balance Of The Site: Staging for the balance of the site is included in Attachment 'A'. Once Precinct 1 has been fully developed and the construction of the balance of the site commences, the ultimate wetland will need to be constructed.

Perimeter catchments: The perimeter catchments will require water quality treatment prior to stormwater discharge to the creek. Attachment 'A' indicates the catchments and approximate sizing of these proposed assets along the corridor. Each asset will treat discharge to the creek to Best Practice guidelines.

A Music model for treatment of subcatchments within the site is included in Attachment 'K' at the end of this report.

3. MINOR DRAINAGE FLOWS (Piped Flows) & THE WETLANDS

As mentioned in the previous section, the current development proposal has been assessed for existing level constraints with the intention to direct as much underground pipe, 1 in 5 year flows, as possible to the southeast corner of the site, where a large wetland, (sediment and nutrient), pond is proposed.

Attachment 'A' shows the overall drainage layout and all the various subcatchments to their creek outlet for the entire site. What is immediately apparent is that every attempt has been made to maximise the catchment to the wetland. The yellow catchment is in the order of 65.2 Ha. As the catchment is above the 60 Ha limit, this wetland would most likely be a Melbourne Water asset. Assuming a water surface area equivalent to approximately 1% of the total catchment, a traditional wetland water surface would be in the order of 6500 sq.m. Within a 2.0 Ha reserve, this would be an achievable ratio of water surface to grassed surface, (balance of reserve), area relationship. In this case however, the wetland is proposed to be a sediment basin / bio retention basin combination. This requires a smaller footprint than a traditional wetland which in this case will minimise the affect on / removal of existing grassed adjacent to the creek reserve. The asset has been approved by Melbourne Water.

The wetlands would accept piped flows from the entire 65.2 Ha, which includes the catchment west of Westwood Drive which currently discharges via a 900mm diameter pipe to a temporary sediment pond at the corner of Rockbank Middle Road and Westwood Drive. The temporary wetland would be filled in and the natural surface levels reinstated. The pipe would be extended along the full length of Rockbank Middle Road, finally discharging into the proposed wetland in the southeast corner of the site. It is anticipated this pipe would be in the order of a 1200-1350mm diameter pipe immediately upstream of the wetland.

The wetlands are proposed to be a “full treatment” system, meaning they would treat the full range of particle sizes from litter, suspended solids, right through to Nitrogen and Phosphorus. A separate drawdown assessment has been made and seasonal water levels, by way of drawdowns, as well as predicted suspended solid and nutrient reductions, to levels acceptable to Melbourne Water prior to discharge to the Kororoit Creek have all been satisfied. For a catchment as large as the one proposed, sustainability of the wetland is therefore not a problem. Other wetlands have proven to be sustainable around Victoria with much smaller catchments than the one proposed in this development.

The typical parameters of the wetland system would be as follows:

- 1 in 5 year piped flows arrive at upstream end of wetland,
- 1 in 1 year flows are to be directed into the sediment basin / bioretention basin to be treated, within it the gap flow between 1 in 1 year and 1 in 5 year flows is to be diverted around the wetland to the creek.
- A further diversion of the 1 in 1 year flows down to 1 in 3 month flows will discharge through a Gross Pollutant Trap prior to entering the wetlands. This would assist in the removal of large particles like General Rubbish. The GPT will be maintained by council and therefore they will have input into the type of pit selected.
- The wetlands itself is to comprise of a primary treatment sediment pond area with most likely an embankment wall at its downstream end, separating this area from the bioretention basin downstream.
- Downstream of the sediment basin and primary treatment areas, the bioretention basin plants and filter media will assist in the removal of nutrients to best practice guidelines.
- The downstream most end of the wetland comprises a spillway and open channel discharging to the creek.

- The sediment basin / bioretention basin also has an extended detention depth (above the normal water level) which is designed to contain the flows within the sediment pond for between 12 and 16 hours to allow the particles to settle.

The 65.2 Ha catchment on attachment "A" includes a section northwest of a dashed orange line, the existing ridge line. This area could possibly have been in a separate catchment to the creek but every attempt has been made to ensure the maximum runoff is taken and treated by the wetlands before entering the creek system.

The interim and ultimate design of the current wetlands design principles and details are included within Attachment "C" in this report.

There are six much smaller catchments, ranging from 1.55 Ha to 7.22 Ha that make up the balance of this site. As can be seen from attachment "A", these have been kept to an absolute minimum area. Melbourne Water will want as few connections as possible to the Kororoit Creek. The topography of the land along the creek perimeter road is such that the number of sub catchments to the creek as shown on Attachment "A" is what is considered to be the minimum number of connections. It is possible the 7.22 Ha catchment at the northern end adjacent to the creek be split in two if the finished surface level of the creek road makes it impractical to direct all pipe drainage to a single point. It is for this reason that a dashed green arrow is also shown within the catchment. It appears very likely that the single discharge point is achievable.

Assuming 10 – 15 lots per ha, these six subcatchments would have a maximum of around 70 lots within the largest one. This area is simply not large enough to provide sufficient runoff to sustain even a small sediment pond prior to discharge to the creek, let alone a full wetland. What is therefore proposed for the six drainage connections to the creek, is to provide commercially available gross pollutant rubbish and silt traps on the last

drainage line adjacent to the road, for the removal of sediment and litter by interception in pits.

A product similar to a 'Humeguard' or 'Rocla Cleansal' litter trap would be selected to treat the predicted flows. Downstream of the GPT, discharge to the creek itself will be via a standard cradle type endwall, which is Melbourne Water's preferred drainage connection to their water courses.

This option was put to Melbourne Water for the 40 lot catchment on the west side of Westwood Drive but Melbourne Water did not require a permanent Gross Pollutant trap. Temporary measures were undertaken to ensure water quality from runoff to the creek were maintained until 90% of the development was completed.

Melbourne Water was in favour of providing a temporary environmental site management plan, showing how silt and litter runoff during the construction phase of the development would be controlled. A permanent litter trap was not required as current data suggests that up to 98% of Gross Pollutants and silt runoff from developments, can occur during the road and house construction phase. Pollutant runoff dramatically reduces thereafter.

Environmental Management plans will be produced for each stage of development, that address all the aspects of that particular stage and how the Contractor is to protect the creek from litter, silt and other pollutants as a result of the construction. These plans are submitted to Melbourne Water prior to the commencement of every stage. Attachment "F" shows the plans submitted with the stages on the west side of Westwood Drive prior to each stage commencing. It is also possible that the Developer may consider the use of Water Sensitive Urban Design (WSUD) measures in some of these smaller subcatchments, prior to discharge to the creek. The types of measures include swales alongside the road pavement to capture suspended solids, and bio-retention trenches below the swales for the treatment of nutrients. It should be noted that the site will meet its obligations

for water quality targets under the proposed strategy, so further treatment as discussed above is not required, it would only be provided if council would agree to maintain additional infrastructure provided.

Prior to any decision to implement further WSUD principles, a number of issues and parameters would need to be addressed. As mentioned previously, Council's acceptance of maintenance of the infrastructure and secondly, whether the physical constraints of the site will allow for the implementation of these measures. For example, current thinking is that WSUD by way of bio-retention trenches is not effective if the grade of the swale and trench is steeper than 4%. The areas that we have been unable to direct to the wetlands in the southeast corner of the site, are such that they are where the ridge "rolls over" towards the creek around the perimeter, and as such, these are the steepest areas of the site.

There is the possibility of a small area, right at the northern tip of the site being developed by backing directly onto the creek, as shown on Attachment "A". The topography is such that this area would discharge its flow via a pipe directly to the creek itself. The size of pipe would be no bigger than a 225mm or 300mm diameter. Drainage from the backs of this lot would not be able to be dragged back into the street drainage.

It should also be noted at this point, that in terms of the development line along the creek for this project, the developer hasn't simply just adopted the recommended minimum of 30-35 metres from the centre of the creek for its position; the line has been adopted after consideration of a number of issues and parameters:

- The Development line needs to be sufficiently away from the creek to ensure that allotments created are 600mm as a minimum above the 1 in 100 year flood level. (Flood levels are indicated on Attachment "D" at the back of this report).
- The Development line also needs to end at a point where the road construction is possible, and grades are not too steep that they

hinder the construction of the road formation. Areas where the existing slopes are steeper than around 1 in 7 have been pushed outside the development line due to this parameter.

- Attachment "E" shows the typical section across the Kororoit Creek from the area adjacent to Westwood Drive as an example. Flood levels are shown; batter slopes and the road formation are also indicated. This section would be fairly typical for the entire new area.

The above parameters have resulted in the development line sometimes achieving a setback from the creek of greater than the minimum required.

4. MAJOR DRAINAGE FLOWS (1 in 100 Overland Flows)

The only overland flow paths of any significance for this site are along the Rockbank Middle Road from west to east. This floodway starts from a catchment in Caroline Springs, and runs along the already developed part of Burnside, north of Rockbank Middle Road and west of Westwood Drive.

Attachment "B" shows the overland flow path catchments for the entire site. As Rockbank Middle Road contains the only external catchment, the internal roads do not have any significant overland flows. The existing ridge diagonally across the site also helps to break down the overall catchment further. Attachment "B" has some notation that shows the reason why roads will be able to discharge all predicted 1 in 100 year flows very easily, due to the efficiency of the road network. Efficiency relates to road layouts being created to take runoff out of the site and either into the Kororoit Creek or Rockbank Middle Road prior to the catchment for each road becoming significant. This last statement is made because overland flow outlets from the site are available at numerous locations due to the direction the road pattern takes for the entire site. Having multiple flow paths by way of individual roads heading directly towards the creek, means that we are creating the opportunity for any overland flows to be split into smaller runoff volumes.

The efficiency of the road network means that the largest internal overland flow path catchment would be catchment B on Attachment "B". A computation at the back of this report labelled Attachment "G" checks a 16m road at the downstream end of Catchment B and its ability to carry the 1 in 100 year overland flow. No other catchment on the site will create a worse case, or bigger runoff volume.

A computation labelled Attachment "H" at the back of this report shows the suitability of Rockbank Middle Road to carry the 1 in 100 year overland flow from its existing catchment and including catchment A added to the flow as well. It should be noted that even though the road will ultimately be a dual carriageway road, the computation checks the capacity based on the northern carriageway only, meaning a factor of safety of almost "2" applies.

5. Protection of the Kororoit Creek

Section 2 above discusses the production of Environmental Management Plans per each stage of development to protect the Kororoit Creek from damaging runoff to flora and fauna, as well as other erosion protection. It also refers to typical plans showing various measures that may be utilised to carry out the relevant protection. A Work Methods Statement that reflects the particular work in each area as well as the construction sequence and any resulting issues, will form the basis of the EMP.

The site will also be provided with a number of "up front," measures that will further protect the creek. Attachment "J" shows an EMP / CMP which details these measures. Two "lines" of silt fence will be provided around the perimeter of the site, along the Kororoit Creek. In essence the area in between the two silt fences will be undisturbed vegetation until any road construction is required closer to the creek. Also, the Growling Grass Frog buffer has been shown on the plan and any future works between the inner silt fence and the buffer will be subject to a further EMP as part of any stage works as mentioned above.

6. SUMMARY

This report addresses the major stormwater drainage issues relating to Modeina. Minor drainage flows up to the 1 in 5 year storm are piped underground, with the majority of the flow being directed into a proposed full treatment wetland in the southeast corner of the site. The proposed wetland would most likely be a Melbourne Water asset as its catchment is proposed above 60 Ha. "Full" treatment is intended from larger litter material, right through to the treatment of nutrients to the satisfaction of Melbourne Water and to Best Practices. The proposed asset is to be a combination sediment basin / bioretention basin which will treat stormwater quality to Best Practice.

The balance of the catchments have been kept to minimum possible size and hence flow volume. Only temporary, (during construction), treatment is expected to be required by Melbourne Water, for these areas or the provision of permanent Gross Pollutant Traps. Site management plans would be submitted to Melbourne Water prior to the commencement of each stage to show the measures required to be undertaken by the contractor in protecting the quality of water runoff to the creek.

The development line for this site has been produced following the assessment of a number of parameters in order that constructability, location to flood level and a minimum buffer requirement have all been achieved for all areas adjacent to the Kororoit Creek. This report has outlined the factors, such as freeboard levels above the 1 in 100 year flood line, and existing slopes adjacent to the creek embankment. They have all been considered prior to the finalisation of the edge of development. The result is that the development line is generally not simply a set distance back from the required minimum of 35 metres from the creek invert.

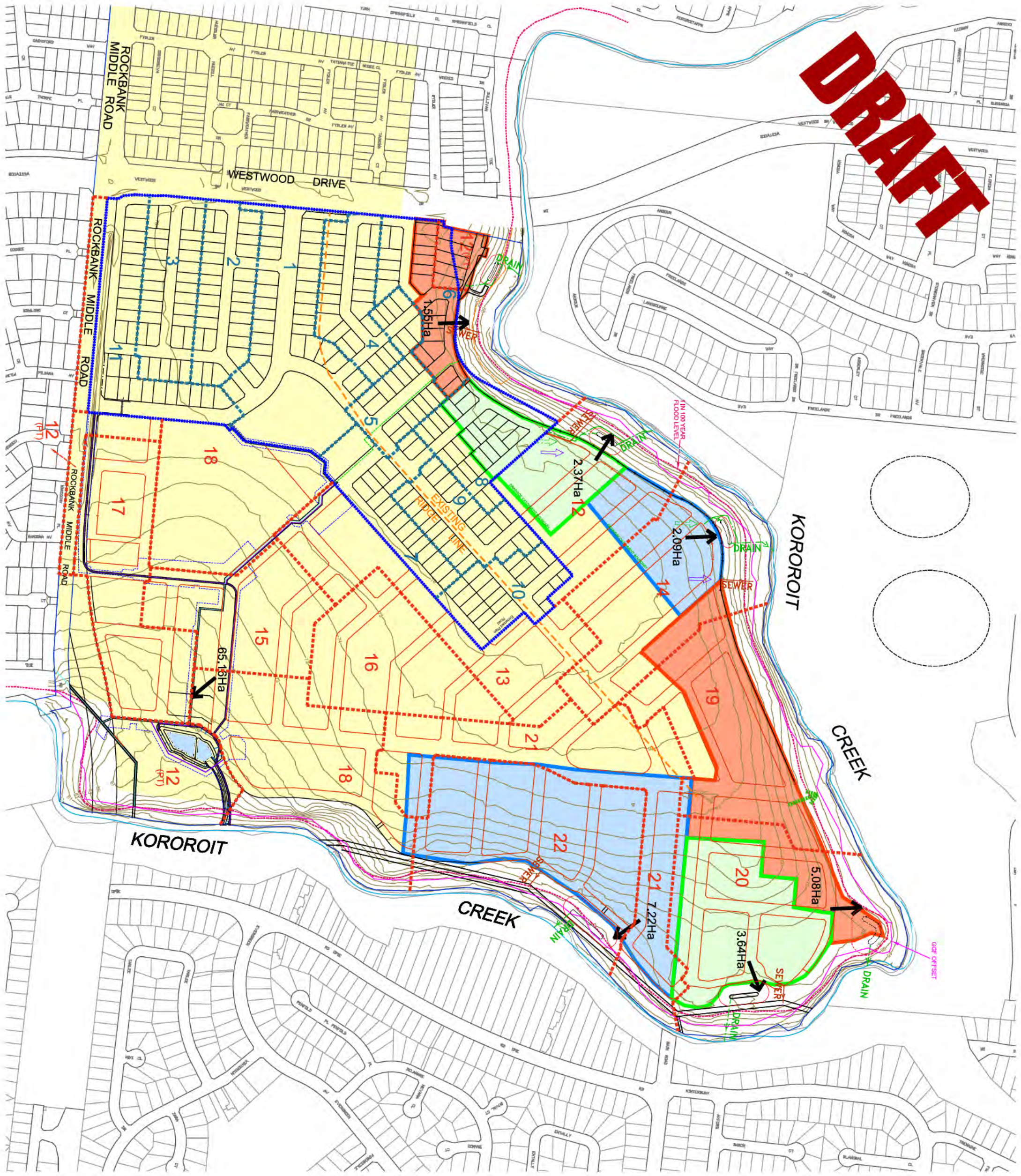
This report has also shown that due to the efficiency in the road network in discharging overland flows to the creek, there is only one catchment within

the site that has any significant overland flow that needs to be carried through to its outlet.

This report has also investigated the ability of Rockbank Middle Road to carry overland flows from its total catchment, which includes Caroline Springs, Burnside northwest and Modeina. The road can convey the flows with a significant factor of safety.

The site will be provided with two lines of silt fences “up front”, that will protect the Kororoit Creek during the development, from damaging erosion runoff. The Growling Grass Frog buffer will therefore remain undisturbed during construction and at all other times during the life of the project.

DRAFT



KOROROIT

CREEK

KOROROIT

CREEK

MODENA

Concept Plan

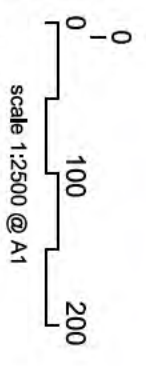
Precinct 2

1 in 100 year floodline

creek set-back

Attachment "A"
Overall drainage
catchment
layout to the creek

Drainage pipeline / sewer outfalls &
water quality asset locations are
conceptual only.



DATE: 7 July 2014
REF: 29743 001
DWG: 2974300AG

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DRAFT



Individual roads will head to the creek to provide continuous relief for 100 year flow. There is no significant catchment.

Individual roads will head to the creek to provide continuous relief for 100 year flow. There is no significant catchment.

KOROROIT CREEK

KOROROIT

CREEK

MODENA

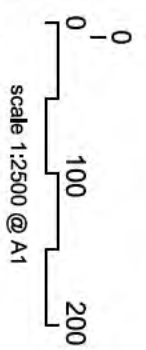
Concept Plan

Precinct 2

Attachment "B"
Overland (Q100) Flow Paths
and catchments

1 in 100 year floodline
creek set-back

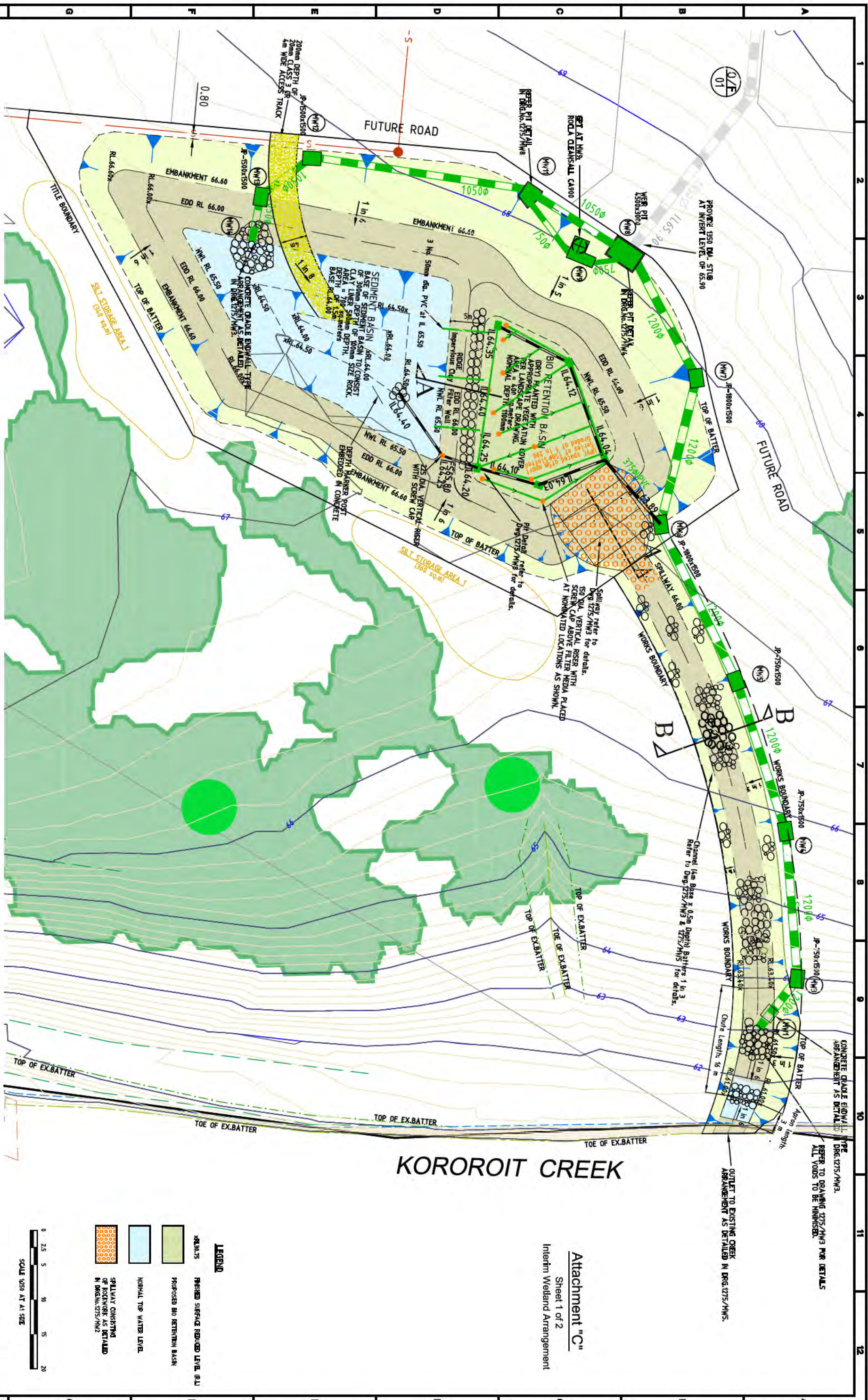
Drainage pipeline / sewer outfalls & water quality asset locations are conceptual only.



DATE: 7 July 2014
REF: 29743 001
DWG: 2974300AG

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NO.	REVISION	DATE	APPROV.
1	ISSUED FOR CONSTRUCTION	12/02/14	L.P.
2	REVISED PER M/W COMMENTS 17/07/13	06/11/13	L.P.
3	REVISED SET	03/06/13	L.P.
4	REVISION		

SYMBOLS AND GENERAL NOTES	REVISIONS	PLAN
— S — WATER MAINS F. RATE REFERENCE
— G — GAS MAINS L.P. RATE M.W. WAY
— E — ELEC. CABLES TELEPHONE CABLES M.W. WAY
— T — TELEPHONE CABLES TELEPHONE CABLES M.W. WAY
— M.H. — MANHOLES M.H. M.W. WAY
— T — TELEPHONE CABLES M.H. M.W. WAY

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MELBOURNE WATER CORPORATION
 MELTON CITY COUNCIL
MODEINA
BIO RETENTION ARRANGEMENT
 LAYOUT PLAN

SCALE: 1:250 AT A1 SIZE

DATE: 12/02/14

DRAWING NO.: 1275/MW2

SHEET 2 OF 9

LEGEND

- FINISHED SURFACE REDUCED LEVEL (R.L.)
- PROPOSED BIO RETENTION BASIN
- NORMAL TOP WATER LEVEL
- SPLILAY CONSISTING OF ROCKING AS RETAINED IN DRG. 1275/MW2

Attachment "C"
 Sheet 1 of 2
 Interim Wetland Arrangement

Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

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 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

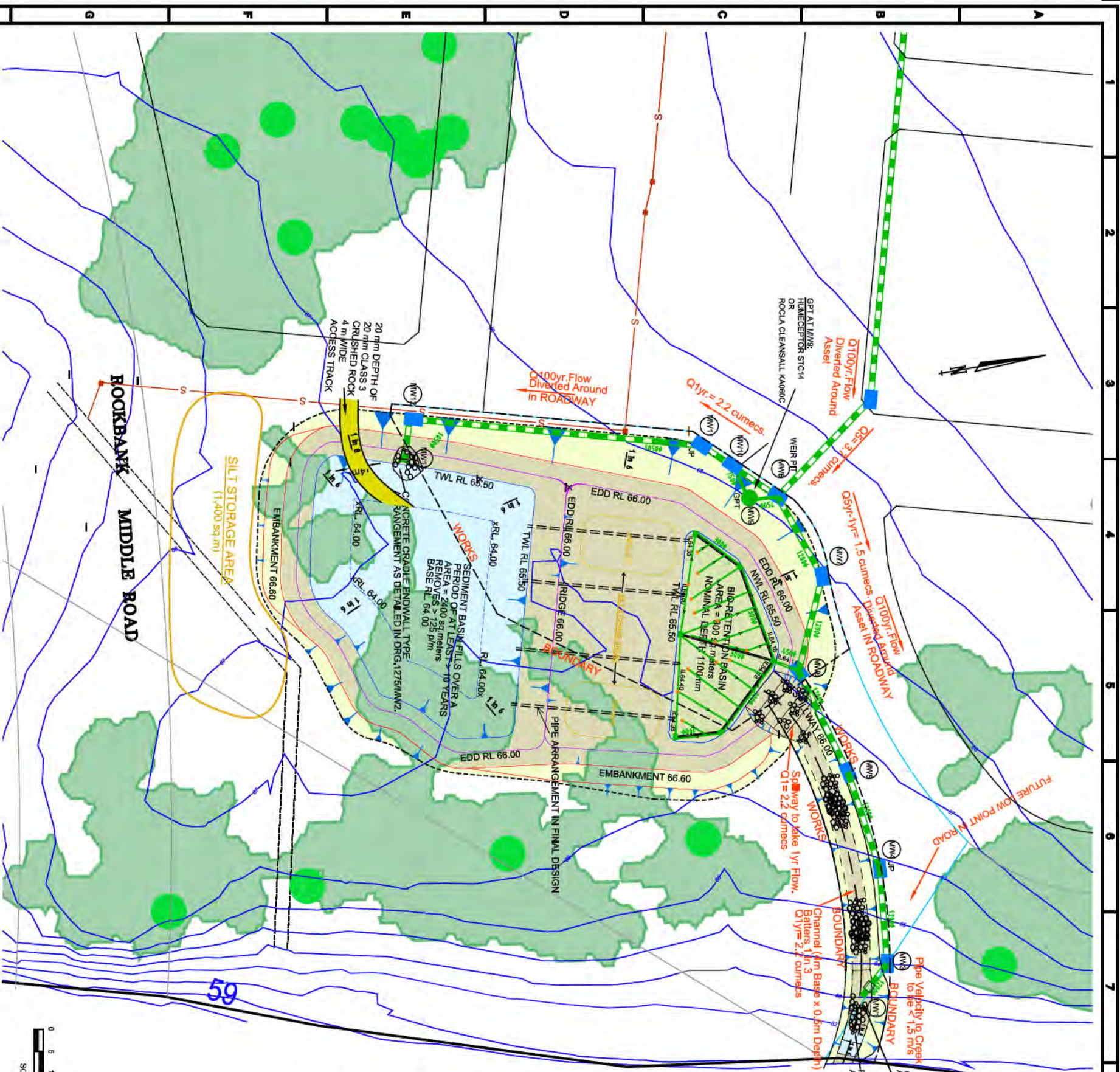
Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

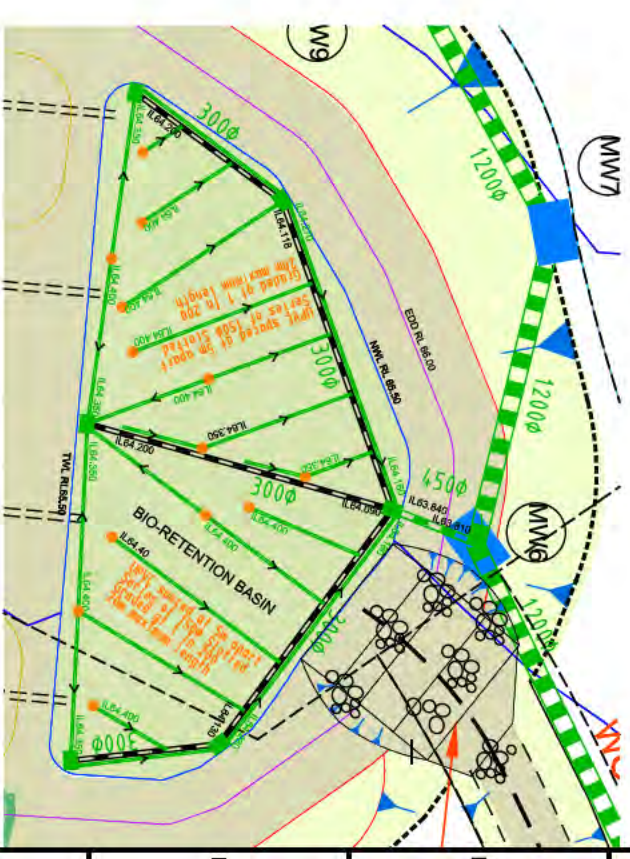
Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.

Channel (4m Base x 0.5m Depth) Batters 1 in 3
 Refer to DWG. 1275/MW3 & 1275/MW5 for details.



KOROROIT CREEK



Attachment "C"
Sheet 2 of 2
Ultimate Wetland Arrangement

NO	REVISION	DATE	APPROVAL
P4	AMENDED PER MWATER REQUIREMENTS	18.11.13	L.P.
P3	AMENDED NOTATION	16.10.13	L.P.
P2	FOR SUBMISSION TO MWATER FOR APPROVAL	23.09.13	L.P.
P1	PRELIMINARY SET	01.08.13	L.P.

SYMBOLS AND GENERAL NOTES
WATER MAINS — S —
GAS MAINS — G —
ELEC. CABLES — E —
TELEPHONE CABLES — T —
M.H. — M.H. —
OR — O.R. —
L.H. — L.H. —

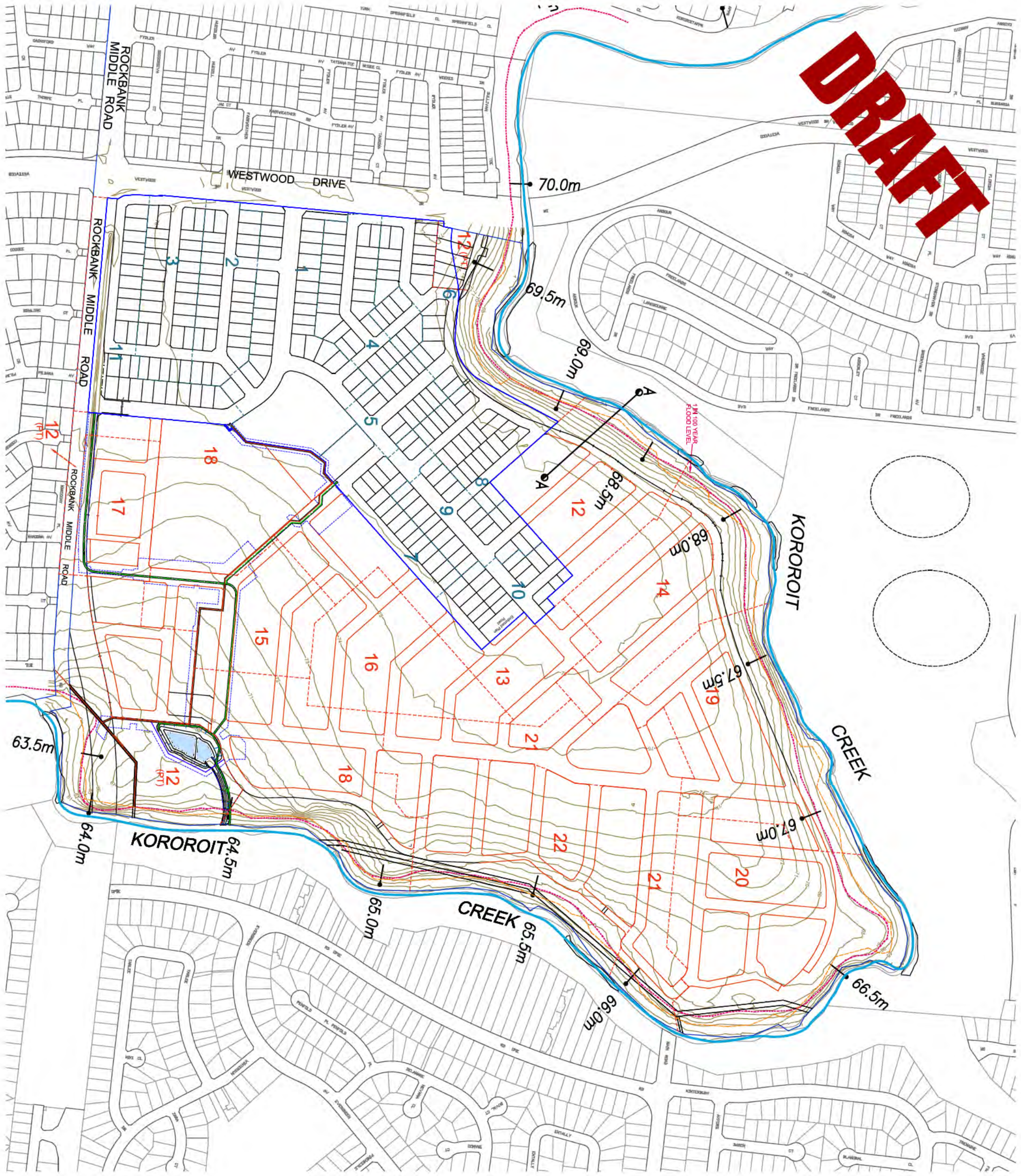
REVISION	DATE	BY	REASON
1	18.11.13	L.P.	AMENDED PER MWATER REQUIREMENTS
2	16.10.13	L.P.	AMENDED NOTATION
3	23.09.13	L.P.	FOR SUBMISSION TO MWATER FOR APPROVAL
4	01.08.13	L.P.	PRELIMINARY SET

DENNIS, PRICE & MILLER PTY. LTD.
A.C.N. 004 590 883
22 Balfour Park Drive Northcote VIC 3146
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MELBOURNE WATER CORPORATION
MELTON CITY COUNCIL
MODENA
BIO RETENTION ARRANGEMENT
ULTIMATE LAYOUT PLAN

SCALE 1:500 AT A1
SHEET 1 OF 1
DRAWING NO. 1275/ULT1
DATE 18/11/13

DRAFT

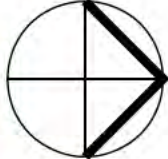
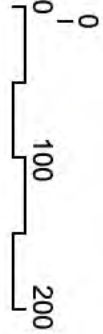


MODENA
Concept Plan
 Precinct 2

- Staging
- 1 In 100 year floodline
- creek set-back

Attachment "D"
 Flood levels and creek section location A-A for Attachment "E".

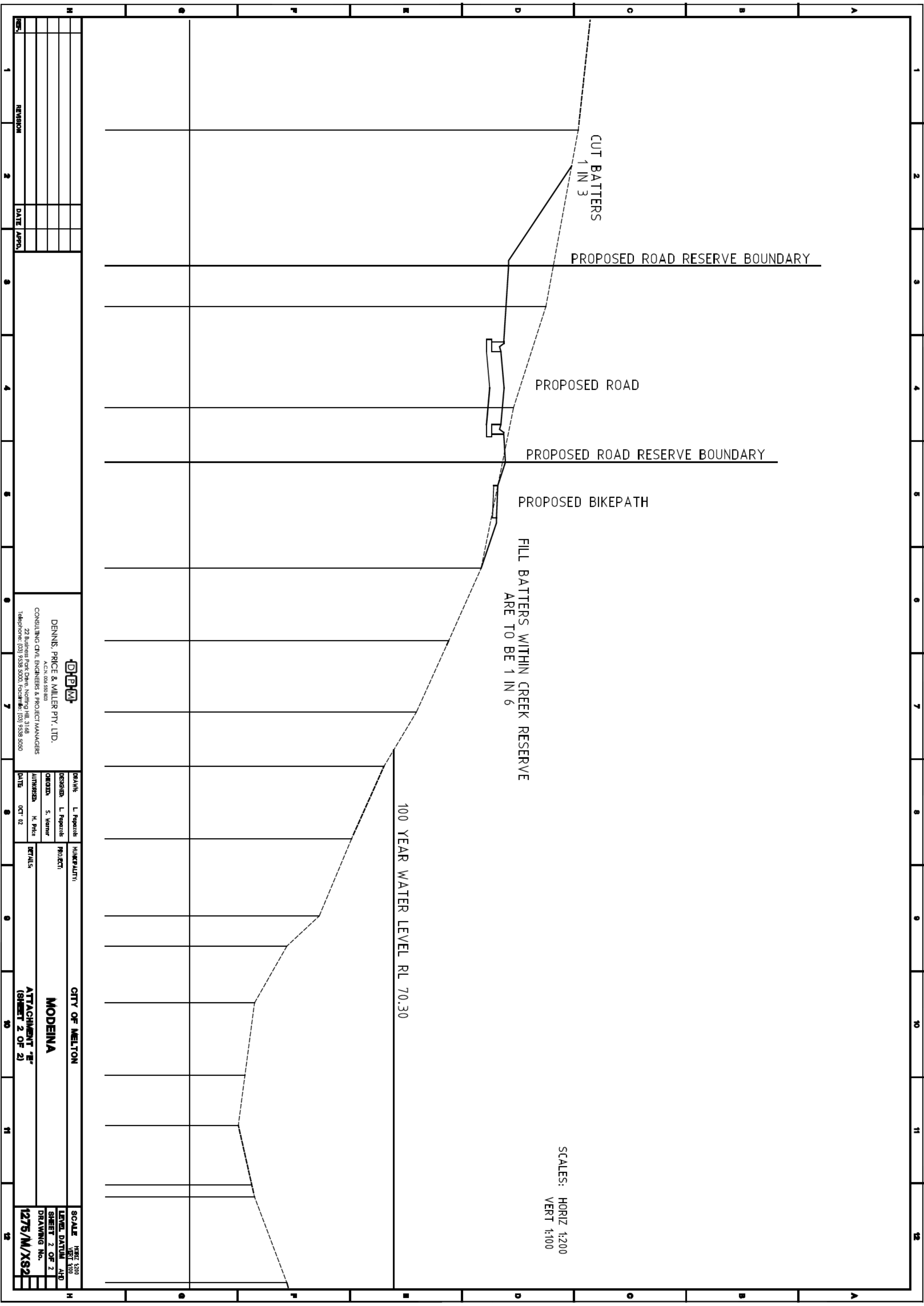
Drainage pipeline / sewer outfalls & water quality asset locations are conceptual only.



DATE: 7 July 2014
 REF: 29743 001
 DWG: 2974300AG

Bosco Jonson Pty Ltd
 A.B.N. 96 282 532 642
 P.O. Box 6076, South Melbourne, Vic 3206
 16 Eastern Road South Melbourne
 Vic 3206 Australia DX 20624 Emerald Hill
 Tel (03) 9699 1400 Fax (03) 9699 5992





CUT BATTERS
1 IN 3

PROPOSED ROAD RESERVE BOUNDARY

PROPOSED ROAD

PROPOSED ROAD RESERVE BOUNDARY

PROPOSED BIKEPATH

FILL BATTERS WITHIN CREEK RESERVE
ARE TO BE 1 IN 6

100 YEAR WATER LEVEL RL 70.30

SCALES: HORIZ 1:200
VERT 1:100

REV.		
REVISION	DATE	APPD.

NO.		
DATE		

DPM
DENNIS, PRICE & MILLER PTY. LTD.
CONSULTING CIVIL ENGINEERS & PROJECT MANAGERS
A.C.N. 008 550 803
22 Business Park Drive, Notting Hill, 3148
Telephone: (03) 9538 5000, Facsimile: (03) 9538 5050

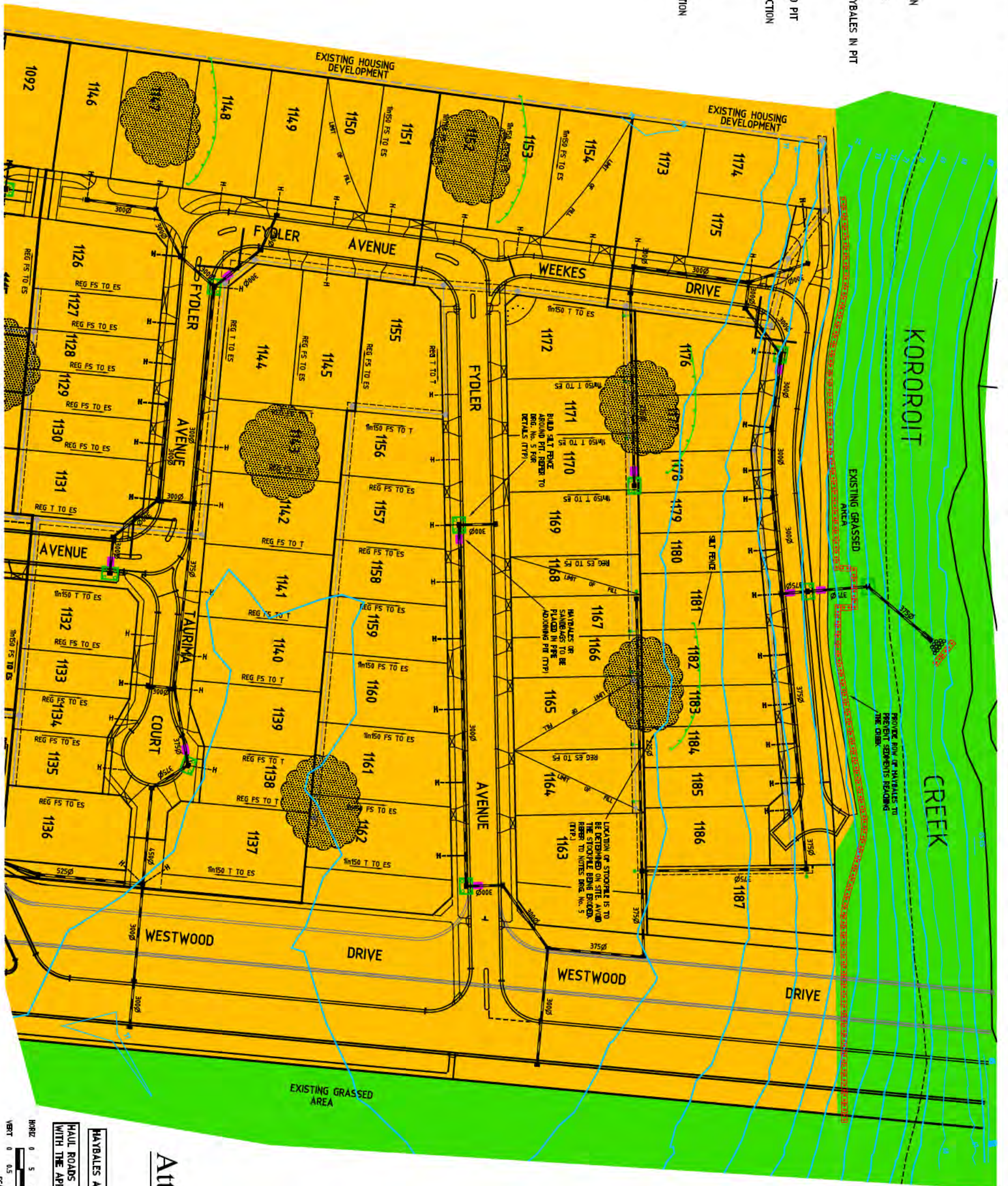
DESIGNED BY	L. Repach
CHECKED BY	S. Warner
AUTHORISED BY	H. Price
DATE	OCT 02

PROJECT:	CITY OF MELTON
DETAILS:	MODENA

ATTACHMENT 'E'
(SHEET 2 OF 2)

SCALE	HORIZ 1:200 VERT 1:100
LEVER DATUM	ABD
SHEET	2 OF 2
DRAWING No.	1275/M/XS2

- LEGEND**
- TEMP. CUTOFF DRAIN
 - TOPSOIL STOCKPILE
 - SAND BAGS OR HAYBALES IN PIT
 - HAY BALES
 - SILT FENCE AROUND PIT
 - KERB INLET PROTECTION
 - AREA OF SITE DISTURBANCE
 - AREA OF UNDISTURBED VEGETATION



FOR CONTINUATION REFER DRG. No. 1275/ENV/2



HAYBALES AND SILTENCES TO BE CHECKED DAILY
HAUL ROADS LOCATIONS TO BE DETERMINED ON SITE
WITH THE APPROVAL OF THE SUPERINTENDENT

Attachment "F"
(1 OF 5)



FOR CONSTRUCTION

REV.	DESCRIPTION	DATE	APPROV.
A	HAYBALES AT END WALL	6/2/01	J.K.
B	SEWER TRAP REMOVED, ROW OF HAYBALES ADDED	4/12/01	J.K.
C			
D			
E			
F			
G			
H			

DENNIS, PRICE & MILLER PTY. LTD.
CORPORATE ENVIRONMENTAL & PLANNING CONSULTANTS
207 Taverley Road, Sandhurst, VIC 3488
Tel: (03) 9778 1200, Fax: (03) 9778 1200

DPM
DRAWN: J. KOZMAR
CHECKED: T. DAVILA
DATE: AUG 2001

PROJECT: BURNSIDE ESTATE
DETAILS: ENVIRONMENTAL MANAGEMENT PLAN
LAYOUT PLAN SHEET 1 OF 3

SHIRE OF MELTON
SCALE 1:500
LEVEL, DATUM AND SHEET 1 OF 5
DRAWING NO. 1275/ENV/1

DATE: 12/11/01

FOR CONTINUATION REFER DRG. No. 1275/ENV/1

- LEGEND**
- TEMP. CUTOFF DRAIN
 - TOPSOIL STOCKPILE
 - SAND BAGS OR HAYBALES IN PIT
 - HAY BALES
 - SILT FENCE AROUND PIT
 - KERB INLET PROTECTION
 - AREA OF SITE DISTURBANCE
 - AREA OF UNDISTURBED VEGETATION



HAYBALES AND SILTFENCES TO BE CHECKED DAILY
 PAVE ROADS LOCATIONS TO BE DETERMINED ON SITE
 WITH THE APPROVAL OF THE SUPERINTENDENT

Attachment "F"
 (2 OF 5)

FOR CONSTRUCTION

REVISION	DATE	APPRO.

DENNIS, PRICE & MILLER PTY. LTD.
 CONSULTING ENGINEERS & PROPERTY MANAGERS
 207 Trenchard Road, Melton, Victoria 3465
 Telephone: (03) 9078 1500, Facsimile: (03) 9079 1500

DESIGNED BY	T. DAVILA
CHECKED BY	R. HALLER
DATE	AUG 2001

SHIRE OF MELTON
BURNSIDE ESTATE
STAGE 31
 ENVIRONMENTAL MANAGEMENT PLAN
 LAYOUT PLAN SHEET 2 OF 3

SCALE	1:500
LEVEL DATUM	AHD
SHEET	2 OF 5
DRAWING NO.	1275/ENV/2

GENERAL NOTES:

Refer to EPA's Environmental Guidelines for Major Construction Sites and Construction Techniques for Sediment Pollution Control. The following are suggested measures to be included in the Environmental Management Plan. The exact nature and extent of measures to be implemented will be determined by the site conditions and the objectives of protecting receiving waters and the environment.

EROSION:

1. Keep land clearing to a minimum and the period of time that an area is kept cleared to a minimum.
2. Do not remove vegetation including grass within the watercourse and within 5 metres from the edge of banks.
3. Avoid disturbing environmentally sensitive areas and create wide buffer strips of vegetation around it. Avoid works which breach embankments.
4. Contour-cut and stagger works to stabilize erodible, revegetated and such as each section of works is completed.
5. Provide culvert debris to prevent runoff from cleared areas and slopes, reducing concentrated water leaving the site.
6. Reduce water velocities on site by installing long continuous flow paths.
7. Erosion treatment structures are to be provided to ensure water leaving the site meets specified standards. Temporary structures are to be designed for a 1 in 2 year greater if there is a high catchment (40) above event of 1 in 50 year storm event for permanent structures.
8. Destruction of sediment and erosion control measures to be in place prior to construction if possible.
9. All Sediment Traps, Detention Ponds, Site Fences, etc. to be checked daily during periods of wet weather & immediately after heavy and intense rainfall. If water entering waterway or drainage system.

DUST SUPPRESSION:

10. Install wind fences around exposed soil in areas susceptible to dust generation.
11. Water exposed soil when dust is visible. Ensure that the water does not concentrate surface water. Water from sediment dams by be used for dust suppression.
12. Limit access to and from the site by specifying hard roads to be installed permanently using fine-silica sands. Stabilize or pave these hard roads. Additives are to have no adverse effects on water quality.

STOPOPLES:

13. Stopples or barriers that are to be installed greater than 20 days must be washed, regraded and seeded with suitable grasses.
14. Stopples are to be placed at a nominated position by the supervising engineer prior to commencement of works. Stopples barriers to have slopes no greater than 2:1. Lower stopples more than ten metres from waterways. Markers the number and site of stopples.

DEWATERING:

15. All low points to be noted and appropriate measures to be put in place. Sediment traps and water to be pumped onto existing vegetation if possible or sediment control structures.

WORKING IN WATERWAYS AND FLOODPLAINS:

16. Where it is not possible to avoid working in streams, plan to address contact with and stop works during periods of low flow. Avoid times of year when potential environmental damage is of the highest.
17. Stream crossings should be reinforced particularly to flow and of the adjacent road or structure. Crossings must be designed to be stable under the expected vehicle loads.

18. Prepare a Contingency Plan for more drastic storm events. The contingency plan should include methods to deal with sudden entering excavation areas, filling of construction facilities, procedures for preventing soil, fuel and chemicals entering the environment.
19. Prepare a Rehabilitation Plan that includes proposed changes to waterways, flood protection, erosion and sediment control. A revegetation plan is also included, addressing revegetation and ongoing maintenance for 12 months.

FLORA AND FAUNA:

20. Avoid undue disturbance to sensitive or endangered native flora and fauna. Reduce impacts on aquatic plants and animals.

WASTES:

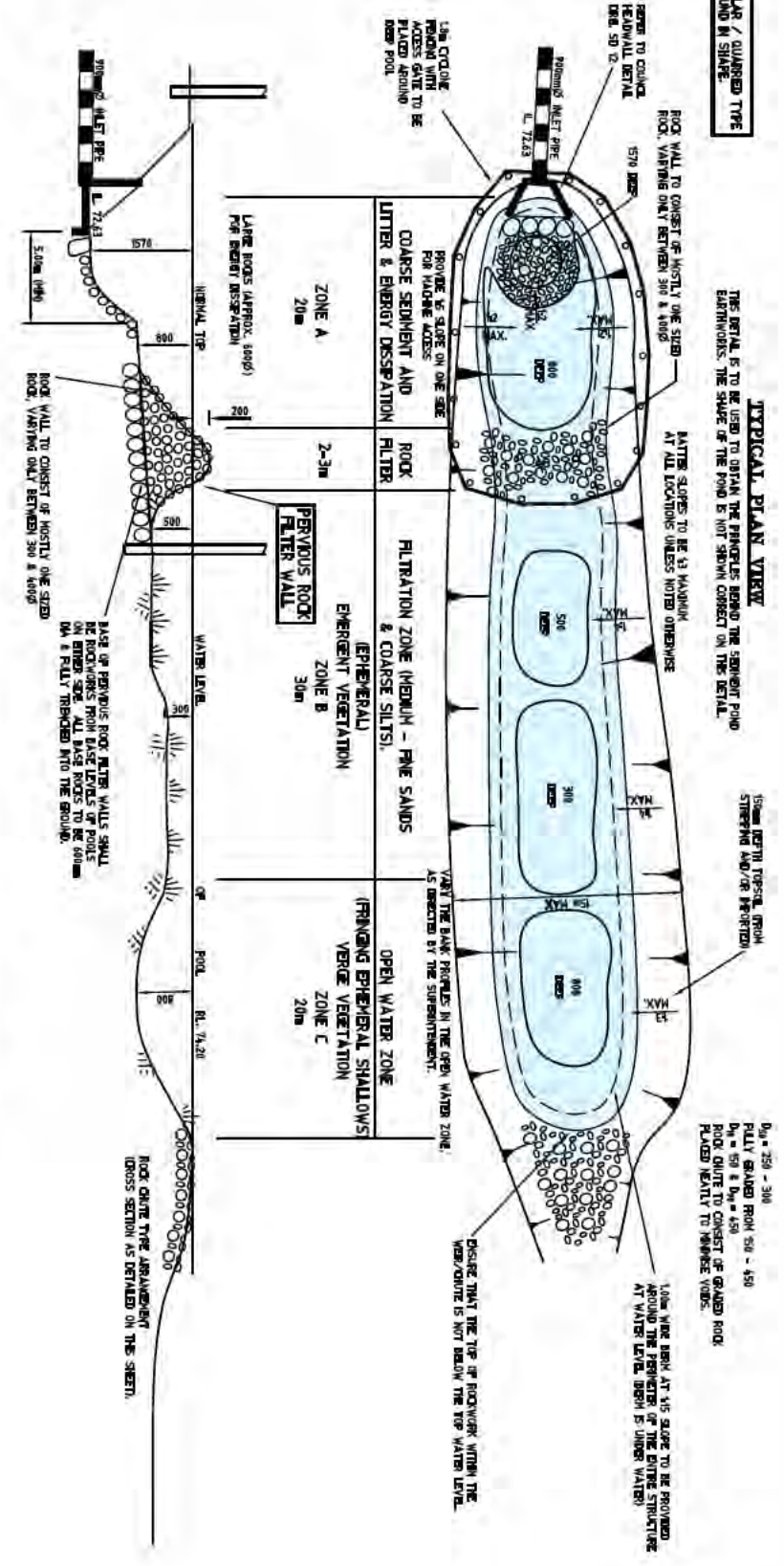
21. Handle wastes on site.
22. Contaminated wastes must be disposed of in safe and appropriate manner. Dispose contaminated material to a licensed disposal facility.
23. Provide bins for litter. Ensure materials are not left where they can be blown or washed away.

MONITORING:

24. Refer to D19 of "Environmental Guidelines for Major Construction Sites". Ensure regular inspections, monitoring and audits.

THE BASE OF POND IS TO BE REGRADED AFTER THE COMPLETION OF ALL WORKS TO BE DONE IN A MINIMUM OF 100mm OF CLAY EXPOSED. IF THIS IS NOT THE CASE SHALL BE EXCAVATED AN ADDITIONAL 100mm AND BACKFILLED WITH SELECTED CLAY MATERIAL. ROCK THE SITE.

ALL ROADS ARE TO MAINTAIN / SLOPED TO PREVENT ROADS FROM BEING IN SHAPE.

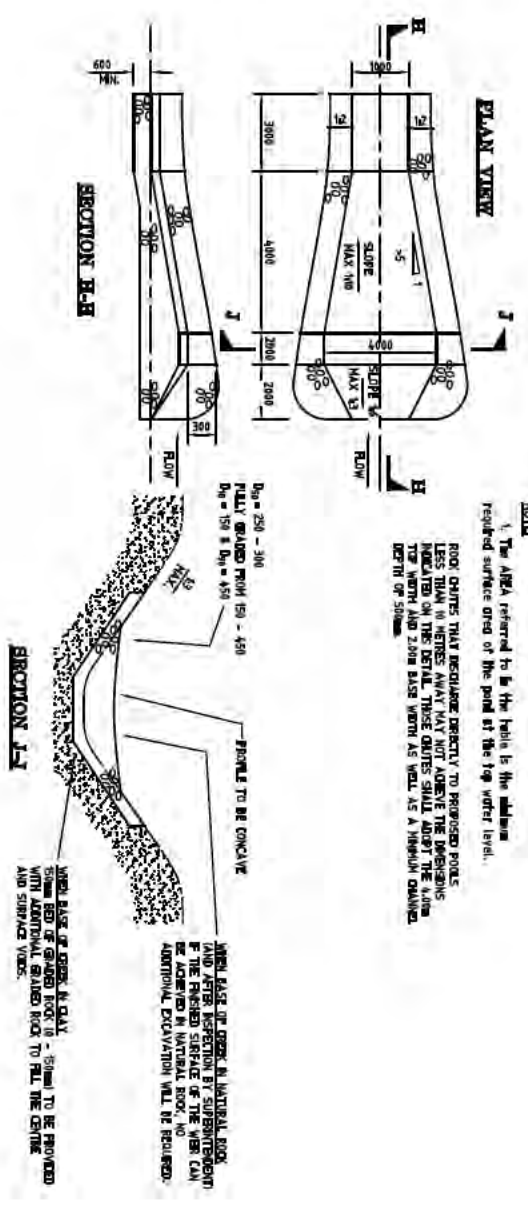


- NOTES:**
1. THE EXACT DIMENSIONS OF THE STRUCTURE MAY BE VARIOUS ON SITE BY THE SUPERINTENDENT DURING THE CONSTRUCTION WORKS, TAKING INTO ACCOUNT PROGRESS OF EXISTING VEGETATION AND TOPOGRAPHY.
 2. DISTURBED AREAS OF EXISTING BANK RESULTING FROM THESE WORKS ARE TO BE STABILIZED WITH VEGETATION.
 3. THE CONTRACTOR IS TO PROVIDE 100mm SAND STAYED INTO THE GROUND IMMEDIATELY DOWNSTREAM OF THESE WORKS TO COLLECT RUNOFF OF SILT WHICH WORKS ARE IN PROGRESS.
 4. THE ENTIRE AREA COVERED BY THE STRUCTURE AS WELL AS AN ADDITIONAL 200m PERIMETER AROUND IT, ARE TO BE TOPDRESSED WITH A MINIMUM DEPTH OF 100mm TOPSOIL. TOPSOIL MATERIAL IS NOT AVAILABLE AT THIS STAGE. IT SHALL BE PROVIDED AT THE CONTRACTOR'S EXPENSE.

SEDIMENT POND DETAIL

SEDIMENT POND DIMENSIONS

POND NO.	ZONE A	ZONE B	ZONE C	AREA
1	20m	20m	20m	420 sq.m



NOTES:

1. The AREA referred to in the table is the minimum required surface area of the pond at the top water level.
2. ROADS THAT REQUIRE DIRECTLY TO REGRADED POND ARE TO BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE.
3. THE AREA OF POND IS TO BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE.
4. THE AREA OF POND IS TO BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE. THESE AREAS SHALL BE REGRADED TO THE ORIGINAL GRADE.

POINT SET OUT SCHEDULE

POINT NO.	EASTING	NORTHING	R.L.
1	301055.48	511905.71	75.72
2	301055.48	511905.71	75.72
3	301055.48	511905.71	75.72
4	301055.48	511905.71	75.72
5	301055.48	511905.71	75.72
6	301055.48	511905.71	75.72
7	301055.48	511905.71	75.72
8	301055.48	511905.71	75.72
9	301055.48	511905.71	75.72
10	301055.48	511905.71	75.72
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12	301055.48	511905.71	75.72
13	301055.48	511905.71	75.72
14	301055.48	511905.71	75.72
15	301055.48	511905.71	75.72
16	301055.48	511905.71	75.72
17	301055.48	511905.71	75.72
18	301055.48	511905.71	75.72
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24	301055.48	511905.71	75.72
25	301055.48	511905.71	75.72
26	301055.48	511905.71	75.72
27	301055.48	511905.71	75.72
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35	301055.48	511905.71	75.72
36	301055.48	511905.71	75.72
37	301055.48	511905.71	75.72
38	301055.48	511905.71	75.72
39	301055.48	511905.71	75.72
40	301055.48	511905.71	75.72
41	301055.48	511905.71	75.72
42	301055.48	511905.71	75.72
43	301055.48	511905.71	75.72
44	301055.48	511905.71	75.72

Attachment "F"

(4 OF 5)

FOR CONSTRUCTION

DENNIS, PRICE & MILLER PTY. LTD.
 207 Tennyson Road, East Melbourne VIC 3002
 Telephone: (03) 9378 1200, Facsimile: (03) 9378 1200

DRPM
 DENNIS, PRICE & MILLER PTY. LTD.
 207 Tennyson Road, East Melbourne VIC 3002
 Telephone: (03) 9378 1200, Facsimile: (03) 9378 1200

SHIRE OF MELTON
BURNSIDE ESTATE
STAGE 31
 ENVIRONMENTAL MANAGEMENT PLAN
 GENERAL NOTES, WETLAND DETAILS & SETOUT TABLE

SCALE: AS SHOWN
 LEVEL, DATUM AND SHEET 1 OF 5
 DRAWING NO. 1276/ENV/4
 DATE: AUG 2001

ATTACHMENT "G" (1 of 2)

Determine the Capacity of a 16m Wide Road Reserve to Discharge the Max. 1 in 100 Year Catchment.

As mentioned in the drainage report, the capacity of this road will be checked for a 16 metre wide road. This is the largest internal catchment so this would show that all internal roads have adequate capacity.

Max. catchment area = 14.11 Ha.

$$T_{C5} \approx \frac{720}{60 \times 1} + 7 \text{ (initial tc)} = 19 \text{ mins} \leftarrow \text{pipe flow}$$

$$T_{C100} \approx 25 \text{ mins} \leftarrow \text{flow across lawns and road}$$

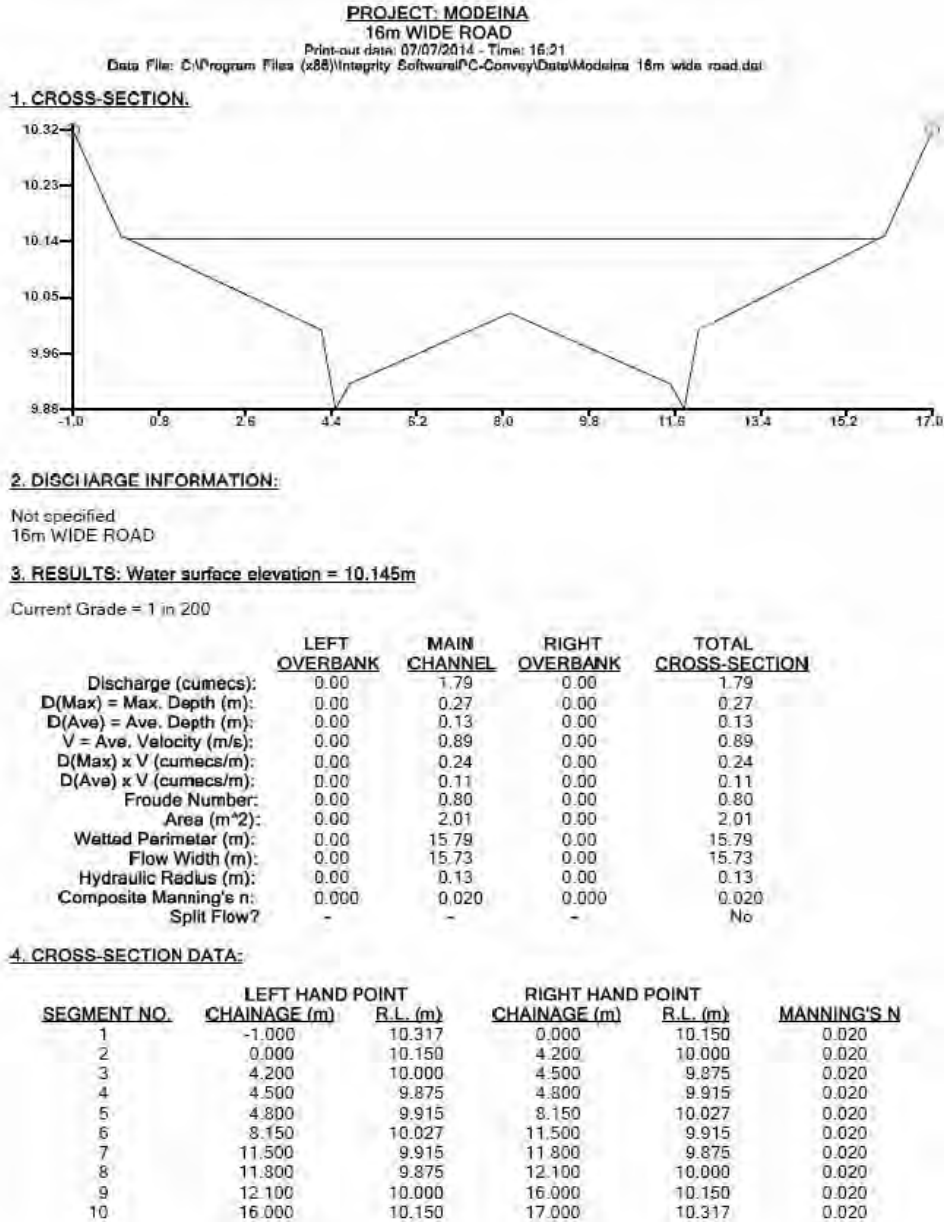
$$\therefore Q_5 = \frac{C.I.A.}{360} = 0.53 \times 47.6 \times 14.11 \times 2.78 = 990 \text{ l/s}$$

$$\therefore Q_{100} = 0.53 \times \underset{\substack{\uparrow \\ \text{Fy for } Q_{100}}}{1.30} \times 83.1 \times 14.11 \times 2.78 = 2245 \text{ l/s}$$

$$\therefore Q_{\text{gap}} = \underline{1.26 \text{ cumecs}}$$

ATTACHMENT "G" (2 of 2)

Check capacity of 16m wide road



The road has a capacity of 1.79 cumecs, therefore it has the capacity needed to discharge the flow ∴ OK

ATTACHMENT "H" (1 of 2)

Determine the Capacity of Rockbank Middle Road to Carry 1 in 100 Year Overland Flows from Burnside, Modeina and Caroline Springs.

At Caroline Springs / Burnside Title Boundary

External catchment = 28.9 Ha.

$$T_c = 22 \text{ mins}$$

$$\therefore Q_{100} = \frac{28.9 \times 0.5 \times 1.3 \times 87 \times 2.78}{A \times C \times Q_{100} \times I \times \frac{1}{F} \text{ Coeff AR\&R}} = 4.54 \text{ cumecs}$$

cf 4.6 from J. Davis (Melton) \therefore OK

At Intersection of Rockbank Middle & Westwood

$$T_c \approx \frac{22 + \frac{260m}{60 \times 1.2 \text{ m/s}}}{60 \times 1.2} = 25.5 \text{ mins} \quad \text{Total Catchment} = 28.9 + 15.2 \text{ Ha} = 44.1 \text{ Ha}$$

In all these calculations, the time of concentration for the 5 year and 100 year storms is assumed to be the same, which is a conservative approach as 100 year runoff generally takes longer to get to its destination than piped flows.

$$\begin{aligned} \text{Now: } Q_5 &= 44.1 \times 0.5 \times 42 \times 2.78 = 2.57 \text{ cumecs} \\ Q_{100} &= 44.1 \times 0.5 \times 1.3 \times 82 \times 2.78 = 6.54 \text{ cumecs} \\ \therefore Q_{\text{gap}} &= 3.97 \text{ cumecs} \end{aligned}$$

At Rockbank Middle & The Wetland

$$T_c \approx \frac{25.5 + \frac{720}{60 \times 1.2}}{60 \times 1.2} = 35.5 \text{ mins} \quad \text{Total Catchment} = 44.1 + 11.2 \text{ Ha} = 55.3 \text{ Ha}$$

$$\begin{aligned} \text{Now: } Q_5 &= 55.3 \times 0.5 \times 33.5 \times 2.78 = 2.58 \text{ cumecs} \\ Q_{100} &= 55.3 \times 0.5 \times 1.3 \times 67.5 \times 2.78 = 6.75 \text{ cumecs} \\ \therefore Q_{\text{gap}} &= 4.17 \text{ cumecs} \end{aligned}$$

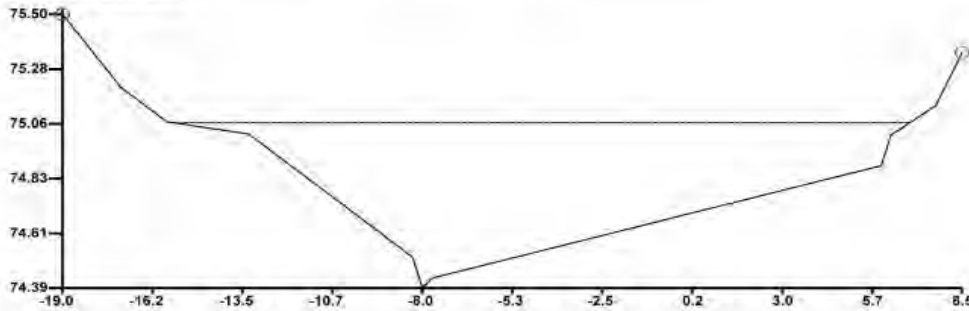
The next page checks the capacity of Rockbank Middle Road to discharge this flow.

ATTACHMENT "H" (2 of 2)

Determine the Capacity of a Single Carriageway of the Future Dual Carriageway Rockbank Middle Road.

PROJECT: MODEINA
 ROCKBANK MIDDLE ROAD
 Print-out date: 07/07/2014 - Time: 16:20
 Data File: C:\prog files (x86)\pcc\Data\Modeina Rockbank Middle Road.dat

1. CROSS-SECTION:



2. DISCHARGE INFORMATION:

Not specified
 Rockbank Middle Road

3. RESULTS: Water surface elevation = 75.060m

Current Grade = 1 in 925

	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	TOTAL CROSS-SECTION
Discharge (cumecs):	0.00	5.55	0.00	5.55
D(Max) = Max. Depth (m):	0.00	0.67	0.00	0.67
D(Ave) = Ave. Depth (m):	0.00	0.33	0.00	0.33
V = Ave. Velocity (m/s):	0.00	0.74	0.00	0.74
D(Max) x V (cumecs/m):	0.00	0.50	0.00	0.50
D(Ave) x V (cumecs/m):	0.00	0.25	0.00	0.25
Froude Number:	0.00	0.41	0.00	0.41
Area (m ²):	0.00	7.45	0.00	7.45
Wetted Perimeter (m):	0.00	22.53	0.00	22.53
Flow Width (m):	0.00	22.44	0.00	22.44
Hydraulic Radius (m):	0.00	0.33	0.00	0.33
Composite Manning's n:	0.000	0.021	0.000	0.021
Split Flow?	-	-	-	No

4. CROSS-SECTION DATA:

SEGMENT NO.	LEFT HAND POINT		RIGHT HAND POINT		MANNING'S N
	CHAINAGE (m)	R.L. (m)	CHAINAGE (m)	R.L. (m)	
1	-18.970	75.500	-17.190	75.204	0.035
2	-17.190	75.204	-15.790	75.064	0.035
3	-15.790	75.064	-13.290	75.014	0.013
4	-13.290	75.014	-12.190	74.904	0.035
5	-12.190	74.904	-8.300	74.515	0.035
6	-8.300	74.515	-8.000	74.390	0.013
7	-8.000	74.390	-7.700	74.430	0.013
8	-7.700	74.430	0.000	74.687	0.013
9	0.000	74.687	5.680	74.876	0.013
10	5.680	74.876	5.980	74.885	0.013
11	5.980	74.885	6.280	75.010	0.035
12	6.280	75.010	7.650	75.130	0.035
13	7.650	75.130	8.450	75.344	0.035

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 The copy is loaned to: Dennis Price & Miller P/L

The road has a capacity of 5.55 cumecs, therefore it has the capacity needed to discharge the flow ∴ OK



Check Safety

$$dave \times Vave \leq 0.35$$

$$dave = 0.33 \text{ m}$$

$$Vave = 0.74 \text{ m/s}$$

$$\therefore dxv = 0.24 < 0.35 \quad \therefore \text{OK}$$

The following have been identified as significant environmental issues for the site:

- Stormwater and Sediment control
- Protection of Kororoit Creek

These issues shall be managed with the measures outlined on this plan.

1. Management:
 Project Engineer, Drake Price & Miller Consulting

2. Consultation of EIP Requirements:
 Notification of all persons working on site regarding the requirements as set out on the EIP.

3. Staging of Works:
 Development will be staged in accordance with the approved plan. It is anticipated that construction will be programmed to minimize impact to surrounding environment.

4. Inspections and Maintenance:
 One inspection per week prior and after storm events and/or heavy rain. Highbanks as required with all rectification to be addressed within 24 hrs of incident/report.

5. Working Hours: 7:00am - 5:00pm

6. Noise Reduction Methods:
 Regular maintenance and inspection of machinery. Approaches for protection required of all times when working near or within machinery.

7. Breeding Restrictions:
 Not Applicable.

8. Stop Work / Restricted Activities:
 Weather requirements may require stop work or restricted activities during strong winds, hot temperatures, rain/storm events.

9. Water Spraying:
 Water spraying shall be carried out when works are generating dust. Water spraying of work site will be carried out as required.

10. Soil Stabilisation:
 All areas of the project that do not affect any catchment shall be mulched and kept free. Silt fences and haybales shall be installed as shown to protect Kororoit Creek from sedimentation and erosion.

11. De-watering:
 Not applicable.

12. Cleaning of Vehicles:
 This will be undertaken in accordance with relevant planning permit condition issued by Melton Council.

13. Street Cleaning:
 As required once per day prior and after any rain.

14. Post Works Stabilisation:
 Stabilisation of areas surrounding the creek area will be addressed once all activities have been completed. This may be often that shall be considered depending on the time of year and if conditions are suitable.

15. Movement of Soil:
 Contaminated Status: (See site) / On site / N/A

16. Waste Identification Methods:
 Not applicable.

17. Litter and Waste Disposal:
 Removed by contractors to approved waste facility.

18. Checkouts:
 Copied and will be set up either in the middle of the site or along the western or southern boundary away from creek. All checkouts will be stored within the compound surrounded by haybales with an emergency creek evacuation plan in place.

19. Yes / No, Details:
 All Fored and Fored requirements are to be addressed in accordance with the EIP requirements/conditions.

20. Yes / No, Details:
 Archaeological / Heritage
 Induction of all contractors to the recommendations and managing actions of the approved Cultural Heritage Management Plan.

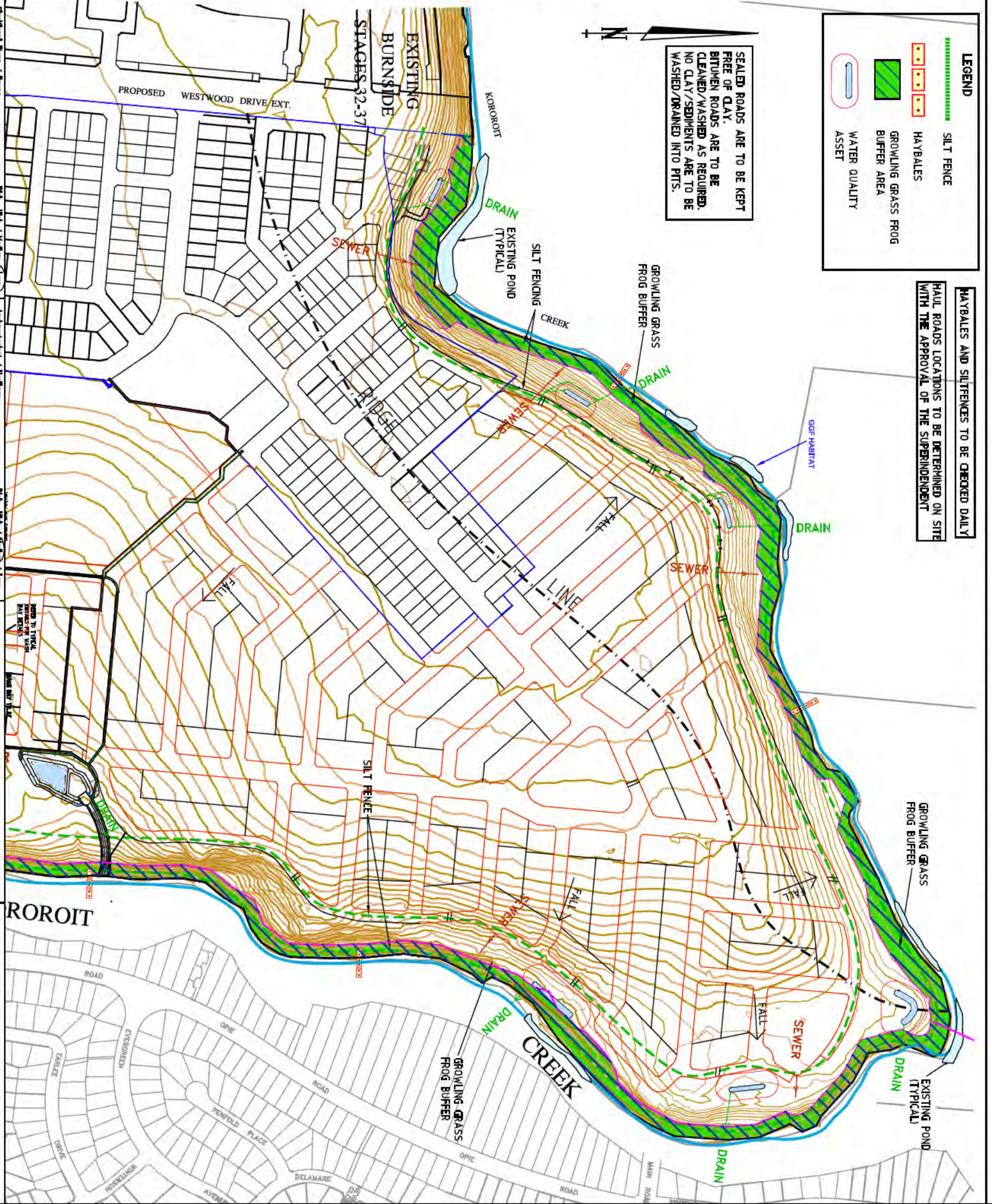
EMP/CMP PLAN (I) - Locations of Types of Environmental Controls

Project Name : MODEENA

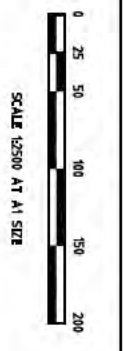
Date and Revision : JULY 2014

Attachment "J" - EMP/CMP showing areas of Protection Measures for Kororoit Creek

DP&M
 DENNIS, PRICE & MILLER PTY. LTD.
 CONSULTING CIVIL ENGINEERS & PROJECT MANAGERS
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 22 Burness Park Drive, Northgate VIC 3168
 Telephone: (03) 7538 5000, Facsimile: (03) 7538 5050



Drainage pipeline / sewer outfalls & water quality asset locations are conceptual only.



The following have been identified as significant environmental issues for the site:

- Streamwater and Sediment control
- Protection of Kororoit Creek

These issues shall be managed with the measures outlined on this plan.

Management

1. Management : Project Engineer, David Price & Miller Consulting

2. Consultation of EIP Requirements : Reduction of all persons working on site regarding the requirements as set out on the EIP.

3. Staging of Works : Development will be staged in accordance with the endorsed plan. It is anticipated that construction will be programmed to minimize impact to surrounding environment.

4. Inspections and Maintenance : One inspection per week prior and after storm events and/or heavy rain. Highways as required with all rectification to be addressed within 24 hrs of incident/report.

5. Working Hours : 7:00am - 5:00pm

6. Noise Reduction Methods : Regular maintenance and inspection of machinery, appropriate ear protection required of all those when working near or within machinery.

7. Breeding Restrictions : Not Applicable.

8. Stop Work / Restricted Activities : Weather requirements may require stop work or restricted activities during strong winds, hot temperatures, rain/storm events.

9. Water Spraying : Water spraying shall be carried out when works are generating dust. Water spraying of work site will be carried out as required.

10. Soil Stabilisation : Not applicable.

11. De-watering : Not applicable.

12. Cleaning of Vehicles : This will be undertaken in accordance with relevant planning permit condition issued by Melton Council.

13. Street Cleaning : As required once per day prior and after any rain.

14. Post Works Stabilisation : Stabilisation of areas surrounding the creek area will be addressed once all activities have been completed. This may be often that shall be considered depending on the time of year and if conditions are suitable.

15. Movement of Soil : (See site) On site / N/A

16. Waste Identification Methods : Not applicable.

17. Litter and Waste Disposal : Removed by contractors to approved waste facility.

18. Contaminated Areas : Risk: High / Medium / Low

19. Yes / No, Details

20. Yes / No, Details

21. Yes / No, Details

22. Yes / No, Details

23. Yes / No, Details

24. Yes / No, Details

25. Yes / No, Details

26. Yes / No, Details

27. Yes / No, Details

28. Yes / No, Details

29. Yes / No, Details

30. Yes / No, Details

31. Yes / No, Details

32. Yes / No, Details

33. Yes / No, Details

34. Yes / No, Details

35. Yes / No, Details

36. Yes / No, Details

37. Yes / No, Details

38. Yes / No, Details

39. Yes / No, Details

40. Yes / No, Details

41. Yes / No, Details

42. Yes / No, Details

43. Yes / No, Details

44. Yes / No, Details

45. Yes / No, Details

EMP/CMP PLAN (1) - Locations of Types of Environmental Controls

Project Name : **MODEINA**

Date and Revision : **JULY 2014**

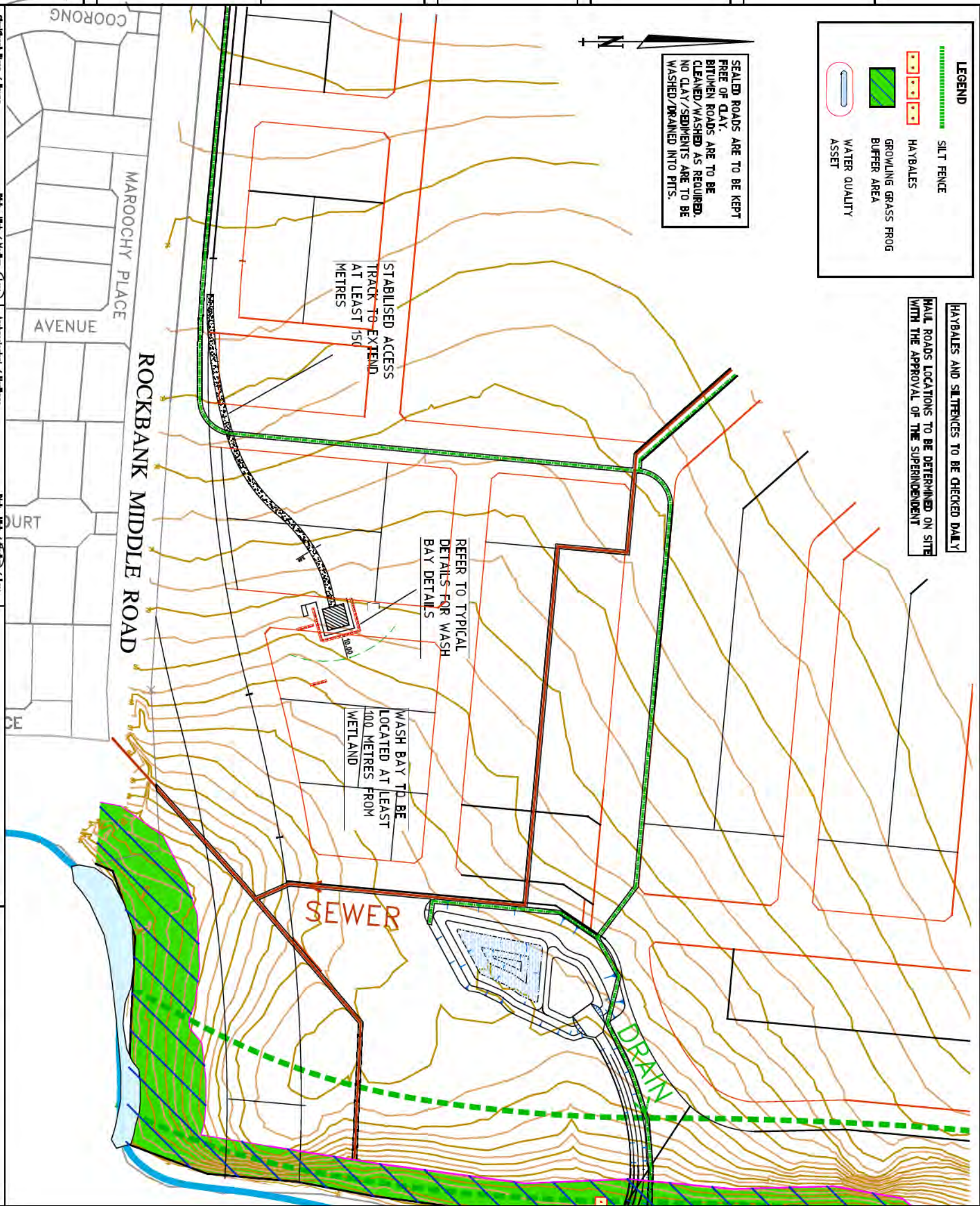
Attachment "J" - EMP/CMP showing areas of Protection Measures for Kororoit Creek

LEGEND

- SILT FENCE
- HAYBALES
- GROWING GRASS PEG
- BUFFER AREA
- WATER QUALITY ASSET

SEALED ROADS ARE TO BE KEPT FREE OF CLAY. BITUMEN ROADS ARE TO BE CLEANED/WASHED AS REQUIRED. NO CLAY/SEDIMENTS ARE TO BE WASHED/DRAINED INTO PITS.

HAYBALES AND SILTFENCES TO BE CHECKED DAILY
HAUL ROADS LOCATIONS TO BE DETERMINED ON SITE WITH THE APPROVAL OF THE SUPERINTENDENT



Drainage pipeline / sewer outfalls & water quality asset locations are conceptual only.



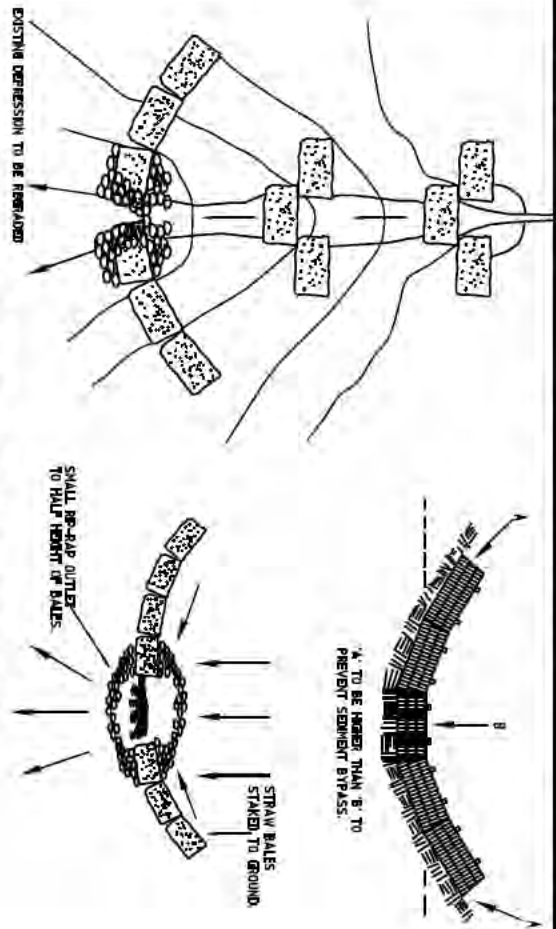
EMP/OMP PLAN (1) - Locations of Types of Environmental Controls

Project Name : MODEINA

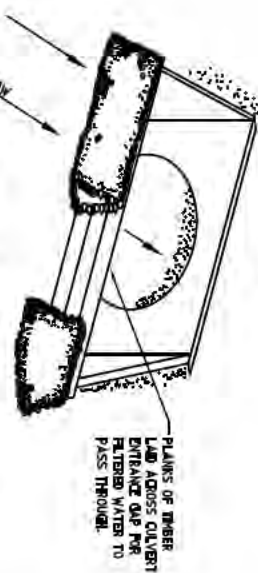
Date and Revision : JULY, 2014

Attachment "J" - EMP/OMP showing areas of Protection Measures for Kororoff Creek

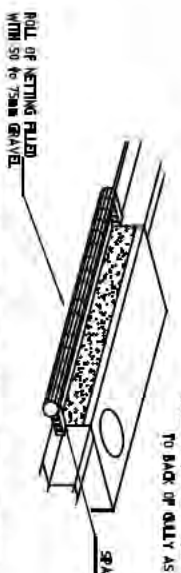
All environmental controls shall be constructed in accordance with the following details.



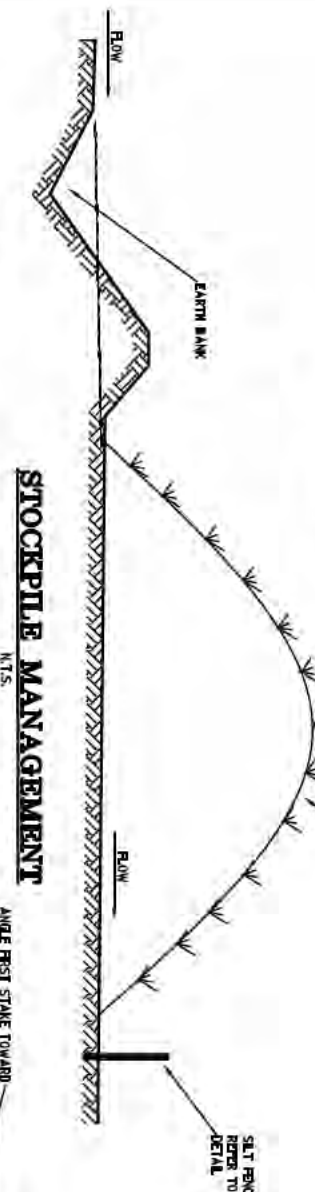
STRAW BALE & STONE TRAP DETAILS
N.T.S.



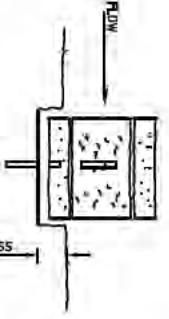
HEADWALL INLET PROTECTION
N.T.S.



KERB INLET PROTECTION
N.T.S.

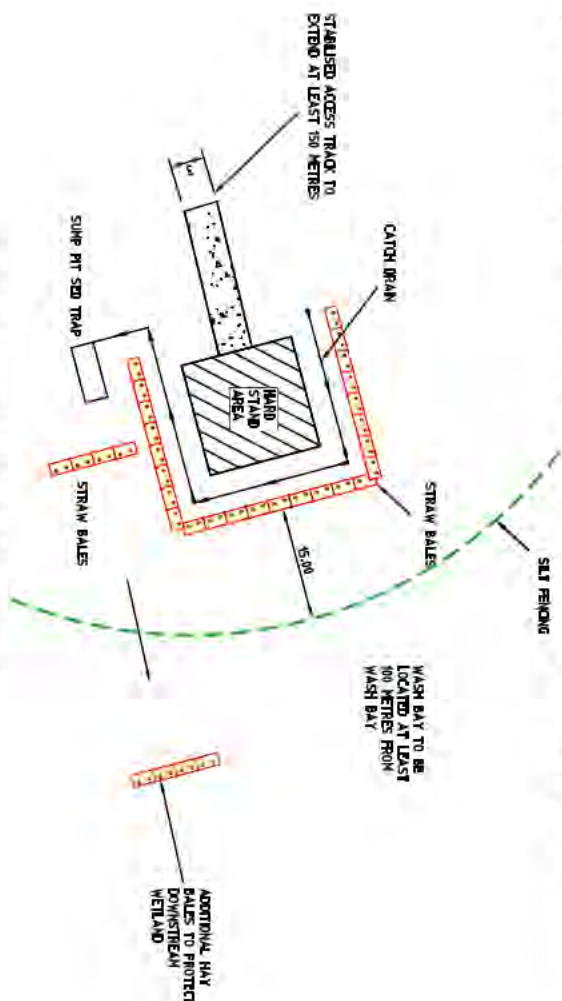


STOCKPILE MANAGEMENT
N.T.S.

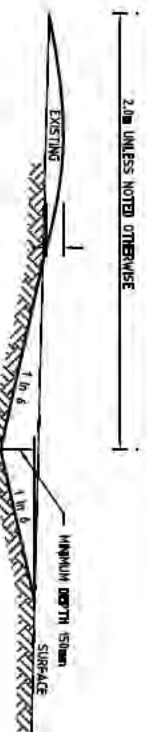


BEDDING DETAIL
N.T.S.

- NOTES**
GENERAL
- REFER TO CIVIL DRAWINGS FOR DETAILS OF EARTHWORKS, DRAINAGE AND SERVICES.
 - ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH CONSULT'S SPECIFICATIONS AND DETAILS WHERE APPROPRIATE.

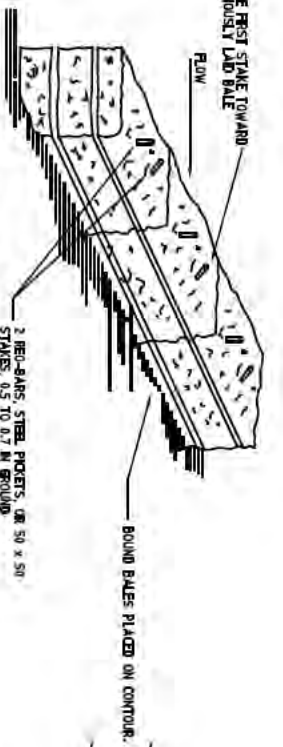


TYPICAL WASH BAY DETAIL
N.T.S.

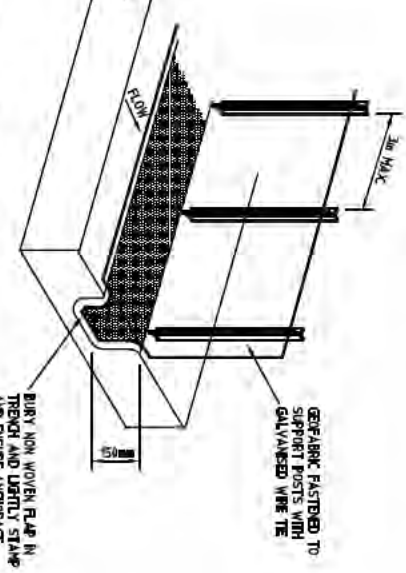


SWALE DRAIN (Typical)
N.T.S.

- THE CONTRACTOR IS TO TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND DOWNSTREAM SEDIMENTATION DURING ALL STAGES OF CONSTRUCTION INCLUDING THE MAINTENANCE PERIOD.
- ALL SEDIMENT CONTROL DEVICES SHALL BE MONITORED, CLEANED AND OR REPAIRED WHENEVER THE ACCUMULATED SEDIMENT REDUCES THE CAPACITY BY 50%.
- AT ALL TIMES THE CONTRACTOR SHALL MONITOR THE PREVAILING WEATHER CONDITIONS AND PROTECT ANY DOWNSTREAM CONSTRUCTION AND GULLY HEADS.
- THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILISED WHEN THE DRAINAGE HAS BEEN PROPERLY STABILISED.
- ALL PERIMETER BANK/SWALE SHALL HAVE AN UNINTERRUPTED POSITIVE GRADE TO AN OUTLET.



ANCHORING DETAIL
N.T.S.



SILT FENCE DETAIL
N.T.S.

GENERAL NOTES:
Refer to Part 1 Environmental Guidelines for Major Construction Sites and Construction Management Plan for further details on the design and construction of measures to be implemented with the risks to the surrounding environment and objectives of protecting receiving waters and its beneficiaries.

EROSION
1. Keep land clearing to a minimum and the period of time that an area is left cleared to a minimum.
2. Do not remove vegetation (including grass) within the watercourse and within 5 metres from the edge of banks.
3. Avoid disturbing environmentally sensitive areas and create wide buffer strips of vegetation around it. Avoid works which increase landslips.
4. Coordinate and stagger works in sensitive erosion. Revegetate and mulch as each section of works is completed.
5. Provide catchment drains to collect runoff from cleared areas and slopes.
6. Reduce water velocities on site by installing long continuous flow paths.
7. Erosive front-end berms/baffles are to be provided to ensure water flowing the site meets specified standards. Temporary structures are to be designed for a 1 to 2 year event. If there is a high environmental risk storm event or 1 to 50 year storm event for permanent structures.
8. Installation of sediment and erosion control measures to be in place prior to construction if possible.
9. All sediment traps, detention ponds, Silt Pans, etc. to be checked daily during periods of wet weather & immediately after heavy and intense rainfall. Monitor water entering wetlands or drainage system.
DUST SUPPRESSION
10. Install wind fences around exposed soil in areas susceptible to dust generation.
11. Water exposed soil when dust is visible. Ensure that the water does not contaminate surface water. Water from sediment dams may be used for dust suppression.
12. Limit access to and from the site to specified haul roads to be shunted periodically away from sleeping huts, Showers or other these haul roads. Addressers are to have no adverse impacts on water quality.

STOOPLES
13. Stopples or barriers that are to be installed greater than 28 days must be mulched, roughened and seeded with sterile grasses.
14. Stopples are to be placed at a standard position by the supervising engineer prior to commencement of works. Stopples barriers to have slopes no greater than 2:1. Lengths of stopples are to be more than 10 metres from waterways. Includes the number and size of stopples.

DEWATERING
15. All low points to be noted and appropriate measures be put in place. Sediment laden water is to be pumped into existing vegetation or possible of sediment control structures.

WORKING IN WATERWAYS AND FLOODPLAINS
16. Where it is not possible to avoid working in streams plan to stabilize contact time and stage works during periods of low flows. Avoid times of year when potential environmental damage is at its highest.
17. Stream crossings should be positioned perpendicular to flows and at the narrowest viable land.
18. Prepare a Contingency Plan for any works above stream events. The contingency plan should include methods to limit downstream entering erosion areas, silt of construction facilities, procedure for preventing silt, soil and chemical entering the environment.
19. Prepare a Rehabilitation Plan that includes proposed changes to waterways, flood protection, erosion and sediment control. A revegetation plan is also included, addressing revegetation and ongoing maintenance for 7 years.

FLORA AND FAUNA
20. Avoid undue disturbance to sensitive or endangered native flora and fauna. Reduce impacts on exotic plants and animals.
WASTES
21. Handle wastes on site.
22. Contaminated wastes must be disposed of in safe and appropriate manner. Dispose contaminated materials in a licensed disposal facility.
23. Provide bins for litter. Ensure materials are well tied when they can be blown or washed away.
24. Remove debris and sediment from pits and adjoining pipes at regular intervals and prior to completion of works.
25. Any holes to be repaired and disposed of site once vegetation is down and exposed areas are established.

MONITORING
26. Refer to Ch 9 of Environmental Guidelines for Major Construction Sites. Ensure regular inspections, monitoring and audits.

DPM
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Telephones: (03) 9238 5000, Facsimiles: (03) 9238 5009

ATTACHMENT K: MODEINA MUSIC MODEL



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Node Type	UrbanSourceNode	UrbanSourceNode	UrbanSourceNode
Node Name	1.85 ha Developed Catchment	2.68 ha Developed Catchment	2.09 ha Developed Catchment
Node ID		1	2
General - Location	1.85 ha Developed Catchment	2.68 ha Developed Catchment	2.09 ha Developed Catchment
General - Notes			
General - Fluxes - Daily			
General - Fluxes - Sub-Daily			
General - Flux unit	mm	mm	mm
Areas - Total Area (ha)		1.85	2.68
Areas - Impervious (%)		55	55
Areas - Pervious (%)		45	45
Rainfall-Runoff - Impervious Area - Rainfall Threshold (mm/day)		1	1
Rainfall-Runoff - Pervious Area - Soil Storage Capacity (mm)		30	30
Rainfall-Runoff - Pervious Area - Initial Storage (% of Capacity)		25	25
Rainfall-Runoff - Pervious Area - Field Capacity (mm)		20	20
Rainfall-Runoff - Pervious Area - Infiltration Capacity Coefficient - a		200	200
Rainfall-Runoff - Pervious Area - Infiltration Capacity Exponent - b		1	1
Rainfall-Runoff - Groundwater Properties - Initial Depth (mm)		10	10
Rainfall-Runoff - Groundwater Properties - Daily Recharge Rate (%)		25	25
Rainfall-Runoff - Groundwater Properties - Daily Baseflow Rate (%)		5	5

Rainfall-Runoff - Groundwater Properties - Daily Deep Seepage Rate (%)	0	0
Total Suspended Solids - Base Flow Concentration - Mean (log mg/L)	1.1	1.1
Total Suspended Solids - Base Flow Concentration - Std Dev (log mg/L)	0.17	0.17
Total Suspended Solids - Base Flow Concentration - Estimation Method	1	1
Total Suspended Solids - Base Flow Concentration - Serial Correlation (R squared)	0	0
Total Suspended Solids - Storm Flow Concentration - Mean (log mg/L)	2.2	2.2
Total Suspended Solids - Storm Flow Concentration - Std Dev (log mg/L)	0.32	0.32
Total Suspended Solids - Storm Flow Concentration - Estimation Method	1	1
Total Suspended Solids - Storm Flow Concentration - Serial Correlation (R squared)	0	0
Total Phosphorus - Base Flow Concentration - Mean (log mg/L)	-0.82	-0.82
Total Phosphorus - Base Flow Concentration - Std Dev (log mg/L)	0.19	0.19
Total Phosphorus - Base Flow Concentration - Estimation Method	1	1
Total Phosphorus - Base Flow Concentration - Serial Correlation (R squared)	0	0
Total Phosphorus - Storm Flow Concentration - Mean (log mg/L)	-0.45	-0.45
Total Phosphorus - Storm Flow Concentration - Std Dev (log mg/L)	0.25	0.25
Total Phosphorus - Storm Flow	1	1

Concentration - Estimation Method Total Phosphorus - Storm Flow			
Concentration - Serial Correlation (R squared)		0	0
Total Nitrogen - Base Flow Concentration - Mean (log mg/L)		0.32	0.32
Total Nitrogen - Base Flow Concentration - Std Dev (log mg/L)		0.12	0.12
Total Nitrogen - Base Flow Concentration - Estimation Method		1	1
Total Nitrogen - Base Flow Concentration - Serial Correlation (R squared)		0	0
Total Nitrogen - Storm Flow Concentration - Mean (log mg/L)		0.42	0.42
Total Nitrogen - Storm Flow Concentration - Std Dev (log mg/L)		0.19	0.19
Total Nitrogen - Storm Flow Concentration - Estimation Method		1	1
Total Nitrogen - Storm Flow Concentration - Serial Correlation (R squared)		0	0
Import Flow Properties - Import Flow Enabled		1	1
Import Flow Properties - Import Flow File			
Import Flow Properties - Header lines		0	0
Import Flow Properties - Baseflow Column		0	0
Import Flow Properties - Impervious Stormflow Column		0	0
Import Flow Properties - Pervious Stormflow Column		0	0
Import Flow Properties - Unit		5	5
Import Flow Properties - Catchment Area for GP (ha)		1	1
Node Type	SedimentationBasinNode	SedimentationBasinNode	SedimentationBasinNode

Node Name	Sed. (75 sq.m)	Sed. (75 sq.m)	Sed. (100 sq.m)
Node ID		13	15
General - Location	Sed. (75 sq.m)	Sed. (75 sq.m)	Sed. (100 sq.m)
General - Notes			
General - Fluxes			
General - Flux File Timestep (in seconds)		360	360
Reuse Properties - Reuse Enabled		1	1
Reuse Properties - Annual Demand Enabled		1	1
Reuse Properties - Annual Demand Value (ML/year)		0	0
Reuse Properties - Annual Demand Distribution		0	0
Reuse Properties - Monthly Distribution Values	8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33	8.33;8.33	8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33
Reuse Properties - Daily Demand Enabled		1	1
Reuse Properties - Daily Demand Value (ML/day)		0	0
Reuse Properties - Custom Demand Enabled		1	1
Reuse Properties - Custom Demand Time Series File			
Reuse Properties - Custom Demand Time Series Units		5	5
Reuse Properties - Minimum Draw down height		0	0
Inlet Properties - Low Flow By-pass (cubic metres per sec)		0	0
Inlet Properties - High Flow By-pass (cubic metres per sec)		100	100
Storage and Infiltration Properties - Surface Area (square metres)		75	75
Storage and Infiltration Properties - Extended Detention Depth (metres)		0.5	0.5
Storage and Infiltration Properties -		75	75

Permanent Pool Volume (cubic metres)		
Storage and Infiltration Properties - Initial Volume	75	75
Storage and Infiltration Properties - Exfiltration Rate (mm/hr)	0	0
Storage and Infiltration Properties - Evaporative Loss as % of PET	75	75
Outlet Properties - Equivalent Pipe Diameter (mm)	16	16
Outlet Properties - Overflow Weir Width (metres)	2	2
Outlet Properties - Notional Detention Time (hrs)	24.69720908	24.69720908
Advanced Properties - Orifice Discharge Coefficient	0.6	0.6
Advanced Properties - Weir Coefficient	1.7	1.7
Advanced Properties - Number of CSTR Cells	1	1
Advanced Properties - Total Suspended Solids - k (m/yr)	8000	8000
Advanced Properties - Total Suspended Solids - C* (mg/L)	20	20
Advanced Properties - Total Suspended Solids - C** (mg/L)	20	20
Advanced Properties - Total Phosphorus - k (m/yr)	6000	6000
Advanced Properties - Total Phosphorus - C* (mg/L)	0.13	0.13
Advanced Properties - Total Phosphorus - C** (mg/L)	0.13	0.13
Advanced Properties - Total Nitrogen - k (m/yr)	500	500
Advanced Properties - Total Nitrogen - C* (mg/L)	1.4	1.4
Advanced Properties - Total Nitrogen - C** (mg/L)	1.4	1.4

Advanced Properties - Threshold Hydraulic Loading for C** (m/yr)		3500		3500
Advanced Properties - User Defined Storage-Discharge-Height				
Node Type	BioRetentionNodeV4		BioRetentionNodeV4	BioRetentionNodeV4
Node Name	Bio (25 sq.m)		Bio (25 sq.m)	Bio (25 sq.m)
Node ID		14		16
General - Location	Bio (25 sq.m)		Bio (25 sq.m)	Bio (25 sq.m)
General - Notes				
General - Fluxes				
General - Flux File Timestep (in seconds)		360		360
Inlet Properties - Low Flow By-pass (cubic metres per sec)		0		0
Inlet Properties - High Flow By-pass (cubic metres per sec)		100		100
Storage Properties - Extended Detention Depth (metres)		0.5		0.5
Storage Properties - Surface Area (square metres)		25		25
Filter and Media Properties - Filter Area (square metres)		25		25
Filter and Media Properties - Unlined Filter Media Perimeter (metres)		29		29
Filter and Media Properties - Saturated Hydraulic Conductivity (mm/hr)		100		100
Filter and Media Properties - Filter Depth (metres)		0.45		0.45
Filter and Media Properties - TN Content of Filter Media (mg/kg)		800		800
Filter and Media Properties - Orthophosphate Content of Filter Media (mg/kg)		80		80
Infiltration Properties - Exfiltration Rate (mm/hr)		0		0
Lining Properties - Base Lined		0		0

Vegetation Properties - Vegetation Properties		0		0
Outlet Properties - Overflow Weir Width (metres)		2		2
Outlet Properties - Underdrain Present		0		0
Outlet Properties - Submerged Zone With Carbon Present		1		1
Outlet Properties - Submerged Zone Depth (metres)		0.45		0.45
Advanced Properties - Total Suspended Solids - k (m/yr)		8000		8000
Advanced Properties - Total Suspended Solids - C* (mg/L)		20		20
Advanced Properties - Total Phosphorus - k (m/yr)		6000		6000
Advanced Properties - Total Phosphorus - C* (mg/L)		0.13		0.13
Advanced Properties - Total Nitrogen - k (m/yr)		500		500
Advanced Properties - Total Nitrogen - C* (mg/L)		1.4		1.4
Advanced Properties - Filter Media Soil Type		1		1
Advanced Properties - Weir Coefficient		1.7		1.7
Advanced Properties - Number of CSTR Cells		3		3
Advanced Properties - Porosity of Filter Media		0.35		0.35
Advanced Properties - Porosity of Submerged Zone		0.35		0.35
Advanced Properties - Horizontal Flow Coefficient		3		3
Node Type	JunctionNode		JunctionNode	JunctionNode
Node Name	Outfall to Kororoit Creek		Outfall to Kororoit Creek	Outfall to Kororoit Creek
Node ID		7		8
General - Location	Outfall to Kororoit Creek		Outfall to Kororoit Creek	Outfall to Kororoit Creek

General - Notes

Node Type	ReceivingNode	{Node Type}
Node Name	Ultimate Discharge to Kororoit Creek	{Node Name}
Node ID		12 {Node ID}
Coordinates	1319.97363641846:-1069.23401520741	{Coordinates}{{[X:Y]}}
General - Location	Ultimate Discharge to Kororoit Creek	

General - Notes

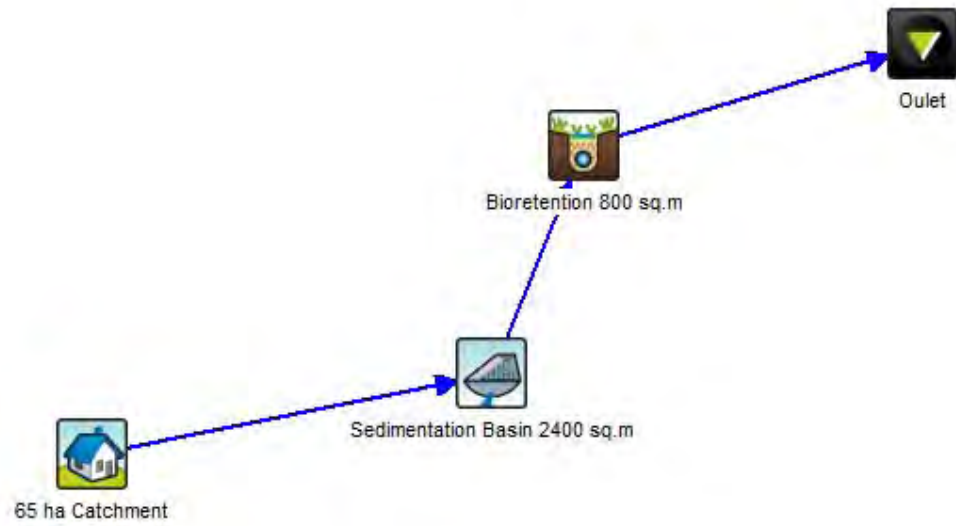
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Link Name	Drainage Link	Drainage Link	Drainage Link
Source Node ID		1	13
Target Node ID		13	14
Routing	Not Routed	Not Routed	Not Routed
Muskingum K		30	30
Muskingum Theta		0.25	0.25

Secondary Outflow Components

=====
=====

65 Ha Ultimate Sediment Basin- Bioretention System



Node Type	UrbanSourceNode
Node Name	65 ha Catchment
Node ID	
General - Location	65 ha Catchment
General - Notes	
General - Fluxes - Daily	
General - Fluxes - Sub-Daily	
General - Flux unit	mm
Areas - Total Area (ha)	
Areas - Impervious (%)	
Areas - Pervious (%)	
Rainfall-Runoff - Impervious Area - Rainfall Threshold (mm/day)	
Rainfall-Runoff - Pervious Area - Soil Storage Capacity (mm)	
Rainfall-Runoff - Pervious Area - Initial Storage (% of Capacity)	
Rainfall-Runoff - Pervious Area - Field Capacity (mm)	
Rainfall-Runoff - Pervious Area - Infiltration Capacity Coefficient - a	
Rainfall-Runoff - Pervious Area - Infiltration Capacity Exponent - b	
Rainfall-Runoff - Groundwater Properties - Initial Depth (mm)	
Rainfall-Runoff - Groundwater Properties - Daily Recharge Rate (%)	
Rainfall-Runoff - Groundwater Properties - Daily Baseflow Rate (%)	
Rainfall-Runoff - Groundwater Properties - Daily Deep Seepage Rate (%)	
Total Suspended Solids - Base Flow Concentration - Mean (log mg/L)	
Total Suspended Solids - Base Flow Concentration - Std Dev (log mg/L)	
Total Suspended Solids - Base Flow Concentration - Estimation Method	
Total Suspended Solids - Base Flow Concentration - Serial Correlation (R squared)	
Total Suspended Solids - Storm Flow Concentration - Mean (log mg/L)	
Total Suspended Solids - Storm Flow Concentration - Std Dev (log mg/L)	
Total Suspended Solids - Storm Flow Concentration - Estimation Method	
Total Suspended Solids - Storm Flow Concentration - Serial Correlation (R squared)	
Total Phosphorus - Base Flow Concentration - Mean (log mg/L)	
Total Phosphorus - Base Flow Concentration - Std Dev (log mg/L)	
Total Phosphorus - Base Flow Concentration - Estimation Method	

Total Phosphorus - Base Flow Concentration - Serial Correlation (R squared)
Total Phosphorus - Storm Flow Concentration - Mean (log mg/L)
Total Phosphorus - Storm Flow Concentration - Std Dev (log mg/L)
Total Phosphorus - Storm Flow Concentration - Estimation Method
Total Phosphorus - Storm Flow Concentration - Serial Correlation (R squared)
Total Nitrogen - Base Flow Concentration - Mean (log mg/L)
Total Nitrogen - Base Flow Concentration - Std Dev (log mg/L)
Total Nitrogen - Base Flow Concentration - Estimation Method
Total Nitrogen - Base Flow Concentration - Serial Correlation (R squared)
Total Nitrogen - Storm Flow Concentration - Mean (log mg/L)
Total Nitrogen - Storm Flow Concentration - Std Dev (log mg/L)
Total Nitrogen - Storm Flow Concentration - Estimation Method
Total Nitrogen - Storm Flow Concentration - Serial Correlation (R squared)
Import Flow Properties - Import Flow Enabled
Import Flow Properties - Import Flow File
Import Flow Properties - Header lines
Import Flow Properties - Baseflow Column
Import Flow Properties - Impervious Stormflow Column
Import Flow Properties - Pervious Stormflow Column
Import Flow Properties - Unit
Import Flow Properties - Catchment Area for GP (ha)
Node Type
Node Name
Node ID
Coordinates
General - Location
General - Notes
General - Fluxes
General - Flux File Timestep (in seconds)
Reuse Properties - Reuse Enabled
Reuse Properties - Annual Demand Enabled
Reuse Properties - Annual Demand Value (ML/year)
Reuse Properties - Annual Demand Distribution
Reuse Properties - Monthly Distribution Values

SedimentationBasinNode

Sedimentation Basin 2400 sq.m

203.89008794857;-512.746117724648

Sedimentation Basin 2400 sq.m

8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33;8.33

Reuse Properties - Daily Demand Enabled
Reuse Properties - Daily Demand Value (ML/day)
Reuse Properties - Custom Demand Enabled
Reuse Properties - Custom Demand Time Series File
Reuse Properties - Custom Demand Time Series Units
Reuse Properties - Minimum Draw down height
Inlet Properties - Low Flow By-pass (cubic metres per sec)
Inlet Properties - High Flow By-pass (cubic metres per sec)
Storage and Infiltration Properties - Surface Area (square metres)
Storage and Infiltration Properties - Extended Detention Depth (metres)
Storage and Infiltration Properties - Permanent Pool Volume (cubic metres)
Storage and Infiltration Properties - Initial Volume
Storage and Infiltration Properties - Exfiltration Rate (mm/hr)
Storage and Infiltration Properties - Evaporative Loss as % of PET
Outlet Properties - Equivalent Pipe Diameter (mm)
Outlet Properties - Overflow Weir Width (metres)
Outlet Properties - Notional Detention Time (hrs)
Advanced Properties - Orifice Discharge Coefficient
Advanced Properties - Weir Coefficient
Advanced Properties - Number of CSTR Cells
Advanced Properties - Total Suspended Solids - k (m/yr)
Advanced Properties - Total Suspended Solids - C* (mg/L)
Advanced Properties - Total Suspended Solids - C** (mg/L)
Advanced Properties - Total Phosphorus - k (m/yr)
Advanced Properties - Total Phosphorus - C* (mg/L)
Advanced Properties - Total Phosphorus - C** (mg/L)
Advanced Properties - Total Nitrogen - k (m/yr)
Advanced Properties - Total Nitrogen - C* (mg/L)
Advanced Properties - Total Nitrogen - C** (mg/L)
Advanced Properties - Threshold Hydraulic Loading for C** (m/yr)
Advanced Properties - User Defined Storage-Discharge-Height

Node Type

Node Name

Node ID

BioRetentionNodeV4
Bioretention 800 sq.m

Coordinates

General - Location

General - Notes

General - Fluxes

General - Flux File Timestep (in seconds)

Inlet Properties - Low Flow By-pass (cubic metres per sec)

Inlet Properties - High Flow By-pass (cubic metres per sec)

Storage Properties - Extended Detention Depth (metres)

Storage Properties - Surface Area (square metres)

Filter and Media Properties - Filter Area (square metres)

Filter and Media Properties - Unlined Filter Media Perimeter (metres)

Filter and Media Properties - Saturated Hydraulic Conductivity (mm/hr)

Filter and Media Properties - Filter Depth (metres)

Filter and Media Properties - TN Content of Filter Media (mg/kg)

Filter and Media Properties - Orthophosphate Content of Filter Media (mg/kg)

Infiltration Properties - Exfiltration Rate (mm/hr)

Lining Properties - Base Lined

Vegetation Properties - Vegetation Properties

Outlet Properties - Overflow Weir Width (metres)

Outlet Properties - Underdrain Present

Outlet Properties - Submerged Zone With Carbon Present

Outlet Properties - Submerged Zone Depth (metres)

Advanced Properties - Total Suspended Solids - k (m/yr)

Advanced Properties - Total Suspended Solids - C* (mg/L)

Advanced Properties - Total Phosphorus - k (m/yr)

Advanced Properties - Total Phosphorus - C* (mg/L)

Advanced Properties - Total Nitrogen - k (m/yr)

Advanced Properties - Total Nitrogen - C* (mg/L)

Advanced Properties - Filter Media Soil Type

Advanced Properties - Weir Coefficient

Advanced Properties - Number of CSTR Cells

Advanced Properties - Porosity of Filter Media

Advanced Properties - Porosity of Submerged Zone

Advanced Properties - Horizontal Flow Coefficient

320.894909767108:-223.999253959979

Bioretention 800 sq.m

Node Type	ReceivingNode
Node Name	Oulet
Node ID	
Coordinates	749.482736770716:-94.5300145526389
General - Location	Oulet
General - Notes	

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Link Name	Drainage Link
Source Node ID	
Target Node ID	
Routing	Not Routed
Muskingum K	
Muskingum Theta	
Secondary Outflow Components	

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Appendix 4: Response to public submissions

General category	Particular issues raised	Number of submitters	Response
1. Fragmentation of populations/habitat (disagreement with response to significant impact criteria for NTGVVP)	SRF population on the site is not isolated	2	<p>One submitter argues that the removal of all Spiny Rice-flower and Matted Flax-lily from the site would make fragmentation of this population a moot point. It is reiterated that the Action is considered not to fragment the population recorded at Precinct 2 of the Modeina Estate (referred to herein as simply 'Precinct 2').</p> <p>Another submitter argues that the removal of up to 20 hectares of NTGVVP would fragment this community based on existing links with nearby reserves, including the 5-hectare Isabella Williams Memorial Reserve (approximately 3 hectares of which is native grassland) to the southeast across Kororoit Creek, the Bullum Bullum Reserve (assumed to be a parcel of land zoned Public Conservation and Resource Zone 650 metres south of Precinct 2) and 'Tenterfield Reserve' (assumed to mean the Burnside Heights Recreation Reserve to the north across the creek, zoned Public Park and Recreation Zone where sportsgrounds are under construction, and Urban Floodway Zone adjacent to the creek).</p> <p>Neither the Burnside Heights Recreation Reserve nor the parcel zoned PCRZ are listed as public land and their ongoing management status is unknown; the extent of NTGVVP on these parcels is also unknown and this information was not provided by the submitter. It therefore cannot be concluded that these reserves form part of contiguous NTGVVP habitat (the parcel zoned PCRZ is also separated from Precinct 2 by a 650 metre-long narrow reserve along Kororoit Creek, of unknown status).</p> <p>No information was provided by the submitter as to whether the Isabella Williams Memorial Reserve contains NTGVVP. It is believed that at least part of this reserve contains this community; however, it is not linked to the grasslands on the project site. Furthermore, it is understood that this reserve and the parcel zoned PCRZ to the south will be separated from Precinct 2 by the proposed extension to the east-west Rockbank Middle Road across Kororoit Creek and its upgrade to a 4 lane divided carriageway arterial road in accordance with the Melton East Strategy Plan (1997).</p> <p>In light of the above and the fact that this once-widespread grassland community has been subject to more than 20 years of development in this urban landscape and is now only represented by relatively small 'pocket' remnants, it is not considered reasonable to assert that the removal of NTGVVP from Precinct 2 represents fragmentation of the community. Based on the prevailing land use in the landscape it is also not considered reasonable to assert that this vegetation would be likely to play a role in the recovery of NTGVVP in the broader region as it is not linked to other remnants and of itself has no room to recover given pre-existing land use rights on surrounding land and almost continuous surrounding urban development. Recovery of this community is more effectively promoted in a rural landscape.</p>
	Object to fragmentation of SRF and MFL populations		
	The loss of NTGVVP WILL fragment the community – significant impact criterion		
	The loss of NTGVVP should be seen as interfering with the recovery of an ecological community – significant impact criterion		
2. An Environmental Impact Statement should be prepared	An Environmental Impact Statement should be prepared because of impacts on GGF, SRF, SLL & NTGVVP	2	<p>The Commonwealth government decided that assessment through the Preliminary Documentation process was appropriate for the proposal. Furthermore, the State government has decided in response to an EES Referral that an EES is NOT required, subject to certain conditions being met. It is proposed that the EPBC Preliminary Documentation will be considered in addressing the 'No EES conditions'.</p>

General category	Particular issues raised	Number of submitters	Response
3. Growling Grass Frog impacts	Growling Grass Frog (GGF) habitat along Kororoit Creek is strategically important	6	<p>The Sub-Regional Strategy for the Growling Grass Frog identifies this section of Kororoit Creek as 'potentially important habitat' based on pre-2000 records of the species in the waterway. More recently, BL&A recorded the species in the section of Kororoit Creek adjacent to Precinct 2. The proposal recognised the importance of this habitat by providing a 30-metre buffer zone from Kororoit Creek and the edges of wetland areas (including those where the records were identified and future stormwater treatment wetlands) in this precinct. This approach has been found to be acceptable for the provision of habitat under the Commonwealth EPBC Act assessment process for a number of property developments in Melbourne with past records of the species (e.g. 110 Cardinia Road, Officer, EPBC 2010/5729; Former Lalor Golf Course EPBC 2004/1605; North Burnside Precinct 1, EPBC 2003/1185). These distances refer to habitats and are proposed for buffers within the retained creek side corridor. In fact the development is set back from the creek, averages 50 metres and in places is up to 100 metres, to provide adequate space for recreational infrastructure. This distance is considerably greater than the minimum 35 metre creek setback required under the Commonwealth's approval of Precinct 1 and this is demonstrated in Figure 3 of the Preliminary documentation and Attachment 2 to this response. The proposed waterway separations are not dissimilar to those on nearby developments along Kororoit Creek.</p> <p>The Commonwealth significant impact guidelines for the species lists as significant the "Permanent removal or degradation of terrestrial habitat (for example between ponds, drainage lines or other temporary/permanent habitat) within 200 metres of a water body in temperate regions..." It is considered that in the absence of significant ponds or drainage lines outside the creek corridor, grassland habitat proposed for removal does not constitute dispersal habitat for the species as it does not provide connecting habitat between breeding habitats – i.e. it is considered that the species would be more likely to disperse along the creek corridor itself.</p> <p>The Sub-Regional Species Strategy (SRSS) for the Growling Grass Frog and guidelines contained within it do not apply to Precinct 2 as it is not within the Urban Growth Zone and is not covered by the Melbourne Strategic Assessment. This SRSS is based on guidelines for protecting frog habitat in new urban development areas. Precinct 2 is an infill development within the existing urban fabric and the frog is therefore not using space in the same way as in pre-urban rural landscapes. It is noteworthy that notwithstanding this, the frog persists along urban waterways even though the SRSS's setback requirements have not to date been applied.</p>
	Only impact on GGF considered in the document is sediment and erosion – this is inadequate and impacts need to be quantified		
	Removal of non-breeding habitat for GGF near creek unacceptable (dispersal, foraging, overwintering)		
	Distance between creek and development not in line with Commonwealth significant impact guidelines and compromises landscape scale habitat linkages for SRF, GGF and SLL		
	Wider zone should be retained along Kororoit Creek for the GGF to permit dispersal and foraging opportunities, similar to developments along the creek and in the new growth areas (i.e. 100 m setbacks)		
4. Native vegetation offsets not stated	No compensation for NV removal	1	Section 8.2 of the Preliminary Documentation outlines how offsets for the removal of NTGVVP will be achieved in the Western Grassland Reserve, consistent with the Commonwealth's policy <i>Melbourne Urban Development – Policy Statement for EPBC Act referrals</i> (July 2012).

General category	Particular issues raised	Number of submitters	Response
5. No 'avoid' or 'minimise' demonstrated	No attempt has been made to 'avoid' and 'minimise' impacts	5	<p>The proponent has advised that it has addressed the 3 step avoid, minimise, offset process in the development of the proposal as follows:</p> <ol style="list-style-type: none"> 1. Avoid. The staging of development has been configured to ensure no material impact of the critically endangered Spiny Rice-flower until the Propagation Project delivers sustainable results and offset sites are established. Design has carefully considered the location of services and infrastructure to ensure development can proceed in a holistic manner and be completed once sustainable results have been delivered. A fragmented development approach is not possible and would render the project unviable. 2. The staged development proposal minimises the impact on the Spiny Rice-flowers in accordance with agreed milestones until the last three stages. If necessary development of these three stages can also be deferred until the Propagation Project has been successfully concluded. 3. On successful completion of the Propagation Project all Spiny Rice-flowers will be deemed to have been offset. <p>The proponent has indicated that impacts will be further minimised through its focus on achieving broader conservation benefits, in particular for the Spiny Rice-flower through the Propagation Project and its offset program which is consistent with the Victorian offset approach to native vegetation removal proposals assessed under the high risk assessment pathway.</p> <p>The proponent commits to the retention of 175 Spiny Rice-flower plants in a Management Area corresponding to Stage 22 until such time as the Propagation Project proves its success. In the event the Propagation Project is successful it will underwrite the long term survival of the specie.</p>
6. Objection to removal of NTGVVP/SRF/SLL habitat	<p>Object to removal of grasslands and Spiny Rice-flower (SRF)</p> <p>The majority of the population on the site should be retained and protected in perpetuity</p> <p>Object to removal of a significant grassland ecosystem (NTGVVP)</p> <p>Too much habitat for the GGF, SLL and SRF is being destroyed by this development</p> <p>High quality NTGVVP should be preserved</p> <p>Propagation Trial has merit but not at expense of removing species</p>	7	<p>The proponent has indicated that it is focussed on achieving broader conservation benefits. The Spiny Rice-flower Propagation Project also involves the reinstatement of native grassland habitat, including the planting of a suite of graminoid and forb species, with considerable success achieved to date.</p>

General category	Particular issues raised	Number of submitters	Response
	Remove development from all or part of Stages 8 (assumed to mean Stage 18 – Primary School), 12, 14, 20, 21 and 22 and retain these areas for protection of the SRF, GGF and SLL		
7. Offsets inadequate generally	Any 'offset agreement' cannot adequately offset such an important community (NTGVVP)	2	The proponent has indicated that it is focussed on achieving broader conservation benefits, in particular for NTGVVP and the Spiny Rice-flower through the Propagation Project and its offset program. It considers this to be a substantially greater commitment to compensation and offset, with potentially lasting benefits for the threatened Spiny Rice-flower over and above just a usual offset approach. In the event that the Spiny Rice-flower Propagation Project is unsuccessful the proposal commits to the retention of 175 Spiny Rice-flower plants in a Management Area corresponding to Stage 22 until such time as sustainable success can be demonstrated.
8. Planning consideration – housing types	Development could include a greater variety of housing to achieve the same yield, thereby justifying the services investment AND retaining more of the significant biodiversity areas, as suggested in the VCAT decisions in 2006 and 2008 on the site	1	The proponent has provided the response below: The density of housing proposed for the development is consistent with State and local planning policy for the area, and home buyer expectations. Reference by VCAT to a different style of development was a hypothetical reflection in what was otherwise a lengthy and complex decision. The Responsible Planning Authority has subsequently approved development of Precinct 1 on the basis of similar densities applying over the balance area.
9. Planning consideration – open space	Current proposal does not have any significant open space and does not reflect current trends with developments incorporating wider buffers along waterways so vegetation/conservation and passive recreation can co-exist (without significant impacts on GGF)	6	The proponent has provided the response below: As described by VCAT the site represents the last piece of a jigsaw in development of the Melton East Growth Corridor. It is not an isolated ad hoc development proposal, but is consistent with long term planning policy and strategy for the area. From a planning perspective it is not appropriate that the site be considered in an isolated, stand alone context. The EPBC Act assessment of Precinct 1 in 2004 was the first time residential development in this growth area was captured by the Act, which came into force in July 2000, and after most of the Burnside area had been approved and developed. Planning for the area has proceeded in accordance with the Melton East Growth Area Strategy (1997). The provision of services, infrastructure, community facilities and open space have been delivered and are proposed to be delivered in accordance with that Strategy. With respect to open space and buffers along the creek for much of its length the edge of development is set back from the creek by 50 metres or more.
	Limited open space in the current development proposal puts pressure on remaining open space and conservation reserves in Brimbank - particularly the Isabella Williams Reserve		
	Alternatives to the proposed development layout that include more open space and wider creek buffers have not been adequately considered and it is inconsistent with developments elsewhere along the Kororoit Creek in this respect.		

General category	Particular issues raised	Number of submitters	Response
10. Striped Legless Lizard impacts	Little consideration of the Striped Legless Lizard (SLL)	7	<p>The following consideration was given to Striped Legless Lizard on the site of the proposed Action:</p> <ul style="list-style-type: none"> Targeted surveys involving 8 tile grids place throughout suitable habitat, undertaken to Commonwealth guidelines under the EPBC Act The recorded presence of the species at three of the eight tile grids led to the conclusion that a population of the species was present at the site Page 31 of the Preliminary Documentation states that: "Given the size and availability of suitable habitat on the Modeina site, it may be considered a key breeding site for [the] Striped Legless Lizard." Based on the above information it was considered that the Action will have a significant impact on the species under EPBC Act guidelines <p>Submitter Megan O'Shea (a researcher of Striped Legless Lizard in Victoria) raised a concern that non-native vegetation within the study area immediately adjacent to native grassland habitat may support populations of Striped Legless Lizard. It is inferred from this comment that O'Shea believes that gene flow within the site cannot be ruled out.</p> <p>None of the submissions presented any evidence to suggest that gene flow may occur between the population(s) on Precinct 2 and nearby sites separated from the impact site by Kororoit Creek and/or urban development.</p> <p>The non-native vegetation adjacent to the native grassland habitat on the site has been largely subject to repeated soil cultivation and grazing over time, and as such is not considered likely to support a population(s) of the species.</p> <p>It is conceded that gene flow may occur between any distinct populations occurring within the impact site, although any gene flow is not considered likely to be significant given the small home range of the species and its restriction to Precinct 2 due to surrounding development. Furthermore, it is considered that the Preliminary Documentation's analysis of connectivity between this site and nearby sites with SLL populations is adequate in support of the argument that gene flow in these scenarios is unlikely.</p> <p>Concerns raised by submitters about sub-optimal timing and weather conditions do not provide any detail as to why these conditions are considered to be sub-optimal. All surveys were undertaken in 2010 according to both State (then Department of Sustainability and Environment) and Commonwealth (then Department of Sustainability Environment Water Population and Communities) guidelines and were terminated when ambient temperatures exceeded 28°C (one exception to this rule is noted for Grid 8 on 26/10/2010; however, the species was recorded from this grid on 13/10/2010).</p>
	No attempt to confirm if the habitat for SLL represents significant breeding habitat		
	SLL habitat may not be isolated, as claimed		
	Gene flow between SLL populations on the site cannot be ruled out		
	Not enough is known about SLL to allow an impact of this size		
	Inadequate consideration of use by SLL of on-site and off-site non-native habitats		
	Timing and weather conditions during the SLL survey were sub-optimal for detecting the species		
The SLL Recovery plan recommends a 'cluster' approach to managing the SLL population and the Burnside site is one of a cluster of habitats that occurs in the region			
11. Striped Legless Lizard salvage and translocation	Salvage and translocation of SLL to the Western Grassland Reserves can only be done for developments in the growth areas, not this one.	1	It has always been the proponent's intention to translocate any Striped Legless Lizards found during the salvage operation to land owned by a related entity known as Quandong that forms part of the proposed Western Grassland Reserve. Discussions are continuing with the Department of Environment and Primary Industry to ensure that this long-standing proposal is in place prior to the development of the Western

General category	Particular issues raised	Number of submitters	Response
	<p>Some aspects of the translocation site for SLL still require resolution (in particular those mentioned on p. 14-15 of the DEPI Translocation Strategic Approach document)</p> <p>Salvage area mentioned as 1.1 ha when in fact over 20 ha of SLL habitat is being removed.</p> <p>Proposed salvage and translocation does not provide any significant conservation benefit or contribute to scientific research for the species (as per the National Recovery Plan and the DEPI Translocation Evaluation Panel)</p>		<p>Grassland Reserve and is acceptable to the Department.</p> <p>Assessments at Quandong show suitable and sufficient habitat used by a current population of the Striped Legless Lizard occurs in this part of the Western Grassland Reserve to allow translocation of Striped Legless Lizard to the Reserve. More detailed analysis of specific sites for translocation will be undertaken prior to any removal of identified habitat from Precinct 2 and documented in a Striped Legless Lizard Salvage and Translocation Plan, prepared to the satisfaction of the Department of the Environment (DotE) and DEPI.</p> <p>BL&A Report 7045 (2.6) dated January 2012 incorrectly stated that an area of 1.1 hectares in the north of the site will be salvaged for the species.</p> <p>Areas of Priority 1 habitat identified using the Striped Legless Lizard Salvage and Translocation Protocol documents (DSE 2011) will be salvaged for the species. It is expected that Priority 1 habitat will coincide with the areas of uncultivated land containing <i>Heavier-soils</i> Plains Grassland (up to 24.24 hectares); however, the precise area will be determined in a Salvage and Translocation Plan for the species, prepared to the satisfaction of DEPI and DotE. The Protocol identifies that no salvage is required for recently cultivated land – this applies to the balance of the land outside the <i>Heavier-soils</i> Plains Grassland patches.</p> <p>Proposed salvage and translocation of the species, in accordance with DEPI’s approach, would relocate a population(s) from an isolated area of habitat subject to pressures associated with surrounding residential development to a large area set aside for conservation – the Western Grassland Reserve. It is considered that this will provide a significant conservation benefit to the species.</p>
12. Spiny Rice-flower offset	<p>The ability to offset through the propagation trial does not automatically provide a basis for approving removal of SRF</p> <p>No certainty that re-established SRF will recruit into the second generation</p> <p>Survival of an SRF plant after 2 years is not considered long enough for ‘success’ of the propagation project to be gauged</p> <p>Land tenure at the Brimbank Council propagation site (Isabella Williams Reserve) has not been adequately addressed</p>	4	<p>The removal of most of the SRF will not occur until the Spiny Rice-flower Project has demonstrated sustainable outcomes. The proponent believes that this satisfies the need for avoidance as the offset is not required until the latter part of development and then is provided once successful propagation of Spiny Rice-flowers is verified. The majority of Spiny Rice-flowers are retained until verification.</p> <p>The Spiny Rice-flower Propagation Project proposes (p. 13, Report 7045 [4.17]):</p> <ul style="list-style-type: none"> ▪ <i>The establishment of a viable and self-sustainable Spiny Rice-flower population at the recipient sites, of at least a total of 800 individuals.</i> <p><i>To be considered established, the Spiny Rice-flower population would need to demonstrate:</i></p> <ul style="list-style-type: none"> ▪ <i>The establishment of new plants that are able to flower and set seed</i> ▪ <i>The production of viable seed</i> ▪ <i>Approximate even numbers of annually flowering male and female plants</i> ▪ <i>New germinants recruiting in numbers similar to that in natural populations</i> ▪ <i>A growing population (i.e. recruitment exceeds mortality)</i>

General category	Particular issues raised	Number of submitters	Response
	<p>The outstanding issues raised in the second peer review of Dr Georgia Garrard remain unanswered, including:</p> <ul style="list-style-type: none"> ▪ The request that individuals be considered established only after surviving for at least 2 years ▪ Inadequate detail around the protection of retained SRF on the site prior to the establishment of 800 off-site plants ▪ Clarification regarding retention of SRF plants 7-11 & 51-52 in situ for 3 years ▪ Recipient sites: <ul style="list-style-type: none"> ○ Is MZ2 in the Isabella Williams Memorial Reserve considered a 'new' population ○ Viability of Quandong sites based on size (< 0.3 hectares) 		<p>Discussions have been held between the proponent and Brimbank City Council to the effect that the issue of land tenure of the Isabella Williams Memorial Reserve will be resolved based on the outcome of the EPBC Act assessment process. Brimbank Council has previously indicated in principle support for the inclusion of Isabella Williams Reserve as part of the Propagation Project subject to its approval by the Commonwealth and State.</p> <p>Dr Georgia Garrard states in her second peer review dated 14th March 2014 that "...most of the issues I raised have been satisfactorily addressed by the authors. In particular, my concerns regarding mitigation of project risks have been addressed in significant detail in the revised document."</p> <p>The following responses are provided to outstanding minor issues identified in this second peer review:</p> <ul style="list-style-type: none"> ▪ The Spiny Rice-flower Propagation Project Report 7045 (4.17) contained an error which has now been rectified in Report 7045 (4.18) – plants will be considered established if they survive for at least <u>2 years</u> after translocation ▪ The proponent will prepare a Spiny Rice-flower Interim Conservation Management Plan for the plants retained on site prior to the establishment of 800 off-site plants. This Plan will be prepared to the satisfaction of DEPI and the Commonwealth ▪ Female SRF plants outside the SRF Management Area retained <i>in situ</i>: <ul style="list-style-type: none"> ○ #7 (Stage 13) – at least until August 2015 ○ #8 (Stage 18) – at least until September 2018 ○ #9-11, 51 & 52 (Stage 21) – at least until August 2019 ▪ Report 7045 (4.17) states that: "MZ2 and MZ3 (if required) can be considered for offset purposes as they are not currently managed for conservation purposes by Brimbank Council" – i.e. MZ2 constitutes a 'new' population for the purposes of offsetting ▪ Debbie Reynolds' research has investigated the approximate population size within a set area and found that the population sizes within an area of less than 0.3 hectares could range from 710 (Geggies Road) to more than 5,000 plants (McKenzie Road and Brownwaterholes Bridge Rail Reserve). Her findings established that with a greater female density the population was more likely to be able to produce greater numbers of germinants and that the species has a great potential to flourish in a high density spatial arrangement.
13. State-listed flora species consideration	Presence of numerous state listed threatened flora species should be considered, not just the presence of NTGVVP alone	1	State-listed flora species recorded at Precinct 2 will be addressed under the State approval process and have been addressed to some extent by the EES referral process. State-listed flora species are not under considered in the Commonwealth assessment process.



Australian Government
Department of the Environment

Approval

Burnside Development - The Point, Victoria (EPBC 2011/6063)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

Person to whom the approval is granted DFC (Project Management) Pty Ltd

Proponent's ABN 83 161 448 139

Proposed action To develop Modeina Estate Precinct 2, a residential housing development in the Melbourne suburb of Burnside, Victoria [see EPBC Act referral 2011/6063 and variation to proposal dated XX March 2015].

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

Conditions of approval

This approval is subject to the conditions specified below.

Expiry date of approval

This approval has effect until 31 February 2035.

Decision-maker

Name and position Paula Stagg
Acting Assistant Secretary
South-Eastern Australia Environment Assessments Branch

Signature TRACK CHANGE COPY (do not sign)

Date of decision TRACK CHANGE COPY (do not date)

Conditions attached to the approval

To minimise impacts of construction on listed threatened species and ecological communities:

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2.3. Prior to the issue of statement of compliance for the first **stage** within **Project Area A**, the person taking the action must implement an offset strategy and offset management plan consistent with the **Melbourne Urban Development Policy**, to compensate for impacts to 9.67 hectares of **NTGVVP** and **Striped Legless Lizard habitat** associated with **Project Area A**. Documentary evidence that the offset has been secured must be provided to the **Department**.

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4.5. The person taking the action must ensure the action does not **impact** more than 9.67 hectares of **Striped Legless Lizard habitat** within **Project Area A**.

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Melbourne Urban Development Policy - the document *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act*, Department of the Environment, February 2014, online:
http://www.environment.gov.au/system/files/resources/dc154fd1-d526-4e7d-9a8e-bd17f8ceac15/files/melbourne-urban-development_1.pdf.

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Striped Legless Lizard - the lizard species *Delma impar*, protected under the **EPBC Act**.

Striped Legless Lizard habitat - is any grassland (exotic and native) that may be utilised by the **Striped Legless Lizard** for breeding, sheltering, foraging or ranging.

Striped Legless Lizard Offset - an area of land secured ~~in perpetuity~~ to compensate for impacts on **Striped Legless Lizard** as a result of the action.

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Australian Government
Department of the Environment

Approval

Burnside Development - The Point, Victoria (EPBC 2011/6063)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

Person to whom the approval is granted DFC (Project Management) Pty Ltd

Proponent's ABN 83 161 448 139

Proposed action ~~To develop the second stage of a 1486 lot housing~~The development of Precinct 2 at Modeina to create approximately 590 residential lots and a school in the Melbourne suburb of Burnside, Victoria.

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

Conditions of approval

This approval is subject to the conditions specified below.

Expiry date of approval

This approval has effect until 31 February 2035.

Decision-maker

name and position Paula Stagg
Acting Assistant Secretary
South-Eastern Australia Environment Assessments Branch

signature **PROPOSED DECISION ONLY (do not sign)**

Date of decision **PROPOSED DECISION ONLY (do not date)**

Conditions attached to the approval

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6.9. Prior to the **commencement of construction**, the person taking the action must offset impacts to the first 9.67 hectares of Striped Legless Lizard habitat, into the Western Grassland Reserve, consistent with the **Melbourne Urban Development Policy**. Documentary evidence that the offset has been secured must be provided to the **Department**.

The person taking the action must also ensure activities associated with stages 12 to 20 (excluding 18PS) do not impact more than 9.67 hectares of **Striped Legless Lizard** habitat.

7.10. Prior to the **commencement of construction** of the land included in stages 18PS, 21 and 22 the person taking the action must implement a Striped Legless Lizard Offset Strategy (SLLOS) that has been approved in writing by the **Department**. The SLLOS must:

- a. Identify proposed offsets to compensate for unavoidable impacts to the **Striped Legless Lizard**, consistent with the **EPBC Act Offsets Policy**; and
- b. Address (b) to (e) of condition **85** with reference to the **Striped Legless Lizard**.

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Definitions:

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Striped Legless Lizard is the EPBC listed vulnerable species *Delma impar*

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RECOMMENDATION REPORT

Burnside Development - The Point, Victoria (2011/6063)

Recommendation

1. That the proposed action, to develop the second stage of a 1486 lot housing development in the Melbourne suburb of Burnside, Victoria, be approved subject to the conditions specified below.

Conditions	Relevant paragraph in report
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6. Prior to the **commencement of construction**, the person taking the action must offset impacts to the first 9.67 hectares of Striped Legless Lizard habitat, into the Western Grassland Reserve, consistent with the **Melbourne Urban Development Policy**. Documentary evidence that the offset has been secured must be provided to the **Department**.

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The person taking the action must also ensure activities associated with stages 12 to 20 (excluding 18PS) do not impact more than 9.67 hectares of **Striped Legless Lizard** habitat.

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Melbourne Urban Development Policy is the document *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act*, Department of the Environment, February 2014, online:
http://www.environment.gov.au/system/files/resources/dc154fd1-d526-4e7d-9a8e-bd17f8ceac15/files/melbourne-urban-development_1.pdf

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Striped Legless Lizard is the EPBC listed vulnerable species *Delma impar*

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Striped Legless Lizard (*Delma impar*) – endangered*Description*

39. As discussed in the National Recovery Plan (the recovery plan) for the Striped Legless Lizard (*Delma impar*), the Striped Legless Lizard (SLL) resembles a snake, but can be readily distinguished by the presence of external ear openings, a fleshy undivided tongue and a tail which, when unbroken, is longer than the body. The SLL is a grassland specialist, found only in areas of native grassland and nearby grassy woodland and exotic pasture. Natural temperate grassland is one of Australia's most threatened ecological communities and it is the loss and degradation of native grassland that is primarily responsible for the decline of the SLL.

Proposed action area and Impact

40. In 2010, tile grid targeted surveys recorded five SLL at three different grids in the proposed project area (see Appendix A below). Due to the suitability of habitat and previous records, the assessment deemed that there is 24.4 hectares of potential habitat in the proposed project area (encompassing both NTGVVP and other areas of suitable habitat). Assessment documentation states that given the size and availability of suitable habitat, it may also be considered a key breeding site for SLL. The Department notes that there are other nearby SLL populations, however these populations are unlikely to interact with populations on site, given habitat barriers such as roads, cleared or 'improved' pasture or residential suburbs.
41. As discussed above, the Department considers that opportunities to avoid and mitigate impacts to the potential SLL habitat are limited. The PD states that a rocky escarpment along Kororoit Creek will be retained subject to an Environmental Management Plan, however, it is expected that the proposed development will lead to the loss of 24.24 hectares of potential SLL habitat.

Offsets and proposed conditions

42. The offset site for precinct one, discussed above under NTGVVP is proposed to also act as an offset for SLL. The PD states that grassland habitats within the Western Grassland Reserve have been confirmed as supporting SLL with the species recorded during a targeted tile grid survey of grassland in the north western part of the 'Quandong' property in 2011. Detailed offset information will be required as limited supporting information has been provided to date.
43. The Department notes that additional matters of national environmental significance (other than NTGVVP and Golden Sun Moth) may be considered under the *Melbourne Urban Development Policy* (February 2014). The Department therefore recommends condition 6 requiring the proponent to offset the initial 9.67 hectares of SLL impacts into the Western Grassland Reserve, consistent with the Melbourne Urban Development Policy.
44. The Department considers that there is a strategic benefit in having proposed offsets co-located with sites of the NTGVVP and Spiny Rice-flower Research Program. The recovery plan states that there is a biodiversity benefit of conserving the SLL and its habitat with the conservation of natural temperate grassland. Therefore, the Department considers that the co-location of these offset sites will have significant conservation benefits, as well as being an efficient and cost-effective approach.

45. The Department does however note that the remaining 14.24 hectares of direct impacts will require offsetting consistent with the EPBC Act Offsets Policy. Proposed condition 7 requires the proponent to prepare a Striped Legless Lizard Offset Strategy (SLLOS) that must be approved in writing by the Department. The SLLOS must identify proposed offsets to compensate for unavoidable impacts of the development of precinct two to the Striped Legless Lizard and be consistent with the EPBC Act Offsets Policy. The SLLOS must also address (b) to (e) of condition 5. The proponent must not impact more than 9.67 hectares of SLL habitat without an approved SLLOS.

Conclusion

46. The Department considers that with recommended conditions, the proposed offsets discussed above will be consistent with the principles of the EPBC Act Offsets Policy (October 2012) because they will:
- a. be direct offsets that deliver an overall conservation outcome that improves or maintains the viability of SLL;
 - b. reflect the endangered status of SLL and be of a size and scale proportionate to the residual impacts;
 - c. effectively account for and manage the risks of the offset not succeeding, while being additional to what is already required or determined by law or planning regulations, and
 - d. be efficient, effective, timely, transparent, scientifically robust and reasonable while having transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.
47. The Department considers that with the proposed offsets and recommended conditions discussed above, the proposed action (both precinct one and two) is unlikely to result in unacceptable impacts to SLL.

A large, bold, black serif font 's22' is centered on a light grey rectangular background. The 's' is lowercase and the '22' are lowercase numerals.

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89. As detailed in the Assessment section above, all recommended conditions attached to the proposed approval are necessary or convenient to protect, repair and/or mitigate impacts on a matter protected by provision of Part 3 for which this proposed approval has affect. Conditions 1 to 9 are recommended to ensure acceptable impacts on listed threatened species and ecological communities. Conditions 10 to 17 are administrative conditions recommended ensuring that the action can be monitored and compliance with conditions enforced.



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Australian Government
Department of the Environment

Approval

Burnside Development - The Point, Victoria (EPBC 2011/6063)

This decision is made under sections 130(1) and 133 of the *Environment Protection and Biodiversity Conservation Act 1999*.

Proposed action

Person to whom the approval is granted DFC (Project Management) Pty Ltd

Proponent's ABN 83 161 448 139

Proposed action To develop the second stage of a 1486 lot housing development in the Melbourne suburb of Burnside, Victoria.

Approval decision

Controlling Provision	Decision
Listed threatened species and communities (sections 18 & 18A)	Approved

Conditions of approval

This approval is subject to the conditions specified below.

Expiry date of approval

This approval has effect until 31 February 2035.

Decision-maker

name and position Paula Stagg
Acting Assistant Secretary
South-Eastern Australia Environment Assessments Branch

signature PROPOSED DECISION ONLY (do not sign)

Date of decision PROPOSED DECISION ONLY (do not date)

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6. Prior to the **commencement of construction**, the person taking the action must offset impacts to the first 9.67 hectares of Striped Legless Lizard habitat, into the Western Grassland Reserve, consistent with the **Melbourne Urban Development Policy**. Documentary evidence that the offset has been secured must be provided to the **Department**.

The person taking the action must also ensure activities associated with stages 12 to 20 (excluding 18PS) do not impact more than 9.67 hectares of **Striped Legless Lizard** habitat.

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Definitions:

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Melbourne Urban Development Policy is the document *Policy Statement for Melbourne urban development proposals needing consideration under Parts 7, 8 and 9 of the EPBC Act*, Department of the Environment, February 2014, online:

http://www.environment.gov.au/system/files/resources/dc154fd1-d526-4e7d-9a8e-bd17f8ceac15/files/melbourne-urban-development_1.pdf

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Striped Legless Lizard is the EPBC listed vulnerable species *Delma impar*

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DEPARTMENT OF THE ENVIRONMENT

To: Paula Stagg, Acting Assistant Secretary, South-Eastern Australia Environment Assessments Branch (for decision)

PROPOSED APPROVAL DECISION BRIEF (RECOMMENDATION REPORT)
Burnside Development - The Point, Victoria (2011/6063)

Timing: As soon as possible to provide time for consulting on conditions. Statutory timeframe for the final decision is 24 March 2015.

Recommendations:

1. Consider the final preliminary documentation at Attachment B including the public submissions received at Attachment B1. (Circled) Considered / please discuss
2. Consider the recommendation report at Attachment A. (Circled) Considered / please discuss
3. Consider the approved conservation advice at Attachment C. (Circled) Consider / please discuss
4. Agree to the proposed conditions of approval as set out in Attachment D. (Circled) Agreed / Not agreed
5. Sign the letters at Attachment E to consult the proponent, the Victorian Minister for Planning and the Melton City Council on your proposed decision. (Circled) Signed / Not signed
6. Agree to not publish the proposed decision on the internet for public comment. (Circled) Agreed / Not agreed

Summary of recommendations on each controlling provision:

Controlling Provisions for the action	Recommendation	
	Approve	Refuse to Approve
Listed threatened species and communities (s 18, 18A)	Approve with conditions	

Paula Stagg
A/g Assistant Secretary
South-Eastern Australian Environment Assessments Branch



Date: 16/2/15

Comments:

I note paragraph 19 of the recommendation report as it relates to condition 5.

Key Points:

Background:

1. North Burnside Pty Ltd is proposing to develop the second stage of a 1486 lot housing development in the Melbourne suburb of Burnside, Victoria. The proposed development's footprint is approximately 65.4 hectare (ha) and involves the development of approximately 590 residential lots and a 3.5 ha site for a school.
2. The proposed action was determined a controlled action to be assessed by preliminary documentation (PD) because of likely significant impacts on listed threatened species and ecological communities (sections 18 and 18A). Specifically, s22
s22 Striped
Legless Lizard (SLL) s22
3. The proponent exhibited the draft PD from 10 September 2014 to 9 October 2014 and sought public comments. Eight submissions were received ([Attachment B1](#)) and the revised final PD incorporating responses to the issues raised in the submissions was submitted to the Department on 8 December 2014.
4. The proposal is currently being assessed under the Victorian *Environmental Effects Act 1978* and *Planning and Environment Act 1987*.

Issues and sensitivities:

5. The proposed action will involve the staged clearance of all vegetation on site, including 19.99 ha of NTGVVP, 244 SRF and 24.24 ha of SLL habitat. The proposed action is also occurring in close proximity to Kororoit Creek which is known GGF habitat. Given the nature of the development, the Department notes that opportunities to avoid or mitigate impacts are limited.
6. The proponent has proposed offsets to compensate for residual significant impacts on threatened species and ecological communities. As the development is to be undertaken in two stages, (the first one is proposed to occur from 2015 – 2018 and the second from 2018 -2021), the Department recommends that offsets be secured prior to the development of each stage.
7. The proponent, in collaboration with relevant experts, has developed a Spiny Rice-flower Propagation Project (the Project) to offset the direct impact to 244 SRF by establishing a combined population of 800 SRF in 3 recipient sites. The project has been devised in consultation with Deborah Reynolds (SRF expert at Victoria University) and is discussed in detail at Appendix 2 of [Attachment B](#). The Department considers that the projects aims and criteria for success are comprehensive and robust and will ensure the offset meets the requirements on the EPBC Act Offsets Policy.
8. During the first stage of development, the proponent will actively manage the SRF population at the project site, while the second stage (and associated SRF clearance) can only commence once the Project is determined successful, or alternative direct offsets sought. The Department recommends conditions that are consistent with this approach.

9. The first stage of the development will result in the removal of 9.67 ha of NTGVVP and SLL habitat. The proponent has proposed to offset the impacts of the first stage into the Western Grassland Reserve, consistent with the Melbourne Urban Development Policy. Impacts associated with stage two of the development will require additional offsets, consistent with the EPBC Act Offsets Policy. The Department considers a staged approach to offsets is appropriate having regard to the extended period of time between the commencement of stage one and stage two. The Department recommends conditions to ensure that offsets for stage two of the development are consistent with the EPBC Act Offsets Policy.

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From: s47F
Sent: Monday, 23 February 2015 7:41 AM
To: s47F
Subject: FW: Burnside [SEC=UNCLASSIFIED]

FYI - Burnside

From: s47F
Sent: Friday, 20 February 2015 3:08 PM
To: s47F
Cc: s47F
Subject: Burnside [SEC=UNCLASSIFIED]

Hey s47F

I just had a call from s47F about the Burnside proposed decision and conditions. It may be worth you giving her a call next week. Following points summarise the conversation:

- s47F had particular concerns with condition 6 (SLL being offset into the WGR). I explained that consistent with the policy, SLL can be offset into the WGR. s47F mentioned that it's difficult to know if land in the WGR supports SLL habitat. I explained that is why the proponent is proposing to use Quandong.
- s47F strongly suggested that the proponent would not be able to use Quandong as an offset under the MUD policy. s47F said that the proponent will be required to pay money to Vic Government who will secure a priority site as an offset. I explained that it was very important that Vic's response and communication with the proponent was consistent as I am unsure as the communication between the proponent and Vic Planning.
- s47F also suggested that with decisions involving the MUD Policy we write directly to her team directly. I explained that it is very important that we notify parties and coordinate responses through established and agreed upon channels – i.e. through Vic Planning. If she wishes to change this process she will have to discuss with planning who can then notify us.
- s47F said she will contact you directly about establishing a workshop with relevant agencies to ensure the MUD policy is applied correctly.

Would be good to discuss this with you further.

Thanks,
s47F

s47F
Assistant Director
Victoria and Tasmania Assessment Section
Department of the Environment

s47F [@environment.gov.au](mailto:s47F@environment.gov.au)

s22

From: s47F
Sent: Monday, 23 February 2015 5:33 PM
To: s47F @delwp.vic.gov.au; s47F
Cc: s47F
Subject: RE: For discussion: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision [SEC=UNCLASSIFIED]

Thanks s47F Just catching up as I was out of the office last week. From our perspective the proposed decision is consistent with the MSA and the MUD policy but will give you a call to discuss concerns (likely not to be until tomorrow arvo as I have back-to-back mtgs all morning...)

s47F
Director - Victoria and Tasmania Section
South Eastern Australia Assessments Branch
Environment Assessments and Compliance Division
Department of the Environment
✉ GPO Box 787 Canberra ACT 2601
s47F @environment.gov.au

From: s47F @delwp.vic.gov.au s47F @delwp.vic.gov.au
Sent: Monday, 23 February 2015 9:25 AM
To: s47F
Cc: s47F
Subject: For discussion: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision

Hi s47F

Sorry I missed your call on Friday - I'm not good at having my work mobile on me at my desk.

For discussion at your earliest convenience please - I had a brief chat with s47F on Friday. We will continue to work with Vic Tas and our planning department - but we need to discuss re: implications for MSA.

Thanks
s47F

s47F **Manager Melbourne Strategic Assessment | Environment and Landscape Performance**
Land, Fire and Environment | Department of Environment, Land, Water & Planning
Level 2, 8 Nicholson Street, East Melbourne, Victoria, 3002
s47F @delwp.vic.gov.au

www.delwp.vic.gov.au



----- Forwarded by s47F on 23/02/2015 09:21 AM -----

From: s47F
To: s47F
Cc: s47F
Date: 23/02/2015 09:16 AM
Subject: Fw: Fyi w: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision

Dear s47F

Further to our discussion on Friday, I confirm that the Melbourne Strategic Assessment (MSA) team administers offsets under the Commonwealth Department of Environment's Melbourne Urban Development policy. These offsets are required to be secured in the Western Grassland Reserves and in accordance with the MSA program. The requirements of the MSA program are published in a number of documents endorsed by the Commonwealth, including '[Habitat compensation under the Biodiversity Conservation Strategy](#)' which describes that offsets are required to be met by payment of fees to DELWP. The proposed conditions in the draft EPBC approval decision are not consistent with this approach, and therefore they are not consistent with the MUD policy.

As mentioned, we would like to schedule a meeting this week with yourself, Geoff and the Commonwealth to discuss the draft approval decision and our comments. We would also like to discuss the coordination process going forward to ensure the MSA team is included on relevant Victorian responses to EPBC-related matters. I will contact you again shortly to identify a convenient time.

Don't hesitate to contact me in the meantime if you would like to discuss any of the above.

Regards
s47F

s47F | Senior Project Officer | Melbourne Strategic Assessment
Land, Fire and Environment | Department of Environment, Land, Water and Planning
8 Nicholson Street EAST MELBOURNE VIC 3002
s47F [@delwp.vic.gov.au](mailto:s47F@delwp.vic.gov.au)

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----- Forwarded by s47F on 20/02/2015 03:01 PM -----

From: s47F
To:
Date: 18/02/2015 03:25 PM
Subject: Fw: Fyi w: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision

hi s47F - you might be interested in this decision given WGR and MUD

Let me know if there's anything that causes you concern.

s47F | Senior Policy Officer | Environment and Landscape Performance
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----- Forwarded by s47F on 18/02/2015 03:24 PM -----

From: s47F
To: s47F
Date: 18/02/2015 01:37 PM
Subject: Fyi w: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision

s47F **Director Regulation and Approvals | Environment and Landscape Performance Division**
Land, Fire and Environment | Department of Environment, Land, Water & Planning
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----- Forwarded by s47F on 18/02/2015 01:37 PM -----

From: s47F
To: s47F
Cc: s47F
Date: 17/02/2015 02:13 PM
Subject: Burnside Residential Development (EPBC 2011/6063) Proposed Approval Decision

Hi s47F and s47F

We have receive the Commonwealth's proposed approval decision for the Burnside Residential Development.

Given your involvement in the project to date, we would value your review of the attached draft conditions. If you have any comments, could you please provide them to me by **2 March 2015**.

Many thanks
s47F

s47F **Impact Assessor**
Impact Assessment Unit
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Please consider the environment before printing this email