APPENDICES

APPENDIX 1: DEVELOPMENT PLANS

OAKBURN PROTEIN RECOVERY PLANT

OAKBURN NSW

LOCATION PLAN

SCALE = 1:5000 (APPROX)

Drawing Schedule	
DWG No.	**Sheet Title**
DA-01	Title Sheet, Location Plan & Drawing Schedule
DA-02	Proposed Site Plan
DA-03	General Arrangement Plans
DA-04	Proposed Elevations
DA-05	Proposed Elevations

DEVELOPMENT APPLICATION

DATE	ISSUE	AMENDMENT	INITIAL
26.11.13	A	DA ISSUE	JP
25.11.13	P1	PRELIMINARY ISSUE FOR REVIEW	JP

AMENDMENTS

CONSULTANT

CLIENT

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Facsimile: (02) 9688 4818

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PROJECT
OAKBURN PROTEIN RECOVERY PLANT
OAKBURN NSW

DRAWING TITLE
TITLE SHEET, LOCATION PLAN & DRAWING SCHEDULE

SCALE
@ A1 = NTS @ A3 = NTS
Do Not Scale from Drawings, Verify all Dimensions and Levels on Site

DRAWN: JP
CHECKED: PS
DATE: NOVEMBER 2013
APPROVED: -

PROJECT NUMBER: W414
BLDG NUMBER: 01
DRAWING NUMBER: DA01
ISSUE: A

Tuesday, 26 November 2013 1:07:15 PM | I:\W414 - Oakburn Protein Plant\00 Design & Preconstruct\00.02 CAD Drawings\00.02.02 Architect\ Current CAD\W414-DA01.dwg

REAL PROPERTY DESCRIPTION

OXLEY HIGHWAY
TAMWORTH NSW 2340

LOT 100 ON DP1097471
(TOTAL LAND PARCEL 57.64ha)

LOCAL GOVNT: TAMWORTH REGIONAL COUNCIL

0 25m 50m 75m 125m

SCALE = 1:1250 @ A1

DEVELOPMENT APPLICATION

DATE	ISSUE	AMENDMENT	INITIAL
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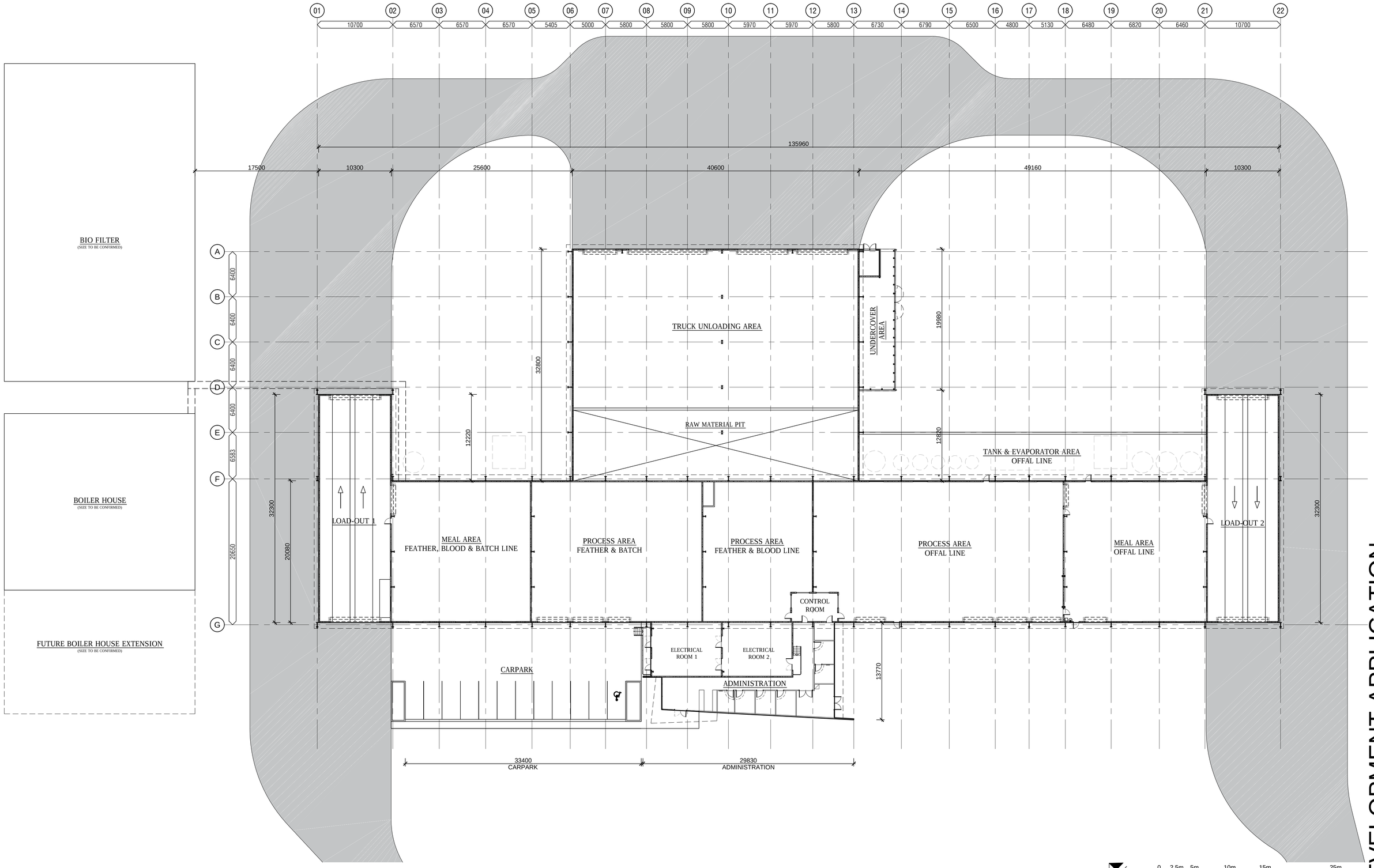
PROJECT
OAKBURN PROTEIN RECOVERY PLANT
OAKBURN NSW

DRAWING TITLE
PROPOSED SITE PLAN

SCALE
@ A1 = 1:1250 @ A3 = NTS
Do Not Scale from Drawings, Verify all Dimensions and Levels on Site

DRAWN: JP
CHECKED: PS
DATE: NOVEMBER 2013
APPROVED: -

PROJECT NUMBER: W414
BLDG NUMBER: 01
DRAWING NUMBER: DA02
ISSUE: A



DEVELOPMENT APPLICATION

DATE	ISSUE	AMENDMENT	INITIAL
26.11.13	A	DA ISSUE	JP
25.11.13	P1	PRELIMINARY ISSUE FOR REVIEW	JP

AMENDMENTS

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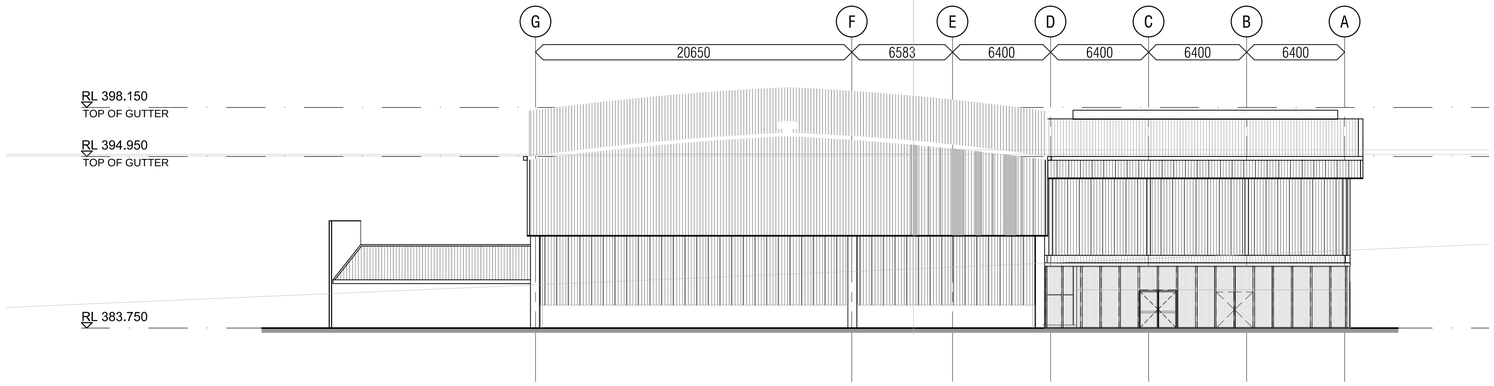
PROJECT
OAKBURN PROTEIN RECOVERY PLANT
OAKBURN NSW

DRAWING TITLE
PROPOSED GENERAL ARRANGEMENT PLAN

SCALE
@ A1 = 1:250 @ A3 = NTS
Do Not Scale from Drawings, Verify all Dimensions and Levels on Site

DRAWN JP | CHECKED PS
DATE NOVEMBER 2013 | APPROVED -

PROJECT NUMBER W414 | BLDG NUMBER 01
DRAWING NUMBER DA03 | ISSUE A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F
E
D
C
B
A
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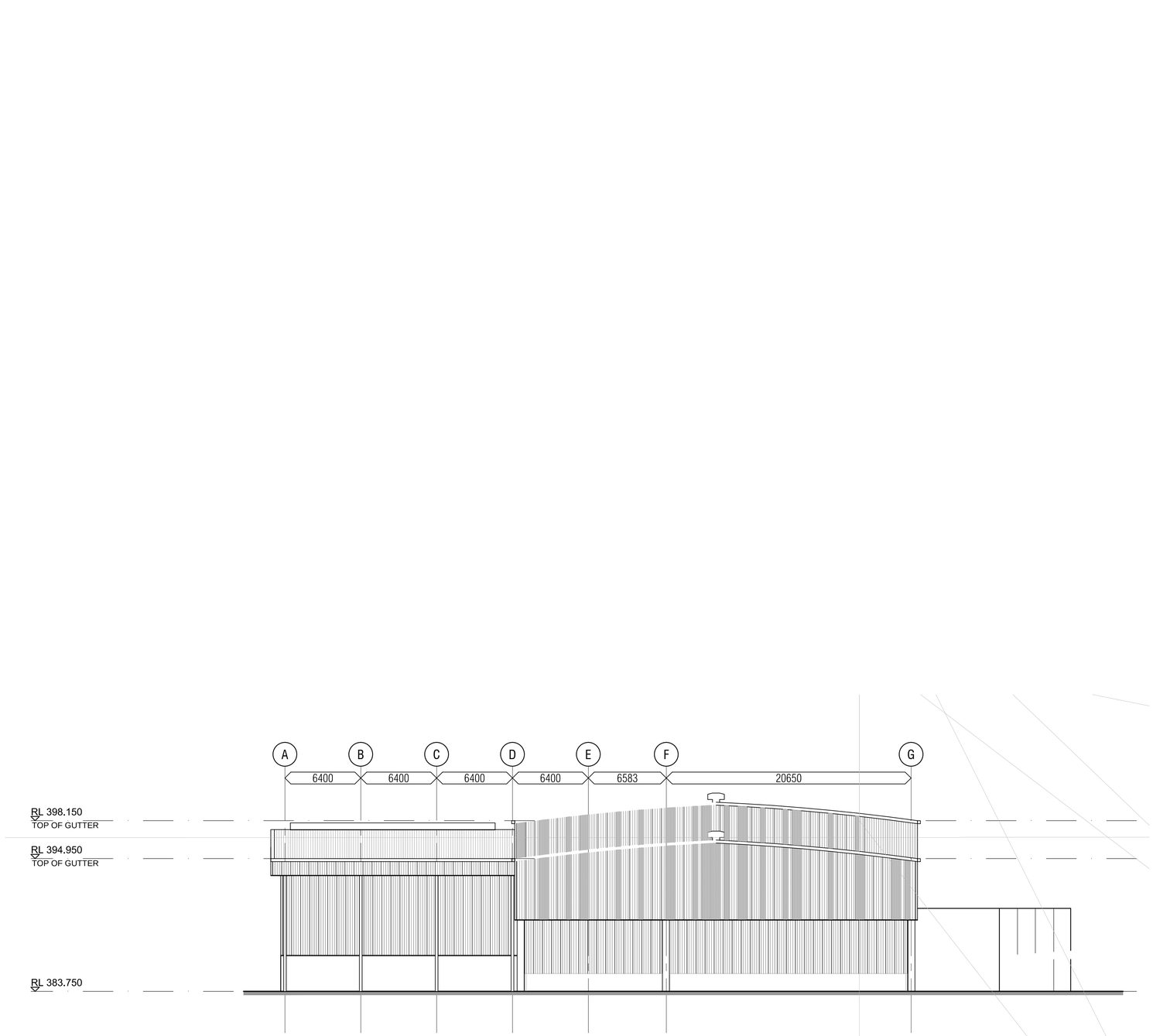
6583
6400
6400
6400
6400
RL 398.150
TOP OF GUTTER
RL 394.950
TOP OF GUTTER
RL 383.750


A
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F
G
6400
6400
6400
6400
6583
20650
RL 398.150
TOP OF GUTTER
RL 394.950
TOP OF GUTTER
RL 383.750

APPENDIX 2: STORMWATER MANAGEMENT PLAN

Oakburn Rendering Plant Stormwater Management Strategy Report

PSA Consulting

November, 2013

SUSTAINABLE CERTIFICATION
AS/NZS 4801 : 2001
Endorsed
OHS
Management
System

SUSTAINABLE CERTIFICATION
ISO 14001 : 2004
Endorsed
Environmental
Management
System

SUSTAINABLE CERTIFICATION
ISO 9001 : 2008
Endorsed
Quality
Management
System

Local Government PROCUREMENT
APPROVED CONTRACTOR

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS

Oakburn Rendering Plant
Stormwater Management Plan

- DOCUMENT CONTROL SHEET -

Issue	Amendment	Author	Reviewer	Certifier
A	Draft	FL (22/11/2013)	DC (25/11/2013)	
B	First Issue	FL (26/11/2013)	DC (25/11/2013)	DC (25/11/2013) 
File Location	J:\9854 - Oakburn Rendering Plant Tamworth\Design Report\9854_Rpt1B.docx			

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- LIST OF APPENDICIES -

1 INTRODUCTION

J. Wyndham Prince Pty Ltd (JWP) have been engaged by PSA Consulting to prepare a Stormwater Management Plan (SWMP) to support the development application (DA) for a proposed replacement Rendering Plant, as the previous plant was destroyed by fire in September 2013. The site is owned by Baiada Poultry, located at “Oakburn”, adjacent to Tamworth Airport on the Oxley Highway in Tamworth, NSW.

This report details the procedure and documents the design of the site stormwater storage and discharge control elements required by Tamworth Regional Council.

2 THE EXISTING SITE

The subject site is identified as Lot 100 of DP 1097471, located on the Oxley Highway adjacent to Tamworth Airport NSW, and is located wholly within the Tamworth Local Government Area.

The existing property is approximately 58 ha on which stood a chicken rendering plant which was destroyed by fire in September 2013. The site is generally undeveloped rural farmland. Plate 2-1 provides an overview of the main property features.

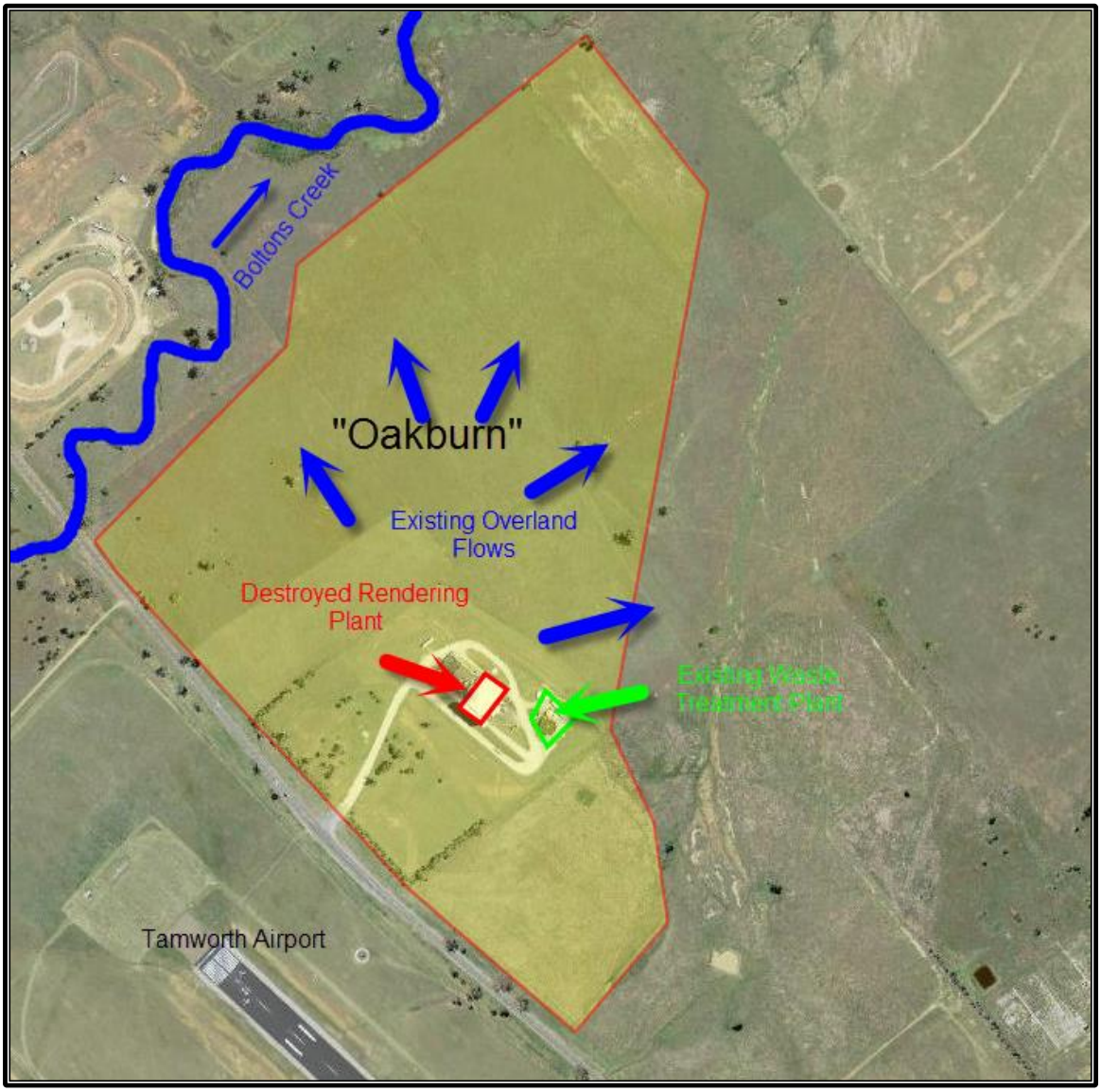

PLATE 2-1 - EXISTING SITE

3 PROPOSED DEVELOPMENT

The replacement rendering plant is to be built at a different location on the site. Details of the preliminary layout are provided in Appendix E.

The new plant will consist of 6496 m^2 buildings, 8200 m^2 new roads, and 530 m^2 new car park. It is to be situated to the north of the building it is replacing, where the land generally grades to the north west toward Boltons Creek.

Plate 3-1 below provides an overview of the Replacement Rendering Plant location on the site.

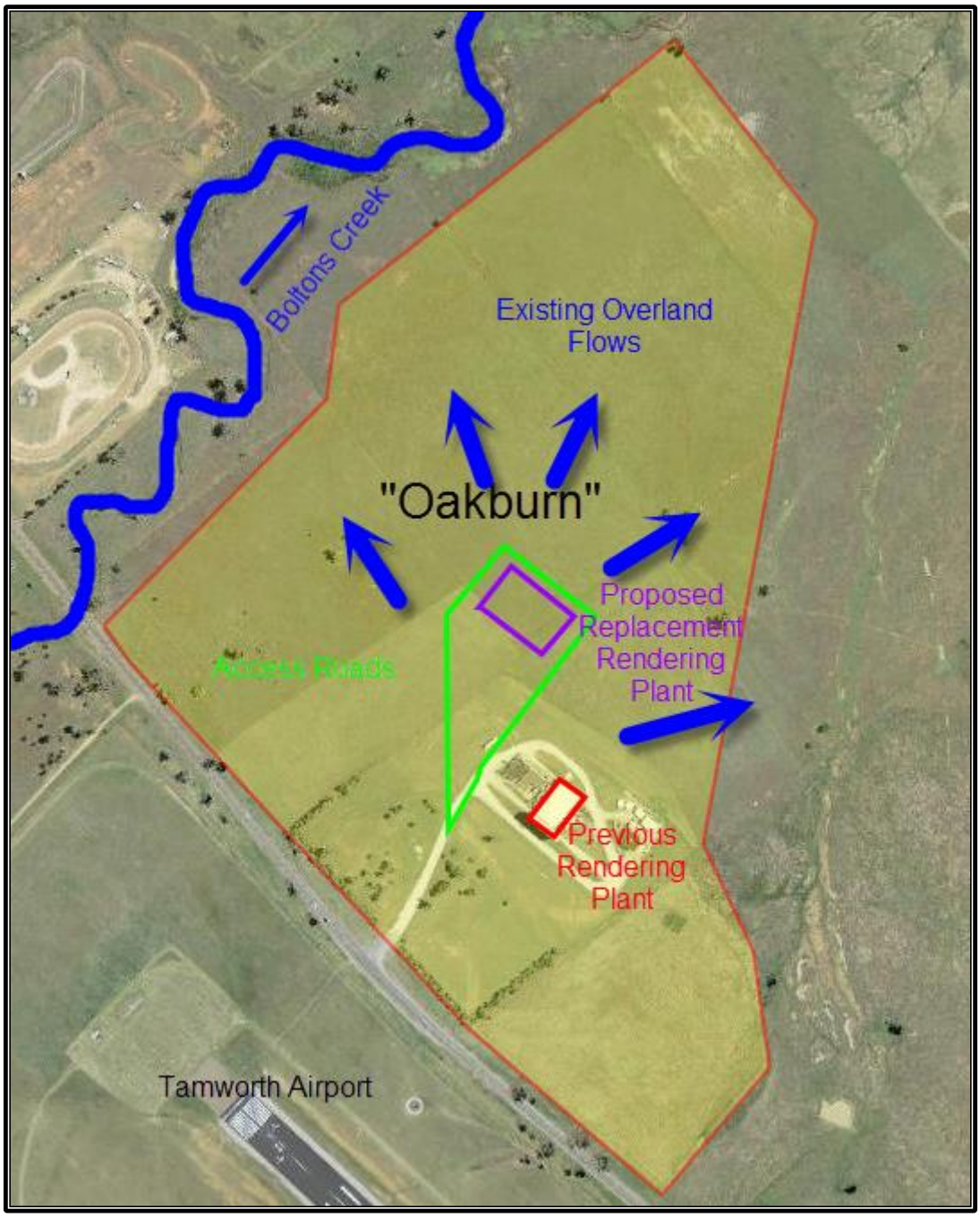

PLATE 3-1 PROPOSED DEVELOPMENT

It is understood that an approved DA for the development of an integrated poultry processing plant over the site has been granted (DA53/97), and that this report pertains to the replacement of the rendering plant constructed as stage 1 of that DA.

4 DEVELOPMENT CONTROLS AND GUIDELINES

4.1 Tamworth Regional Development Control Plan (2010)

The treatment of stormwater from the development is subject to Council's *Tamworth Regional Development Control Plan* (DCP). The relevant sections of the DCP that relate to stormwater management for the site is provided below.

Industrial Development Control - Utilities and Services

- Servicing strategy required to demonstrate the availability and feasibility of providing water, sewer and stormwater services appropriate for the scale and nature of development.
- Onsite stormwater capture and reuse shall be provided for maintenance of landscaping. Storage tanks shall be appropriately located and screened.

  NB – reuse facilities shall not form part of stormwater calculations.

4.2 Tamworth Regional Council Engineering Design Guidelines for Subdivisions & Developments

Council *Engineering Design Guidelines for Subdivisions & Developments (2013)* provides design guidelines for stormwater management in developments.

This report provides the necessary details required for development application, and is consistent with Council's *Engineering Design Guidelines for Subdivisions & Developments.* Additional construction details can be provided prior to Construction Certificate.

5 PROPOSED STORMWATER MANAGEMENT

Summarised below is a detailed methodology used to ensure compliance with Council DCP requirements.

5.1 Water Quantity Management

A Water Quantity Assessment for this study has been undertaken using the XP-RAFTS modelling software package. XP-RAFTS is a non-linear runoff routing model that generates runoff hydrographs from rainfall data.

The aim of this hydrological analysis is to establish the peak flows, considering both existing conditions and development of the site to determine the size of mitigation measures required to restrict developed case flows to existing levels. Details and discussion of this modelling are included below.

5.1.1 Modelling Parameters

As part of the *XP-RAFTS* modelling for site, the following parameters were adopted:

Design rainfall intensity-frequency-duration (IFD) data adopted for the site has been obtained from Council's *Engineering Guidelines for Subdivisions & Developments (January 2013)*.

Rainfall Loss Parameters - The initial and continuing loss method was applied in accordance with Australian Rainfall and Runoff (IE Aust, 1987). Rainfall loss parameters were adopted based on Council's advice (refer Appendix D). The adopted parameters are included in Appendix A.

Slope - Catchment slopes have been estimated from existing survey contours. It is assumed that the development will be designed to generally conform with the existing site gradient. A summary of catchment slopes adopted are provided in Appendix A**.**

Area - Catchment areas were measured digitally and are summarised in Appendix A.

Fraction Impervious – Fraction impervious parameters were calculated based on a detailed area breakdown and applied to various land uses across the overall catchment. Refer to Appendix A for details.

Manning's PERN value – The type of land use has an effect on the runoff by providing some "resistance" to the flow. The "resistance" effect in XP-RAFTS is simulated by a storage delay coefficient called "PERN". Appendix A lists the PERN (n) values used in the model, as advised by Council (refer Appendix D).

5.1.2 Basin Outlet Control

A v-notch weir structure is proposed for the detention basin for the developed scenario, to restrict post development flows back to existing levels for the 1%, 5% and 50% AEP storm events. The proposed basin volume and outlet configuration is shown in Table 5-1 below.

TABLE 5-1 BASIN CONFIGURATION

Detention Basin	
Storage	420 m^3
Outlet (v -notch weir)	1.6 m width @ RL 380.20 0.6 m high
Invert Level	RL 379.60
Top Water Level	RL 380.12
Crest	RL 380.20
FFL	RL 383.75
Freeboard	3.63 m

Detailed output files for the critical storm duration/s associated with the modelling are provided in Appendix A.

5.1.3 Discharge Estimates

Discharge estimates were derived for both the existing and developed catchments for the 1%, 5% and 50% AEP events. A range of storm durations from 10 minutes to 72 hours were analysed to determine the critical storm duration. Table 5-2 shows a comparison between pre and post development discharges.

TABLE 5-2 PRE & POST DEVELOPMENT DISCHARGES

AEP Storm Event	Existing Condition Peak Outflow (m^3/s)	Developed Peak Outflow (m^3/s)	Post/Pre Development Ratio
50%	0.26	0.18	0.70
5%	0.46	0.37	0.80
1%	0.59	0.56	0.94

The performance of the detention basin is outlined in Table 5-3 below.

TABLE 5-3 BASIN PERFORMANCE

AEP Storm Event	Peak Inflow (m^3/s)	Peak Outflow (m^3/s)	Storage used (m^3)	Stage used RL (m)	Depth (m)
50%	0.31	0.06	295	379.97	0.37
5%	0.55	0.19	372	380.06	0.46
1%	0.69	0.28	413	380.12	0.52

5.1.4 Discussion of Modelling Results

The results of the hydrological modelling for the various development scenarios show that the proposed water quantity basin is adequate to manage the increase in stormwater runoff and ensure that development condition flows are restricted to below existing conditions.

5.2 Water Quality Management

The water quality analysis for this study was undertaken using the model MUSIC (Model for Urban Stormwater Improvement Conceptualisation) version 5 (CRCCH - 2005). This water quality modelling software was developed by the Cooperative Research Centre (CRC) for Catchment Hydrology, which is based at Monash University and was first released in July 2002.

The model provides a number of features relevant for the development:

- It is able to model the potential nutrient reduction benefits of gross pollutant traps, constructed wetlands, grass swales, bio-retention systems, sedimentation basins, infiltration systems and it incorporates mechanisms to model stormwater re-use as a treatment technique;
- It provides mechanisms to evaluate the attainment of water quality objectives;

In absence of specific modelling guidelines available from Council, the following industry standard pollution reduction targets have been adopted:

Total Phosphorous	65% reduction of average annual load
Total Nitrogen	45% reduction of average annual load
Suspended Solids	85% reduction of average annual load for particles 0.5 mm or less
Gross Pollutants	90% retention of material greater than 5mm

The MUSIC modelling was undertaken to demonstrate that the stormwater management system proposed for the development will result in reductions in overall post-development pollutant loads and concentrations being discharged from the proposed development and that these discharges comply with the above target objectives.

5.2.1 MUSIC Modelling Philosophy and Parameters

To achieve the required pollutant reduction at the receiving node, the following treatment measures are proposed for this development:

- Gross Pollutant Trap.
- Swale

Details of standard modelling parameters used for the devices are provided in Appendix D.

5.2.2 Catchments

The MUSIC model was established for the site, representing the proposed stormwater management system. The proposed catchment has been split into various land uses to represent the post development condition. The general arrangement of the MUSIC model is shown in Appendix B.

The existing undeveloped area between the temporary roads has been excluded from the water quality modelling. The “bio-filter” and “tank farm” have also been excluded from the water quality analysis, as it is understood that waste and run-off from these areas will be treated by a separate waste treatment system.

5.2.3 Rainfall Data

The MUSIC model is able to utilise rainfall data based on 6 minute, hourly, 6 hourly and daily time steps. A 6 minute time step was used in the analysis which was chosen in accordance with the recommendations for selecting a time step within the MUSIC User's Manual.

The nearest rainfall station to the site with a reasonable period of 6 minute rainfall data for a suitably representative period of rainfall for the site was:

Station No	Location	Years of Record	Type of Data
55054	Tamworth Airport	1958 - 1992	6 minute

The rainfall and potential evapo-transpiration data for the period was taken from the Bureau of Meteorology Website.

5.2.4 Gross Pollutant Trap

A Gross Pollutant Trap (GPT) will be located at the head of the treatment train to prevent litter entering the swale and rain garden. GPT details are provided in Appendix C.

5.2.5 Grassed Swales

It is proposed to incorporate a 60m swale leading into and forming the floor of the detention basin to deliver the water quality treatment at the site. A further swale 115 m long located to the south of the proposed building will treat the temporary roads and the landscaped entry adjacent to the site. Details of the swales are provided in Appendix C.

5.2.6 Pollutant Load Estimates

The total annual pollutant loads derived from the MUSIC model for the proposed development at the point of discharge (i.e. at the Basin Outlet) are shown in Table 5-4 below.

TABLE 5-4 MEAN ANNUAL POLLUTANT LOADS/REDUCTIONS

Pollutant	Total Developed Source Nodes	Minimum Reduction Required	Total Residual Load from Site	Total Reduction Achieved	Total Reduction Achieved
	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)	(%)
TSS	2930	2491	435	2495	85.2%
TP	3.55	2.31	0.72	2.833	79.8%
TN	21.2	9.5	5.91	15.29	72.1%
Gross Pollutants	283	255	0.0	283	100.0%

5.2.7 Discussion of Modelling

The performance of the proposed water quality management strategy for the site shows that the treatment train proposed will meet standard industry reduction targets for TSS, TP, TN and Gross Pollutants.

6 SUMMARY

This report details the investigations and presents the results of the stormwater detention and water quality design to support the proposed new Rendering Plant for Baiada Poultry at their Oakburn Plant.

This report provides the necessary documentation to allow an approval of the development from a stormwater management perceptive.

The Stormwater Management Strategy consists of a treatment train approach that includes a swale and bio-retention rain garden as treatment measures. The structural elements proposed for the development consists of:

- Two gross pollutant traps
- One (1) grassed swale 115 metres long.
- One (1) grassed swale 60 metres long.
- Detention basin with a total detention storage volume 420 m^3

Provision of the proposed detention basin will ensure that peak post development discharges are restricted to less than the pre development levels.

Freeboard of 3.63 m provided is greater than the required 0.5 m to the finished floor level of the development.

The proposed Stormwater Management Strategy for the developed site provides a basis for the detailed design and development of the construction drawings to ensure that the environmental, urban amenity, engineering and economic objectives for stormwater management and site discharge are achieved.

7 REFERENCES

CRC for Catchment Hydrology (2009). MUSIC Model for Urban Stormwater Improvement Conceptualisation – User Guide

Sydney Metropolitan Catchment Management Authority (2010). Draft NSW MUSIC Modelling Guidelines

Willing & Partners Pty. Ltd. (1994). Runoff Analysis & Flow Training Simulation. Detailed Documentation and User Manual, Version 4.0

Willing & Partners Pty. Ltd. (1996). Runoff Analysis & Flow Training Simulation. Addendum, Version 5.0

APPENDIX A – XP RAFTS INPUT AND OUTPUT DETAILS

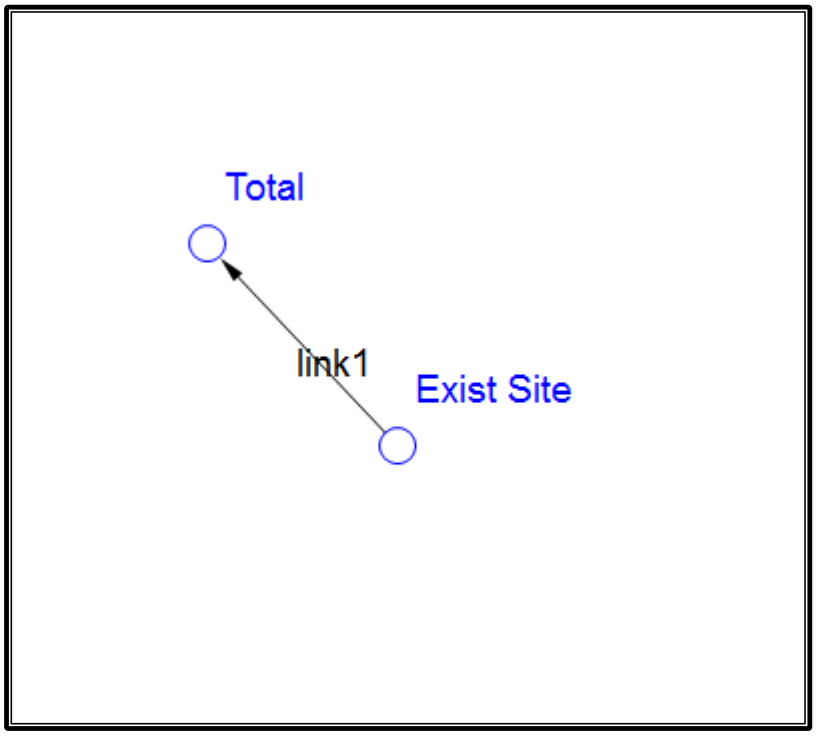

PLATE A 1 – EXISTING CONDITIONS RAFTS MODEL LAYOUT

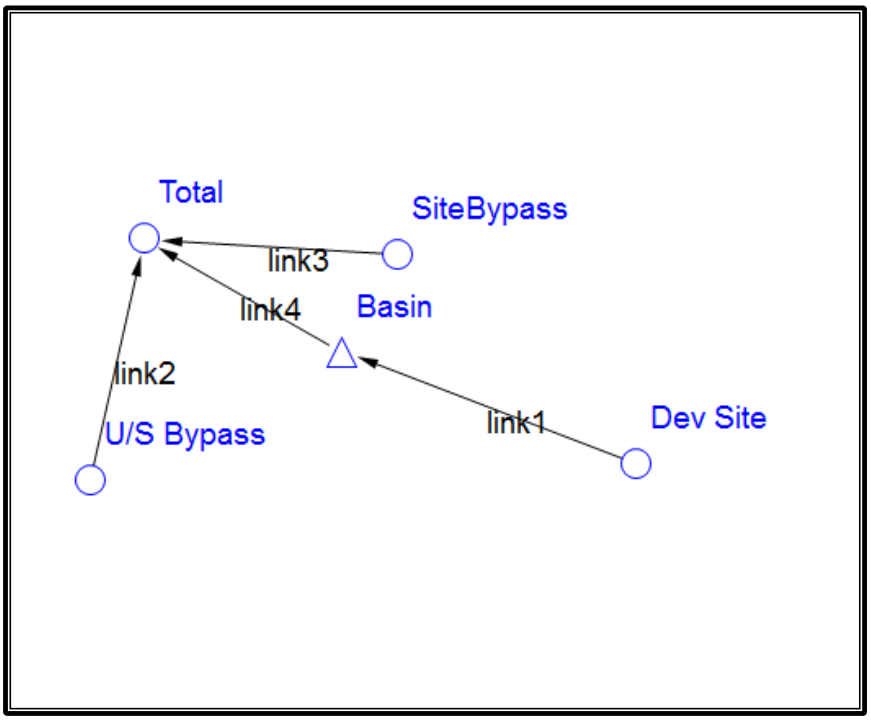

PLATE A 2 – DEVELOPED CONDITIONS RAFTS MODEL LAYOUT

RAFTS INPUT PARAMETERS

TABLE A 1 INITIAL / CONTINUING LOSS

Initial/ Continuing Losses (mm/hr)		
Loss	**Pervious Catchment**	**Impervious Catchment**
Initial Loss	8.00	1.00
Continuing Loss	0.00	0.00

TABLE A 2 - ADOPTED PERNS

Catchment Condition	Adopted Manning's n
Pervious	0.15
Impervious	0.01

Table A 3 – EXISTING CATCHMENT PARAMETERS

Existing Catchment					
Node	**Total Area**	**Percent Impervious**	**Pervious Area**	**Impervious Area**	**Slope**
	(ha)	**(%)**	**(ha)**	**(ha)**	**(%)**
Existing	3.09	35.0	2.010	1.082	1.5

TABLE A 4 – DEVELOPED CATCHMENT PARAMETERS

Developed Catchment					
Node	**Total Area**	**Percent Impervious**	**Pervious Area**	**Impervious Area**	**Slope**
	(ha)	**(%)**	**(ha)**	**(ha)**	**(%)**
Upstream Bypass	1.40	45.00	0.77	0.63	1.5
Site Bypass	0.27	40.0	0.159	0.106	1.5
Dev Site	1.42	90.0	0.142	1.282	1.5

Run started at: 26th November 2013 9:11:35

##
RUNTIME RESULTS
##

LINK Exist Site 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2407
ESTIMATED PEAK FLOW (CUMECS) = 0.26
ESTIMATED TIME TO PEAK (MINS) = 7.00

LINK Total 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2407
ESTIMATED PEAK FLOW (CUMECS) = 0.26
ESTIMATED TIME TO PEAK (MINS) = 7.00

##
Existing Site

Results for period from 0: 0.0 1/ 1/1990
to 3:20.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 20.
RETURN PERIOD (YRS) = 2.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 2.01
TOTAL OF SECOND SUB-AREAS (ha) = 1.08
TOTAL OF ALL SUB-AREAS (ha) = 3.09

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1	% Impervious #2	Perm #1	Perm #2	B #1	B #2	Link No.
Exist Site	2.010	1.082	1.500	1.500	0.000	100.0	.150	.010	.1323	.0010	1.000
Total	.00001	0.000	.0100	0.000	0.000	0.000	.025	0.00	.0006	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
Exist Site	48.720	8.000	1.000	0.000	0.000	8.240	15.240	0.2609	7.000	0.000
Total	48.720	8.000	0.000	0.000	0.000	8.240	0.000	0.2609	7.000	0.000

LINK Exist Site 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.5548
ESTIMATED PEAK FLOW (CUMECS) = 0.46
ESTIMATED TIME TO PEAK (MINS) = 7.00

LINK Total 2.000

```
 ESTIMATED VOLUME (CU METRES*10**3) =                0.5548
 ESTIMATED PEAK FLOW         (CUMECS) =                0.46
 ESTIMATED TIME TO PEAK         (MINS) =                7.00



##############################################################################################
Existing Site

Results for period from  0: 0.0  1/ 1/1990
                    to  3:20.0  1/ 1/1990
##############################################################################################


                               ROUTING INCREMENT (MINS) =       1.00
                               STORM DURATION (MINS)    =        20.
                               RETURN PERIOD (YRS)      =        20.
                               BX                       =     1.0000
                               TOTAL OF FIRST SUB-AREAS  (ha) =       2.01
                               TOTAL OF SECOND SUB-AREAS (ha) =       1.08
                               TOTAL OF ALL SUB-AREAS (ha)    =       3.09


     SUMMARY OF CATCHMENT AND RAINFALL DATA
 Link      Catch. Area      Slope    % Impervious     Pern        B        Link
 Label      #1     #2     #1    #2      #1   #2     #1    #2    #1   #2     No.
            (ha)             (%)          (%)
Exist Site 2.010  1.082  1.500 1.500  0.000 100.0  .150 .010  .1323 .0010  1.000

Total     .00001  0.000  .0100 0.000  0.000 0.000  .025 0.00  .0006 0.000  1.001


 Link    Average  Init. Loss  Cont. Loss    Excess Rain   Peak    Time   Link
 Label  Intensity  #1    #2    #1    #2      #1    #2    Inflow   to     Lag
          (mm/h)    ( mm )      (mm/h)        ( mm )     (m^3/s)  Peak  mins
Exist Site83.578 8.000 1.000  0.000 0.000  19.859 26.859  0.4604  7.000 0.000

Total     83.578 8.000 0.000  0.000 0.000  19.859  0.000  0.4604  7.000 0.000


 LINK Exist Site        3.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.8190
 ESTIMATED PEAK FLOW         (CUMECS) =                0.59
 ESTIMATED TIME TO PEAK         (MINS) =                7.00

 LINK Total             3.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.8190
 ESTIMATED PEAK FLOW         (CUMECS) =                0.59
 ESTIMATED TIME TO PEAK         (MINS) =                7.00



##############################################################################################
Existing Site

Results for period from  0: 0.0  1/ 1/1990
                    to  3:20.0  1/ 1/1990
##############################################################################################


                               ROUTING INCREMENT (MINS) =       1.00
                               STORM DURATION (MINS)    =        20.
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RETURN PERIOD (YRS) = 100.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 2.01
TOTAL OF SECOND SUB-AREAS (ha) = 1.08
TOTAL OF ALL SUB-AREAS (ha) = 3.09

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Area #2	Slope #1 (%)	Slope #2	% Impervious #1	% Impervious #2	Pern #1	Pern #2	B #1	B #2	Link No.
Exist Site	2.010	1.082	1.500	1.500	0.000	100.0	.150	.010	.1323	.0010	1.000
Total	.00001	0.000	.0100	0.000	0.000	0.000	.025	0.00	.0006	0.000	1.001

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
Exist Site	113.69	8.000	1.000	0.000	0.000	29.897	36.897	0.5881	7.000	0.000
Total	113.69	8.000	0.000	0.000	0.000	29.897	0.000	0.5881	7.000	0.000

Run completed at: 26th November 2013 9:11:35

Run started at: 26th November 2013 9:15:25

##
RUNTIME RESULTS
##

LINK Dev Site 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2321
ESTIMATED PEAK FLOW (CUMECS) = 0.31
ESTIMATED TIME TO PEAK (MINS) = 12.00

LINK Basin 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2321
ESTIMATED PEAK FLOW (CUMECS) = 0.31
ESTIMATED TIME TO PEAK (MINS) = 12.00

iosd llkta 0 2
LINK U/S Bypass 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.1650
ESTIMATED PEAK FLOW (CUMECS) = 0.15
ESTIMATED TIME TO PEAK (MINS) = 12.00

LINK SiteBypass 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3248E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.26E-01
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Total 1.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.2545
ESTIMATED PEAK FLOW (CUMECS) = 0.18
ESTIMATED TIME TO PEAK (MINS) = 12.00

##
Existing Site

Results for period from 0: 0.0 1/ 1/1990
to 4:10.0 1/ 1/1990
##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 25.
RETURN PERIOD (YRS) = 2.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 1.07
TOTAL OF SECOND SUB-AREAS (ha) = 2.02
TOTAL OF ALL SUB-AREAS (ha) = 3.09

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area (ha) #1	#2	Slope (%) #1	#2	% Impervious #1	#2	Pern #1	#2	B #1	#2	Link No.
Dev Site	0.1420	1.282	1.500	1.500	0.000	100.0	.150	.010	.0333	.0011	1.000
Basin	.00001	.00001	.0100	.0100	0.000	0.000	.025	.025	.0006	.0006	1.001
U/S Bypass	0.7700	0.6300	1.500	1.500	0.000	100.0	.150	.010	.0803	.0008	2.000

SiteBypass0.1590 0.1060 1.500 1.500 0.000 100.0 .150 .010 .0354 .0003 3.000

Total   .00001 0.000 .0100 0.000 0.000 0.000 .025 0.00 .0006 0.000 1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
Dev Site	43.431	8.000	1.000	0.000	0.000	10.096	17.096	0.3058	12.00	0.000
Basin	43.431	8.000	1.000	0.000	0.000	10.096	17.096	0.3058	12.00	0.000
U/S Bypass	43.431	8.000	1.000	0.000	0.000	10.096	17.096	0.1532	12.00	0.000
SiteBypass	43.431	8.000	1.000	0.000	0.000	10.096	17.096	0.0262	15.00	0.000
Total	43.431	8.000	0.000	0.000	0.000	10.096	0.000	0.1808	12.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	Basin Vol. Avail	Basin Vol. Used	Basin Stage Used
Basin	12.00	.3058	28.00	.0048	232.13	0.0000	216.12	0.2701

##
##

LINK Dev Site 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4133
ESTIMATED PEAK FLOW (CUMECS) = 0.53
ESTIMATED TIME TO PEAK (MINS) = 12.00

LINK Basin 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.4133
ESTIMATED PEAK FLOW (CUMECS) = 0.53
ESTIMATED TIME TO PEAK (MINS) = 12.00

iosd llkta 0 2
LINK U/S Bypass 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.3400
ESTIMATED PEAK FLOW (CUMECS) = 0.27
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK SiteBypass 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6644E-01
ESTIMATED PEAK FLOW (CUMECS) = 0.46E-01
ESTIMATED TIME TO PEAK (MINS) = 15.00

LINK Total 2.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.6167
ESTIMATED PEAK FLOW (CUMECS) = 0.36
ESTIMATED TIME TO PEAK (MINS) = 15.00

```
 LINK Dev Site          5.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.6021
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.46
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK Basin             5.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.6021
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.46
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 iosd llkta         0         2
 LINK U/S Bypass        5.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.5470
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.23
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK SiteBypass        5.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.1028
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.41E-01
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK Total             5.000

 ESTIMATED VOLUME (CU METRES*10**3) =                 1.110
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.34
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

################################################################################################
################################################################################################

 LINK Dev Site          6.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.8142
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.58
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK Basin             6.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.8142
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.58
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 iosd llkta         0         2
 LINK U/S Bypass        6.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.7558
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.30
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK SiteBypass        6.000

 ESTIMATED VOLUME (CU METRES*10**3) =                0.1422
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.52E-01
 ESTIMATED TIME TO PEAK         (MINS) =                22.00

 LINK Total             6.000

 ESTIMATED VOLUME (CU METRES*10**3) =                 1.569
 ESTIMATED PEAK FLOW         (CUMECS) =                 0.56
 ESTIMATED TIME TO PEAK         (MINS) =                25.00

################################################################################################
```

Existing Site

Results for period from 0: 0.0 1/ 1/1990
to 10: 0.0 1/ 1/1990

##

ROUTING INCREMENT (MINS) = 1.00
STORM DURATION (MINS) = 60.
RETURN PERIOD (YRS) = 100.
BX = 1.0000
TOTAL OF FIRST SUB-AREAS (ha) = 1.07
TOTAL OF SECOND SUB-AREAS (ha) = 2.02
TOTAL OF ALL SUB-AREAS (ha) = 3.09

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area (ha) #1	#2	Slope (%) #1	#2	% Impervious (%) #1	#2	Pern #1	#2	B #1	#2	Link No.
Dev Site	0.1420	1.282	1.500	1.500	0.000	100.0	.150	.010	.0333	.0011	1.000
Basin	.00001	.00001	.0100	.0100	0.000	0.000	.025	.025	.0006	.0006	1.001
U/S Bypass	0.7700	0.6300	1.500	1.500	0.000	100.0	.150	.010	.0803	.0008	2.000
SiteBypass	0.1590	0.1060	1.500	1.500	0.000	100.0	.150	.010	.0354	.0003	3.000
Total	.00001	0.000	.0100	0.000	0.000	0.000	.025	0.00	.0006	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	#2	Cont. Loss #1 (mm/h)	#2	Excess Rain #1 (mm)	#2	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
Dev Site	58.874	8.000	1.000	0.000	0.000	50.874	57.874	0.5817	22.00	0.000
Basin	58.874	8.000	1.000	0.000	0.000	50.874	57.874	0.5817	22.00	0.000
U/S Bypass	58.874	8.000	1.000	0.000	0.000	50.874	57.874	0.2974	22.00	0.000
SiteBypass	58.874	8.000	1.000	0.000	0.000	50.874	57.874	0.0522	22.00	0.000
Total	58.874	8.000	0.000	0.000	0.000	50.874	0.000	0.5552	25.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	Basin Vol. Avail	Basin Vol. Used	Stage Used
Basin	22.00	.5817	30.00	.2550	814.23	0.0000	401.24	0.5015

##
##

LINK Dev Site 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8705
ESTIMATED PEAK FLOW (CUMECS) = 0.28
ESTIMATED TIME TO PEAK (MINS) = 33.00

LINK Basin 8.000

ESTIMATED VOLUME (CU METRES*10**3) = 0.8705

```
 ESTIMATED PEAK FLOW         (CUMECS) =                0.28
 ESTIMATED TIME TO PEAK         (MINS) =               33.00

 iosd llkta         0         2
 LINK U/S Bypass        8.000

 ESTIMATED VOLUME (CU METRES*10**3) =               0.8117
 ESTIMATED PEAK FLOW         (CUMECS) =                0.15
 ESTIMATED TIME TO PEAK         (MINS) =               45.00

 LINK SiteBypass        8.000

 ESTIMATED VOLUME (CU METRES*10**3) =               0.1528
 ESTIMATED PEAK FLOW         (CUMECS) =              0.29E-01
 ESTIMATED TIME TO PEAK         (MINS) =               45.00

 LINK Total             8.000

 ESTIMATED VOLUME (CU METRES*10**3) =                1.776
 ESTIMATED PEAK FLOW         (CUMECS) =                0.37
 ESTIMATED TIME TO PEAK         (MINS) =               45.00
```

```
################################################################################
Existing Site

Results for period from  0: 0.0  1/ 1/1990
                     to  6: 0.0  2/ 1/1990
################################################################################
```

```
                              ROUTING INCREMENT (MINS) =       1.00
                              STORM DURATION (MINS)    =       180.
                              RETURN PERIOD (YRS)      =        20.
                              BX                       =     1.0000
                              TOTAL OF FIRST SUB-AREAS  (ha) =       1.07
                              TOTAL OF SECOND SUB-AREAS (ha) =       2.02
                              TOTAL OF ALL SUB-AREAS (ha)    =       3.09
```

SUMMARY OF CATCHMENT AND RAINFALL DATA

Link Label	Catch. Area #1 (ha)	Catch. Area #2 (ha)	Slope #1 (%)	Slope #2 (%)	% Impervious #1 (%)	% Impervious #2 (%)	Perm #1	Perm #2	B #1	B #2	Link No.
Dev Site	0.1420	1.282	1.500	1.500	0.000	100.0	.150	.010	.0333	.0011	1.000
Basin	.00001	.00001	.0100	.0100	0.000	0.000	.025	.025	.0006	.0006	1.001
U/S Bypass	0.7700	0.6300	1.500	1.500	0.000	100.0	.150	.010	.0803	.0008	2.000
SiteBypass	0.1590	0.1060	1.500	1.500	0.000	100.0	.150	.010	.0354	.0003	3.000
Total	.00001	0.000	.0100	0.000	0.000	0.000	.025	0.00	.0006	0.000	1.002

Link Label	Average Intensity (mm/h)	Init. Loss #1 (mm)	Init. Loss #2 (mm)	Cont. Loss #1 (mm/h)	Cont. Loss #2 (mm/h)	Excess Rain #1 (mm)	Excess Rain #2 (mm)	Peak Inflow (m^3/s)	Time to Peak	Link Lag mins
Dev Site	20.955	8.000	1.000	0.000	0.000	54.866	61.866	0.2778	33.00	0.000
Basin	20.955	8.000	1.000	0.000	0.000	54.866	61.866	0.2778	33.00	0.000
U/S Bypass	20.955	8.000	1.000	0.000	0.000	54.866	61.866	0.1537	45.00	0.000
SiteBypass	20.955	8.000	1.000	0.000	0.000	54.866	61.866	0.0294	45.00	0.000

Total	20.955	8.000	0.000	0.000	0.000	54.866	0.000	0.3675	45.00	0.000

SUMMARY OF BASIN RESULTS

Link Label	Time to Peak	Peak Inflow (m^3/s)	Time to Peak	Peak Outflow (m^3/s)	Total Inflow (m^3)	Basin Vol. Avail	Basin Vol. Used	Basin Stage Used
Basin	33.00	.2778	46.00	.1909	870.50	0.0000	371.56	0.4644

Run completed at: 26th November 2013 9:15:34

APPENDIX B – MUSIC MODELLING LAYOUT

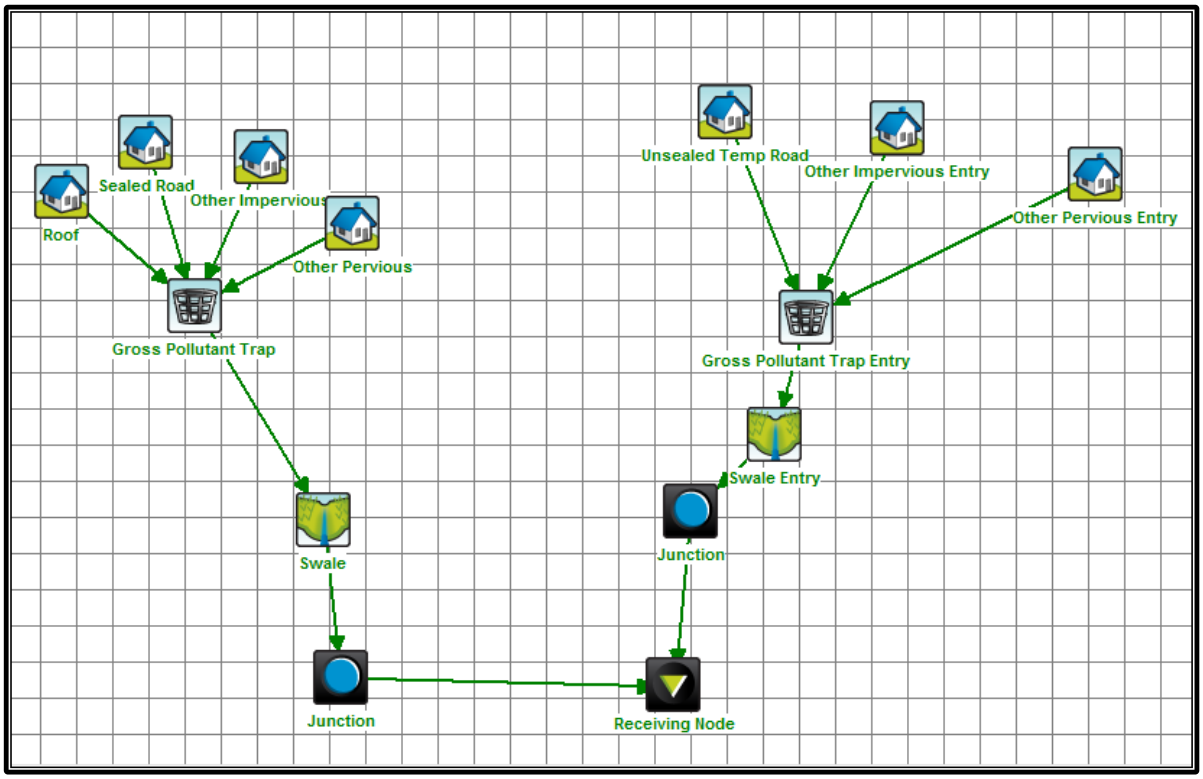


PLATE B 1 – MUSIC MODEL LAYOUT

APPENDIX C – STANDARD MUSIC PARAMETERS & SOIL/GW ASSUMPTIONS

MUSIC MODELLING LANDUSE PARAMETERS

Details of the soil / groundwater parameters adopted for the MUSIC modelling undertaken for this development are presented in Table C1 below. The adopted Annual Pollutant event mean concentrations are also presented in Table C2 below:

Table C1 ADOPTED SOIL / GROUNDWATER PARAMETERS FOR THE SITE

	Units	Roof	Road	Other
Impervious Area Parameters				
Rainfall threshold (Road 1, Roofs0.5)	mm/day	0.3	1.5	1.5
Pervious Area Parameters				
Soil storage capacity	mm	100	100	100
Initial storage	% of capacity	25	25	25
Field capacity	mm	87	87	87
Infiltration capacity coefficient - a		250	250	250
Infiltration capacity coefficient - b		1.3	1.3	1.3
Groundwater Properties				
Initial depth	mm	10	10	10
Daily recharge rate	%	60	60	60
Daily baseflow rate	%	45	45	45
Daily deep seepage rate	%	0	0	0

* Roofed and Road catchments have been assumed to be 100% impervious

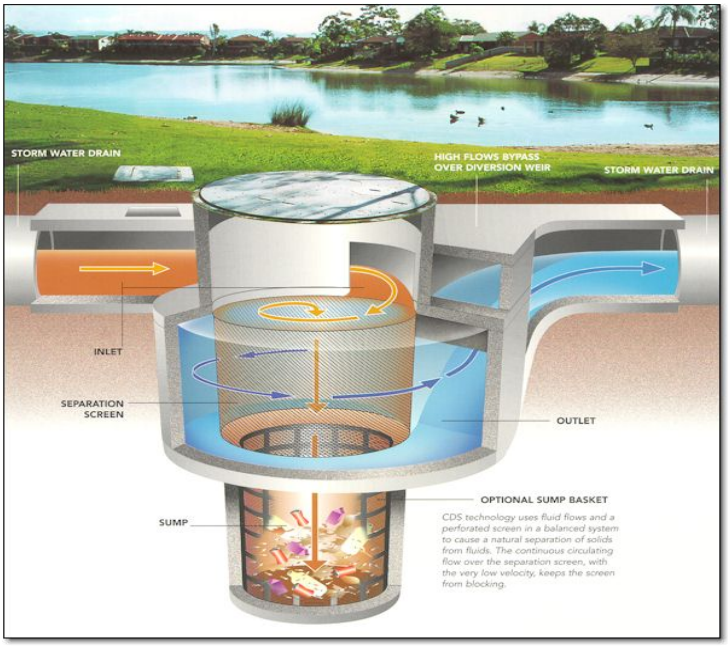
Table C2 ADOPTED ANNUAL POLLUTANT EVENT MEAN CONCENTRATIONS

	Roofed*		Road*		Other	
Pollutant	**Base Flow**	**Storm Flow**	**Base Flow**	**Storm Flow**	**Base Flow**	**Storm Flow**
	(mg/l)	**(mg/l)**	**(mg/l)**	**(mg/l)**	**(mg/l)**	**(mg/l)**
TSS	0	20	0	269	16	141.2
TP	0	0.13	0	0.5	0.14	0.25
TN	0	2	0	2.2	1.3	2

* Roofed and Road catchments have been assumed to be 100% impervious

GROSS POLLUTANT TRAPS (GPT'S)

GPT devices are typically provided at the outlet to stormwater pipes. These systems operate as a primary treatment to remove litter, vegetative matter, free oils and grease and course sediments prior to discharge to a downstream (Secondary and Tertiary) treatment devices. They can take the form of trash screens or litter control pits, filter pit inserts and wet sump gross pollutant traps. Council approved GPT units are to be provided at the end of stormwater pipes servicing urbanised catchments prior to discharging to the receiving waters.



Gross pollutant traps are available in various sizes and the performance of these devices vary substantially. To ensure flexibility in the detailed design phase of any development project, J. Wyndham Prince adopt a generic GPT node in its Water Quality Modelling.

Music Modelling Parameters

Within MUSIC transfer functions are used to calculate the stormwater effluent concentration of the stormwater flowing into the device, using a simple graphical relationship between the inflow and outflow concentration. MUSIC allows the user to describe the performance of the generic node by using a graphically based transfer function editor, for each of the pollutant types – Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN). The adopted values for modelling of GPT's for this development are presented below.

As the there is currently no adopted Australian method of measuring comparable performance of various GPT devices, and the products can range from basic trash screens to sophisticated proprietary devices, the TSS and nutrient removal performance of the systems has been conservatively adopted as zero. Individual products may achieve substantially improved performance over these adopted targets.

Pollutant Type	Remove Efficiency
GP	90%
TSS	0%
TP	0%
TN	0%

GRASSED SWALE

A grassed swale is a graded and engineered landscape feature appearing as a linear, shallow, open channel with trapezoidal or parabolic shape. The swale is vegetated with flood tolerant, erosion resistant plants.

Within the grassed swales storm water is drained at a slow and controlled rate and the swale acts as a treatment device in removing pollutants and allowing stormwater infiltration.

A well-designed grassed swale results in a significant improvement over the traditional drainage ditch in both detaining the flows and cleaning of storm water. Collected stormwater is designed to drain out through the filter medium within several hours or days.

(http://www.lakesuperiorstreams.org/stormwater/toolkit/swales.html)

The general features of the grassed swales proposed for the site are indicated in table below:

Swale South

Swale Properties	Unit	Value
Length	(metres)	115
Bed Slope	(%)	1.5
Base Width	(metres)	10
Top Width	(metres)	10
Depth	(metres)	0.01
Vegetation Height	(metres)	0.05
Exfiltration Rate	(mm/hr)	3.60

Swale North

Swale Properties	Unit	Value
Length	(metres)	60
Bed Slope	(%)	1.5
Base Width	(metres)	100
Top Width	(metres)	100
Depth	(metres)	0.01
Vegetation Height	(metres)	0.05
Exfiltration Rate	(mm/hr)	3.60

Music Modelling Parameters

The water quality reduction mechanisms in MUSIC are based on an exponential decay equation referred to as the k – C* curve. The expected sediment and nutrient removal performance of the proposed devices were determined using the default equations and parameters provided in the MUSIC model. These values area summarised in **Table B5** below;

Table B5 ADOPTED SWALE SYSTEM MUSIC MODELLING PARAMATERS

	Swale	
Pollutant	k (m/yr)	C* (mg/L)
TSS	8000	20.000
TP	6000	0.130
TN	500	1.400

APPENDIX D – CORRESPONDENCE

Francis Lane

From: Faulkner, Warren <w.faulkner@tamworth.nsw.gov.au>
Sent: Friday, 22 November 2013 6:04 PM
To: Francis Lane; Council External email
Cc: David@psaconsult.com.au; David Crompton; Chris Randall; Kruger, Jackie; Resch, Peter
Subject: RE: [JWP 9854] Attention Warren Faulkner
Attachments: Copy of Notice of Determination and subsequent modifications - DA53 97 issued by Department of Planning- ~ Lot 100 DP 1097471 Gunnedah Road Westdale.EML

Francis,

In addition to the Stormwater Management requirements of the DCP, Council has Engineering Design Guidelines for Subdivisions and Developments that set out our minimum requirements for stormwater drainage design in developments, in particular Part 3 of the Guidelines.

The document can be found on our website (www.tamworth.nsw.gov.au) under "Planning and Development", then "Development Application Guide for Building, Development and Subdivision", then click on "Engineering Design Guidelines for Subdivisions and Developments"

Condition 26 of the determination for DA53/97 is for stormwater drainage and requires that "Provisions for the control of stormwater from the site shall be designed so that the rate of discharge from the site for a 1 in 20 year rainfall event is not greater than the discharge which would flow from the undeveloped land". Hence, a pre/post detention basin assessment for the 1% AEP storm will not suffice. The assessment will need to be for the 5%, 2% and 1% AEP peak storms. Please note that Councils Engineering Design Guidelines require that post developed flows be no greater than the pre-developed flows across the range 1 in 1 to 1 in 100 and would prefer that this requirement is satisfied, however, we recognise that this is in excess of the consent requirement and not enforceable.

Relevant stormwater parameters for XP-RAFTS modelling are:

- Initial and continuing loss values, 8 & 0 mm/hr pervious and 1.0 & 0mm/hr impervious.
- Mannings n values to be in accordance with TRC Engineering Design Guidelines Part 3, Table D. The pervious n value would be 0.15, and 0.01 impervious.

Freeboard is necessary for detention basins, refer TRC Engineering Design Guidelines 3.16.3.5, minimum freeboard 500mm for earth structures and 300mm for concrete structures.

Basin discharge in the form of a spreader to create sheet flow is acceptable and preferable. Depending on velocity, scour protection may be required.

Water quality requirements are condition 4 of the determination for DA53/97. This condition identifies that the aspects contained in the Integrated Soil, Water and Landscape Plan included in Appendix 7 of the EIS to the DA form the basis for water quality requirements. I am not aware of what these water quality requirements are as I do not have a copy of the EIS, but apart from them, Council has no other specific water quality requirements. We have no guidelines on MUSIC modelling as apart from GPT's and grassed swales, we do not support a lot of the WSUD principles in Tamworth due to the environment and soil profiles.

As discussed, I have attached an e-mail that contains the determinations and modifications that we are aware of for this site.

I hope this information is of assistance.

Regards,

Warren Faulkner
Manager Infrastructure Planning
Tamworth Regional Council
P O Box 555
TAMWORTH NSW 2340

PH: (02) 6767-5524
FAX: (02) 6767-5295
MOB: 0408-860-469
E: w.faulkner@tamworth.nsw.gov.au

From: Francis Lane [mailto:flane@jwprince.com.au]
Sent: Tuesday, 19 November 2013 3:19 PM
Subject: [JWP 9854] Attention Warren Faulkner

Hi Warren,
As discussed over the phone, we are preparing a Stormwater Management Strategy for a replacement Rendering Plant at the Baiada Oakburn site, across the road from the airport.
Could you please advise/ confirm the following:

- Please provide any Council Stormwater Management Policy requirements in addition to those contained in the DCP.
- Please confirm that a pre/post detention basin assessment for the 1% AEP (100 year) storm is sufficient.
- Relevant parameters for XP-RAFTS modelling –
    - Initial and Continuing loss values of 15 & 2.5 mm/hr (pervious)and 1.5 & 0 mm/hr (impervious). Please confirm acceptance or advise otherwise.
    - Mannings n values often adopted are 0.025 pervious and 0.015 impervious. Please confirm acceptance or advise otherwise.
- Confirm if freeboard to detention basin is necessary.
- Basin discharge will be in the form of a spreader to disperse flows. Confirm acceptance.
- Advise water quality requirements if any, and any Council guidelines on MUSIC modelling.

We are expected to provide our client with a draft report early next week, so your prompt action would be greatly appreciated.
Regards,

Francis Lane – Water Resources Engineer

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS
& PROJECT MANAGERS

P 02 4720 3385 **F** 02 4721 7638 **W** www.jwprince.com.au
580 High Street, Penrith NSW
PO Box 4366 PENRITH WESTFIELD 2750

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APPENDIX E – FIGURES

REFER TO DRAWING SKW02 FOR CONTINUATION

Road Area
577.5 sq.m
Q10 = 19.2 L/s

RL 383.50*

CULVERT

300Ø RCP

Road Area
321.5 sq.m
Q10 = 10.7 L/s

300Ø RCP

300Ø PVC

Road Area
359.1 sq.m
Q10 = 11.9 L/s

RL 382.80*

300Ø RCP

320 dia. RCP @ min. 0.5%
3 month flow = 83 L/s

Surcharge Pit
SL 382.60
IL 381.40

600 dia. RCP @ min. 0.5%
437.2 L/s

SL 382.75
IL 381.43

Roof Area
332.9 sq.m
Q10 = 11.0 L/s

300Ø PVC

Roof Area
513.2 sq.m
Q10 = 17.0 L/s

Assume
Landscape/Grass
(C = 0.5)
Area 303.6 sq.m
Q10 = 6.5 L/s

Assume
Landscape/Grass
(C = 0.5)
Area 857.6 sq.m
Q10 = 18.4 L/s

RL 383.60*

300Ø RCP

Carpark Area
531.4 sq.m
Q10 = 17.6 L/s

Temp Road
Area Bypass
(C=0.85)
1854.1 sq.m

375Ø PVC

5250 RCP

3750 RCP

0.9m WIDE
SWALE DRAIN

RL 383.75*

Roof Area
2561.5 sq.m
Q10 = 85.0 L/s

Exist Pervious
Bypass
Area To Swale
11391.0 sq.m

300Ø PVC

Road Area
1035.0 sq.m
Q10 = 34.3 L/s

Road Area
604.5 sq.m
Q10 = 20.0 L/s

3750 RCP

SWALE DRAIN

Pervious Bypass
Area To Swale
2650.5 sq.m

300Ø PVC

Assume
Landscape/Grass
(C = 0.5)
Area 1223.0 sq.m
Q10 = 26.2 L/s

Roof Area
987.3 sq.m
Q10 = 32.7 L/s

Roof Area
225.2 sq.m
Q10 = 7.5 L/s

Future Roof Area
225.2 sq.m
Q10 = 7.5 L/s

300Ø PVC

300Ø PVC

3000 RCP

Road Area 114.8 sq.m
Q10 = 3.8 L/s

Assume
Landscape/Grass
C = 0.5
Area 570.7 sq.m
Q10 = 12.2 L/s

300Ø RCP

300Ø RCP

300Ø RCP

Roof Area
330.9 sq.m
Q10 = 11.0 L/s

RL 383.90*

Road Area
569.6 sq.m
Q10 = 18.9 L/s

RL 384.80*

Road Area
600.9 sq.m
Q10 = 19.9 L/s

Road Area
690.1 sq.m
Q10 = 22.9 L/s

Temp Road
Area to Swale
Bypass
(C=0.85)
786.0 sq.m

382.00

383.00

385.00

384.00

385.00

LEGEND

- PROPOSED STORMWATER PIPE
- CATCHMENT BOUNDARY
- PROPOSED STORMWATER PIT
- OVERLAND FLOW DIRECTION
- BASIN
- GRASS SWALE DRAIN

1:500 (AT A1)

10 0 10 20 30 40 50

METRES

CLIENT:

ADVANCE COPY ONLY
NOT FOR CONSTRUCTION

A	ISSUE FOR INFORMATION	FL	VG	MS		26/11/13
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE
CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS

PO Box 4366 PENRITH WESTFIELD NSW 2750
P 02 4720 3300 F 02 4721 7638 W www.jwprince.com.au E jwp@jwprince.com.au

AZIMUTH:

DATUM:

ORIGIN:

THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS PART OF AN APPROVED CONSTRUCTION CERTIFICATE.

OAKBUM RENDERING PLANT TAMWORTH

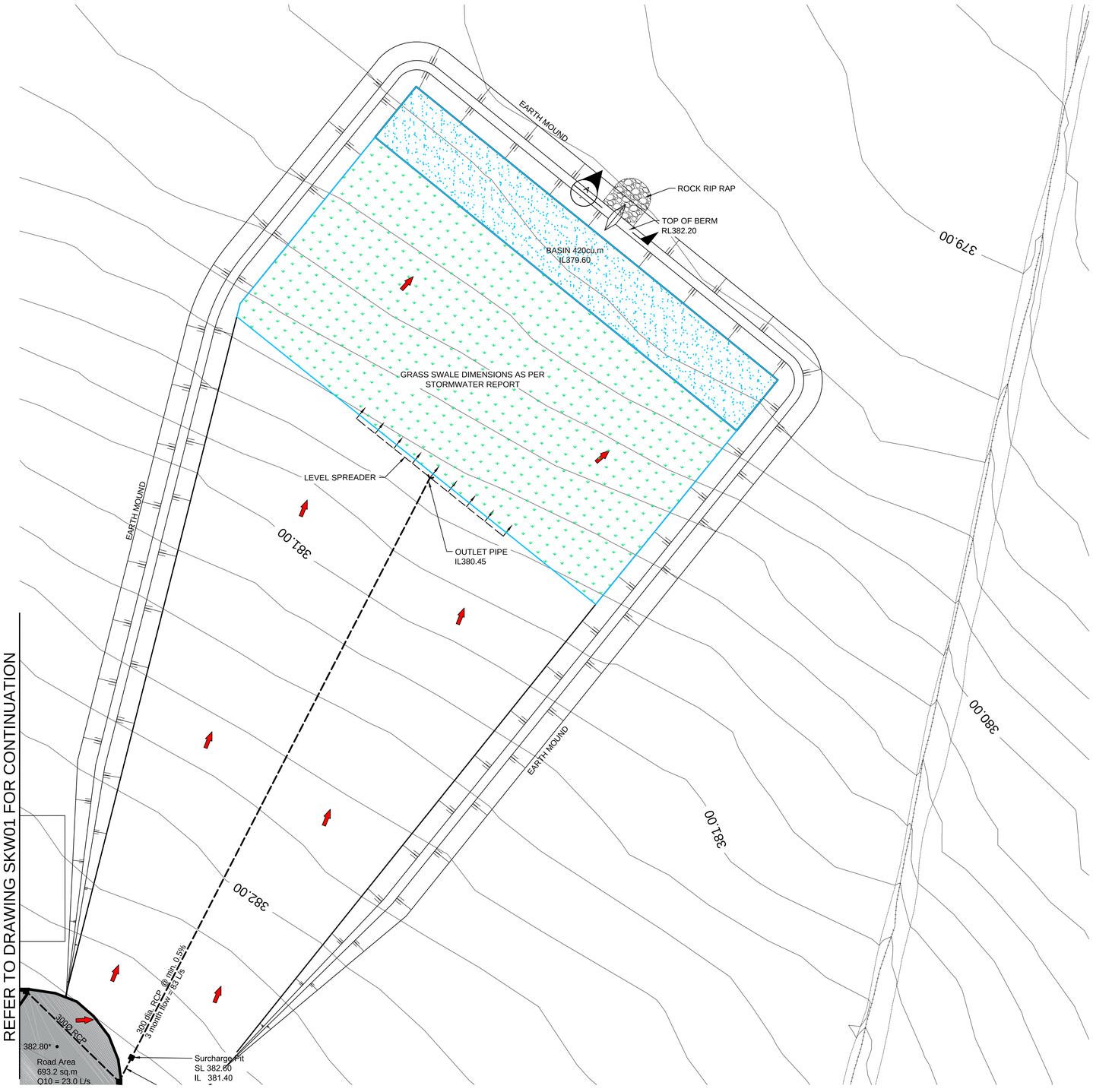
STORMWATER MANAGEMENT PLAN

PLAN No: 9854/SKW01 A

FILE No: 9854SKW01

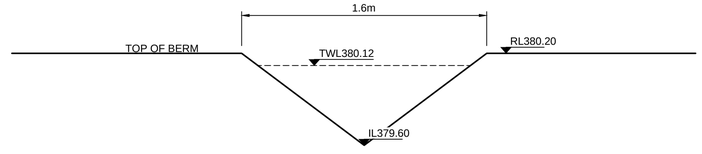
SHEET SIZE: A1 ORIGINAL

Plotted: 26 November , 2013 4:46:39 PM File Name: J:\9854\WDrawings\SW - Figures\9854SKW01.dwg



LEGEND

- PROPOSED STORMWATER PIPE
- CATCHMENT BOUNDARY
- PROPOSED STORMWATER PIT
- OVERLAND FLOW DIRECTION
- BASIN
- GRASS SWALE DRAIN



SECTION A
SCALE 1:20 -

1:500 (AT A1)

10 0 10 20 30 40 50
METRES

A	ISSUE FOR INFORMATION	FL	VG	MS		26/11/13
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
PO Box 4366 PENRITH WESTFIELD NSW 2750
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AZIMUTH:
DATUM:
ORIGIN:

CLIENT:

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NOT FOR CONSTRUCTION

OAKBUM RENDERING PLANT TAMWORTH

STORMWATER MANAGEMENT PLAN

PLAN No: 9854/SKW02 A
FILE No: 9854SKW02
SHEET SIZE: A1 ORIGINAL

Plotted: 26 November , 2013 4:47:09 PM File Name: J:\9854\WDrawings\SW - Figures\9854SKW02.dwg

APPENDIX 3: WASTE WATER TREATMENT PLANT CAPABILITY STATEMENT

Hydroflux Industrial Pty Ltd
Level 26, 44 Market Street, Sydney, NSW 2000
www.hydrofluxindustrial.com.au
e: info@hydrofluxindustrial.com.au
t: 61 2 9089 8833
f: 61 2 9089 8830

25th November 2013

David Ireland
C/- PSA Consulting Australia
Level 11 ICON Place
270 Adelaide Street
Brisbane QLD 4000

david@psaconsult.com.au

David,

Re: Oakburn Protein Recovery Plant – Existing Wastewater Treatment Plant

The current Oakburn Wastewater treatment Plant was designed constructed and commissioned in 2010 by myself and other current principals of Hydroflux Industrial Pty Ltd whilst in the employ of Ovivo Australia Pty Ltd.

As such we are intimately and professionally familiar with the wastewater treatment plants design and treatment capabilities.

Given the relatively new age of the wastewater treatment plant (3 ½ years), the design life of >20years and the predicted flow and loads being simular we have no hesitation in confirming that the wastewater treatment plant is sufficient to appropriately treat the wastewater generated by the new rendering plant.

Should you require any further information please do not hesitate to contact the undersigned.

Best Regards
Hydroflux Industrial Pty ltd

Andrew Miley
Director

APPENDIX 4: ODOUR IMPACT ASSESSESSMENT REPORT

PSA CONSULTING

Baiada Poultry Pty. Ltd.

Oakburn Protein Recovery Plant Replacement

Odour Impact Assessment

Westdale NSW

Final Report

November 2013

THE ODOUR UNIT (QLD) PTY LIMITED

ABN 87 102 255 765
2/57 Neumann Rd
PO Box 365
CAPALABA, Qld 4157

Project Number: N1930L.02

Report Revision		
Report Version	**Date**	**Description**
0.1 (Draft)	29/11/13	Draft report for comment.
1.0 (Final)	29/11/13	Final report.
Report Preparation		
Report Prepared By: S. Hayes		Approved By: T. Schulz
Report Title: Baiada Poultry – Oakburn Protein Recovery Plant Replacement Odour Impact Assessment		

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

1.1 BACKGROUND

The Odour Unit Pty. Ltd. (TOU) was formally commissioned on 8th November 2013 by PSA Consulting (PSA) on behalf of Baiada Poultry Pty. Ltd. (Baiada) to carry out an odour impact assessment for the proposed replacement of the fire damaged Oakburn Protein Recovery Plant (PRP) located near Oxley Highway, Westdale NSW. It is understood that Baiada are seeking consent to proceed from Department of Planning through an s75w modification.

It is understood that the odour control design and management at Oakburn PRP is to be based upon a similar low-temperature PRP located at Hanwood NSW that had been recently commissioned in early November 2013 alongside an existing high temperature PRP. It has been assumed that the low temperature Hanwood PRP is site-representative of Oakburn PRP for the purposes of this odour impact assessment. The odour disperision modelling projections has been carried out with the AUSPLUME modelling package (version 6.0). This report documents the methodologies and findings the assessment.

1.2 SITE PLAN

The proposed replacement for Oakburn PRP is to be located on land at Oxley Highway, Westdale NSW (Lot 100 on DP1097471). The proposed site location has been indicated with a yellow star **Figure 1.2.1**. Potential nearby sensitive places include the cemetery and crematorium approximately 1 km to the southeast of the PRP site and residential dwellings along Wallamore Road approximately 1.5 km to the east-northeast and another approximately 1 km to the north of the PRP site.

The near-field topography surrounding the PRP site could be described as a flat rural floodplain. Further afield there is a slightly elevated ridgeline that runs along Bowlers Lane from the north to the southwest. The Peel River valley is to the northeast. Any ridge and/or valley effects should not be a significant influence as odour impacts are not expected to extend beyond the near-field. An elevation map has been provided in **Figure 1.2.2**

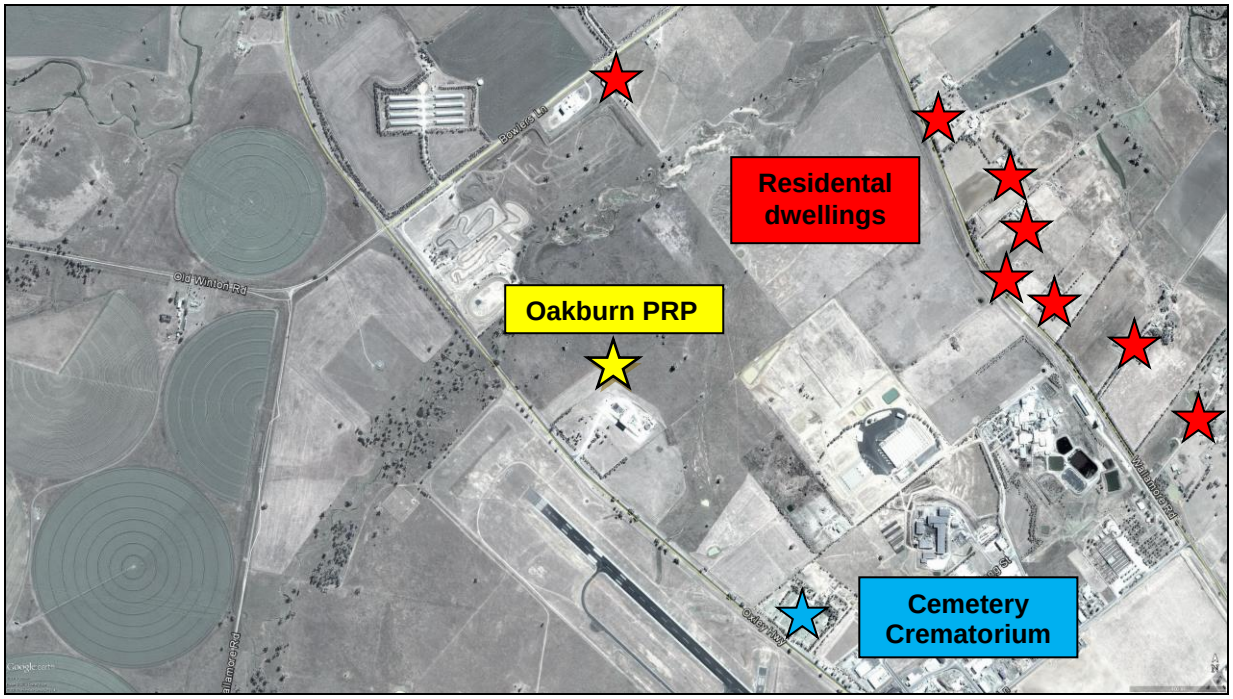

Figure 1.2.1: Oakburn PRP site location and potential nearby sensitive places.

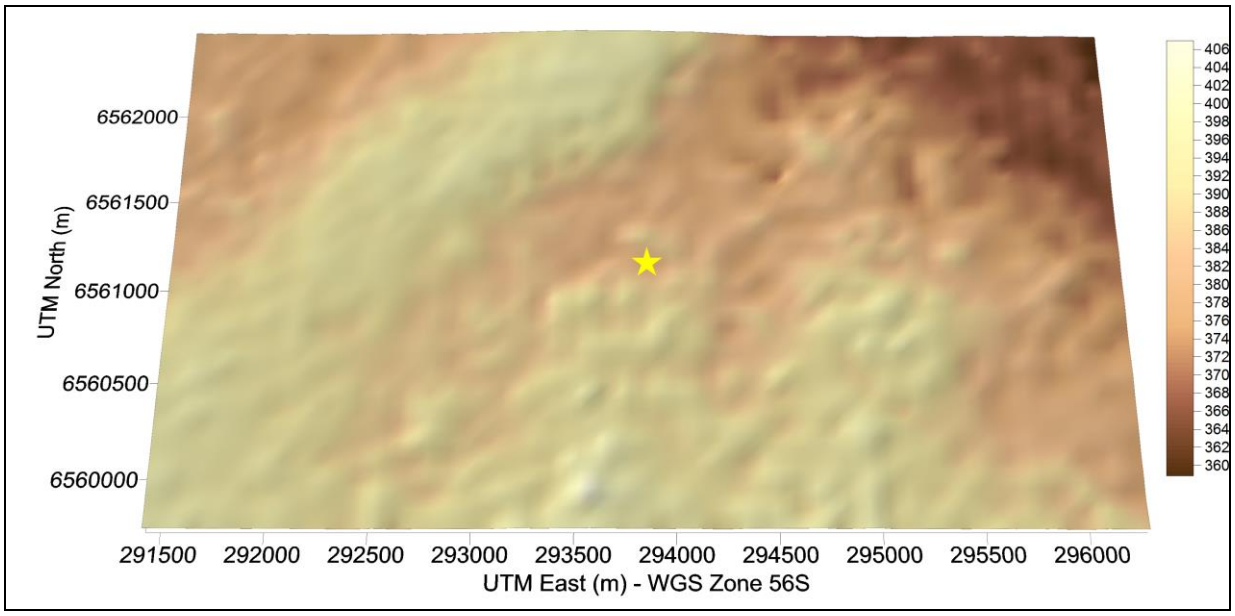

Figure 1.2.2: Elevation surrounding Oakburn PRP site.

1.3 OAKBURN PRP PROCESS DESCRIPTION

Oakburn PRP is planned to process a total of 150 tonne per day (t/day) of poultry by-product material over 16 hours, consistent with the previous fire damaged PRP including:

- offal and bone = 110 t/day;
- feather = 18 t/day;
- blood = 8 t/day;
- hatchery waste and dead birds = 14 t/day.

Soft offal is planned to be processed by continuous low temperature wet rendering and standard dry milling, feather processing is by hydrolization and standard dry milling, blood processing is by hot air drying and standard dry milling, dead bird processing is by batch cooking (under pressure) and standard dry milling.

In comparison, Hanwood low temperature PRP currently processes a total of approximately 110 t/day of offal and bone.

Foul air capture is planned from process units within the following sections:

- low temperature rendering section,
- feather processing,
- batch cooker,
- blood drying and milling, and
- raw material intake.

The foul air will be extracted using a high-standard point source odour collection system to be combined into a common duct and delivered to a new biofilter of modern industry best practice design for treatment. As a result there should only be at worst residual fugitive emissions and at best virtually no fugitive emissions.

At the time this assessment, the design for the new biofilter odour control system has yet to pass the initial concept stage. However, TOU has conservatively assumed that the Oakburn PRP biofilter design capacity is the same as Hanwood biofilter design capacity of 86,000 m^3/h. Based on a nominal empty bed loading rate of 143 $m^3/m^2.h$,

a biofilter of approximately 600 m^2 would be required. The Hanwood biofilter treats both point capture and ventilation air from a high temperature rendering plant as point capture air from the recently commission low temperature plant. It is understood that the capacity requirement for Oakburn PRP should be significantly less, as only point capture air is to be treated.

The rendering building air is planned to be naturally ventilated by thermally induced differential pressure effects as a result of the warmer upper building air and cooler lower building/ambient air. The entry air is to ingress through low level louver intakes and exit air to egress through roof ridgeline vents to atmosphere, along with any residual fugitive odour emissions. The building design air exchange rate is unknown at this stage.

2 METHODOLOGY

2.1 EMISSIONS INVENTORY

The Oakburn PRP odour impact assessment was carried out with use of parameters based upon the Hanwood PRP odour impact assessment parameters.

The biofilter cells were modelled as individial low exit velocity, wide diameter and wake-affected point sources. The stack source release parameters are given in **Table 2.1.1**.

Table 2.1.1: Stack source release parameters

Source	I.D.	Stack height (m)	Exit temp. (^{0}C)	Exit diameter. (m)	Empty bed exit velocity[1.] (m/s)	Design flow rate (m^3/s)
Biofilter – West	BioW	2.5	40	13.8	0.0403	5.97
Biofilter – North	BioN	2.5	40	13.8	0.0403	5.97
Biofilter – East	BioE	2.5	40	13.8	0.0403	5.97
Biofilter – South	BioS	2.5	40	13.8	0.0403	5.97

Note 1: Empty bed exit velocity should not be compared with biofilter performance testing velocities with witches' hat sampling apparatus.

The treated odour level is expected to range from a mean of 200 ou upon commissioning to a mean of 500 ou as the medium degrades. The modelled odour emission rate from each individual biofilter cell was based on the maximum of the expected treated odour concentration range (i.e. 500 ou).

Table 2.1.2: Stack source peak odour emission rates

Source	I.D.	Odour emission rate (ou.m^3/s)	Peak odour emission rate – P/M60 near-field (ou.m^3/s)
Biofilter – West	BioW	2,986	6.868
Biofilter – North	BioN	2,986	6.868
Biofilter – East	BioE	2,986	6.868
Biofilter – South	BioS	2,986	6.868

The Hanwood low temperature PRP had a fugitive emission factor of 2% of the odour load rate, measured at the Hanwood biofilter inlet, the lowest TOU feel is justified without bulk building ventilation air capture and maintenance of negative differential pressure. The factor used was based upon actual measurements carried out by TOU

on a split odour control system installed at a high temperature rendering plant located in the Hunter Valley, NSW. This Hanwood low temperature PRP fugitive emission rate (4,212 ou.m^3/s) has been scaled linearly to represent Oakburn PRP based on daily processing rates of 110 t/day for Hanwood and 150 t/day for Oakburn (1.36 x 4,212 = 5,743 ou.m^3/s). For further information see report: *Proposed Bartter Processing Plant Intensification Odour Impact Assessment* prepared for PSA Consulting on behlalf of Bartter Enterprised Pty. Ltd. (TOU, 2012).

Four volume sources were input into the model to represent the ridgeline vent discharge from each major section of the Oakburn PRP structure with odour emission rates proportionally assigned by estimated volume of each section. The volume source settings within the model has taken into account that emissions discharge from the ridgeline is immediately downwashed into the structure's wake. The volume source release parameters are available in **Table 2.1.3**.

Table 2.1.3: Volume source release parameters

Source	I.D.	Height (m)	Horizontal Spread (m)	Vertical spread (m)	Odour emission rate (ou.m^3/s)	Peak odour emission rate – P/M60 near-field (ou.m^3/s)
PRP (Load out 1 & meal area – 17% building volume)	PRPa	6.40	8.85	3.20	982	2,259
PRP (Feather, blood & batch area – 37% building volume)	PRPb	8.00	11.60	4.00	2,112	4,858
PRP (load out 2, offal, meal and tank area – 30% building volume)	PRPc	6.40	11.75	3.20	1,735	3,990
PRP (Truck unloading area – 16% building volume)	PRPd	7.20	8.05	3.60	914	2,102

Further model source configurations and output are available in the AUSPLUME text file output files in **Appendix A**.

2.2 BACKGROUND ODOUR AND CUMULATIVE ODOUR IMPACT EFFECTS

As a result of the proposed demolishment and replacement of the existing fire damaged PRP at Oakburn with a new PRP of modern design, the net contribution to

regional background odour should at the very least be completely offset. Therefore cumulative impact with background odour from similar nearby industries has not been considered in this assessment.

Over the past decade, TOU have experienced through many odour sampling, testing and downwind surveys, that certain classifications of sources have discrete and different odour character emissions. This effect has been repeatedly experienced at rendering plants by TOU assessors during downwind surveys. As a result it was concluded that the biofilter and PRP odour characters do not combine in the atmosphere, but remain as discrete odours, such that minimal cumulative or additive odour effects occur. For this reason this odour impact assessment treats the biofilter and PRP as separate, non-cumulative impacts.

2.3 METEOROLOGICAL DATASET

A one year site-representative meteorological dataset was developed by pDs Consultancy using data from Bureau of Meteorology (BoM) operated Tamworth Airport weather station with supplementary data obtained from BoM facilitated vertical temperature profiles at Moree Airport. The year of 2010 was deemed most acceptable after correlation against a site-representative dataset of five consecutive years from 2008 to 2012. The full meteorological dataset report has been provided in **Appendix B**.

2.4 NSW ODOUR CRITERIA AND DISPERSION MODEL GUIDELINES

Regulatory authority guidelines for odorous impacts of gaseous process emissions are not designed to satisfy a 'zero odour impact criteria', but rather to minimise the nuisance effect to acceptable levels of these emissions to a large range of odour sensitive receptors within the local community.

The odour impact assessment for this project has been carried out in accordance with the methods outlined by the NSW EPA documents:

> "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*" (2005), and

"*Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW*" (2006).

The EPA documents specify that the odour modelling for Level 3 impact assessments upon which this study has been conducted be based on the use of:

- 99.0th percentile dispersion model predictions;
- 1-hour averaging times with built–in peak-to-mean ratios to adjust the averaging time to a 1-second nose-response-time;
- The peak-to-mean ratio in the near- and far-field for wake-affected stack/roof vent and volume sources for Pasquill-Gifford atmospheric stability classes A-F is 2.3.
- The near field distance is defined as typically 10 times the largest source dimension, either height or width
- The appropriate odour unit performance criterion, based on the population of the affected community in the vicinity of the development.

The impact assessment criteria (IAC) for complex mixtures of odours are designed to include receptors with a range of sensitivities. Therefore a statistical approach is used to determine the acceptable ground level concentration of odour at the nearest sensitive receptor. This criterion is determined by the following equation outlined in the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2005* (p. 37):

$$IAC = \frac{\log_{10}(p) - 4.5}{-0.6} \qquad \textbf{Equation 2.4.1}$$

where,

IAC = Impact Assessment Criterion (ou)

***p* =** population

Based on **Equation 2.4.1**, **Table 2.4.1** outlines the odour performance criteria for six different affected population density categories, and is reproduced from the EPA's *Approved Methods* document. It states that higher odour concentrations are permitted in lower population density applications.

Table 2.4.1 - Odour Performance Criteria under Various Population Densities

Population of affected community	Impact assessment criterion (ou)
Urban Area (≥ ~2000)	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤ ~2)	7.0

Source: Department of Environment and Climate Change (NSW), 2005, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

Based on the NSW EPA classification of population densities presented in **Table 2.4.1** and **Equation 2.4.1** the IAC adopted for this odour impact assessment study is **5.2 ou** for the residential dwellings along Wallamore Road (estimated 24 residents) and **7.0 ou** elsewhere in the modelled domain.

2.5 DISPERSION MODELLING

2.5.1 The Odour Dispersion Model

The odour dispersion modelling assessment was carried out using AUSPLUME Version 6.0, a Gaussian, steady-state, plume dispersion model developed by the Victorian Environmental Protection Authority (EPA Victoria). Ausplume is an approved dispersion model by the NSW EPA in their document - *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales (2005)*.

AUSPLUME is considered by TOU as suitable for the purpose of odour dispersion modelling of the projected near-field impacts from Oakburn PRP.

For this study, the air contaminant was odour and ground level concentrations in odour units (ou) have been projected.

2.5.2 Topographical Data and Land Use

Topographical data from the area of interest was extracted from 3-arc resolution Shuttle Radar Topography Mission (SRTM) Void Filled Digital Elevation Model (DEM) of the Tamworth region obtained from USGS Earth Resources Observations and Science (EROS) Center website http://earthexplorer.usgs.gov.

The DEM was processed into a 50 m by 50 m horizontal resolution by Surfer Surface Mapping System. The grid file was then processed by the AUSPLUME file conversion utility into a compatible terrain file. Land use immediately surrounding the Oakburn PRP site is within a flat rural land use. Therefore, the surface roughness category (Z_o) used in the dispersion model was 0.1 m.

2.5.3 Gridded Receptor Configuration

The gridded receptors used in the model was configured as a Cartesian grid with receptors spaced at 50 m by 50 m intervals over a 4.85 km by 2.75 km domain. The gridded receptor values were based on the projected coordinate system *WGS 84 / UTM Zone 56S*. The contour plots derived from the receptor grid were overlaid on a geo-referenced Google Earth satellite image.

2.5.4 Building Profile Input Program

The Building Profile Input Program (BPIP) was incorporated into the model accounting for the nearby main plant structures including the PRP structure, the boiler house and biofilter.

2.5.5 Further Model Configurations

Further model configurations and output are available in the AUSPLUME text file outputs in **Appendix A.**

2.6 ODOUR DISPERSION MODELLING SCENARIOS

Two odour emission scenarios were modelled. The first is the projected ground level odour concentrations from the biofilter emissions and the second is the projected ground level odour concentrations as a result of the PRP building fugitive emissions.

3 RESULTS

The odour dispersion modelling results are presented in the following figures as ground level odour concentrations, 99.0th percentile with one second nose-response-time averaging (P/M60):

Figure 3.1: Biofilter Odour Control System

Figure 3.2: Oakburn PRP fugitive emissions

The modelling results show clear compliance with the IAC. The plotted 5.2 ou (**BLUE**) and 7.0 ou (**RED**) contours do not approach the vicinity of the nominated sensitive places.

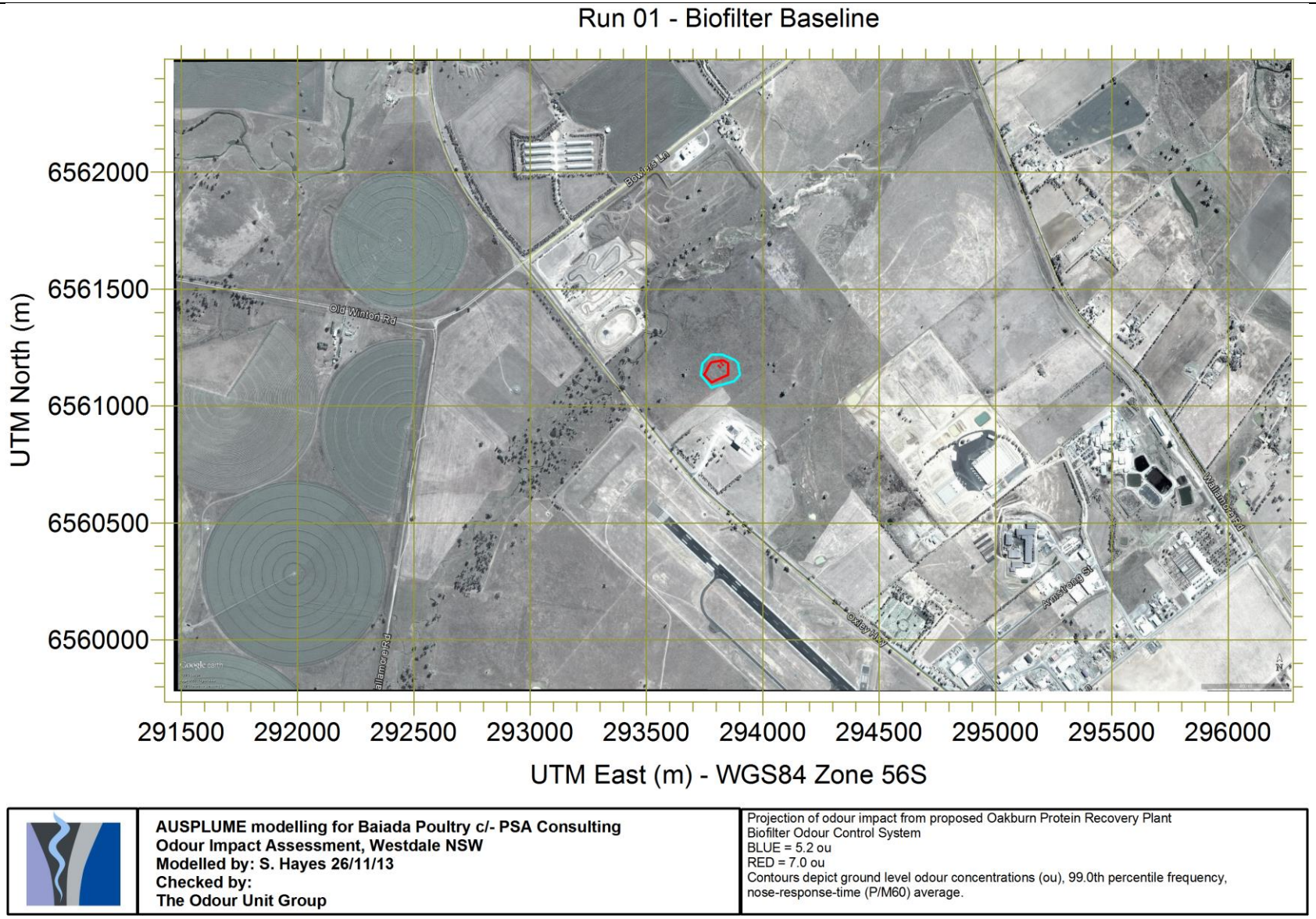

Figure 3.1: Projected ground level odour concentration for Biofilter OCS emissions

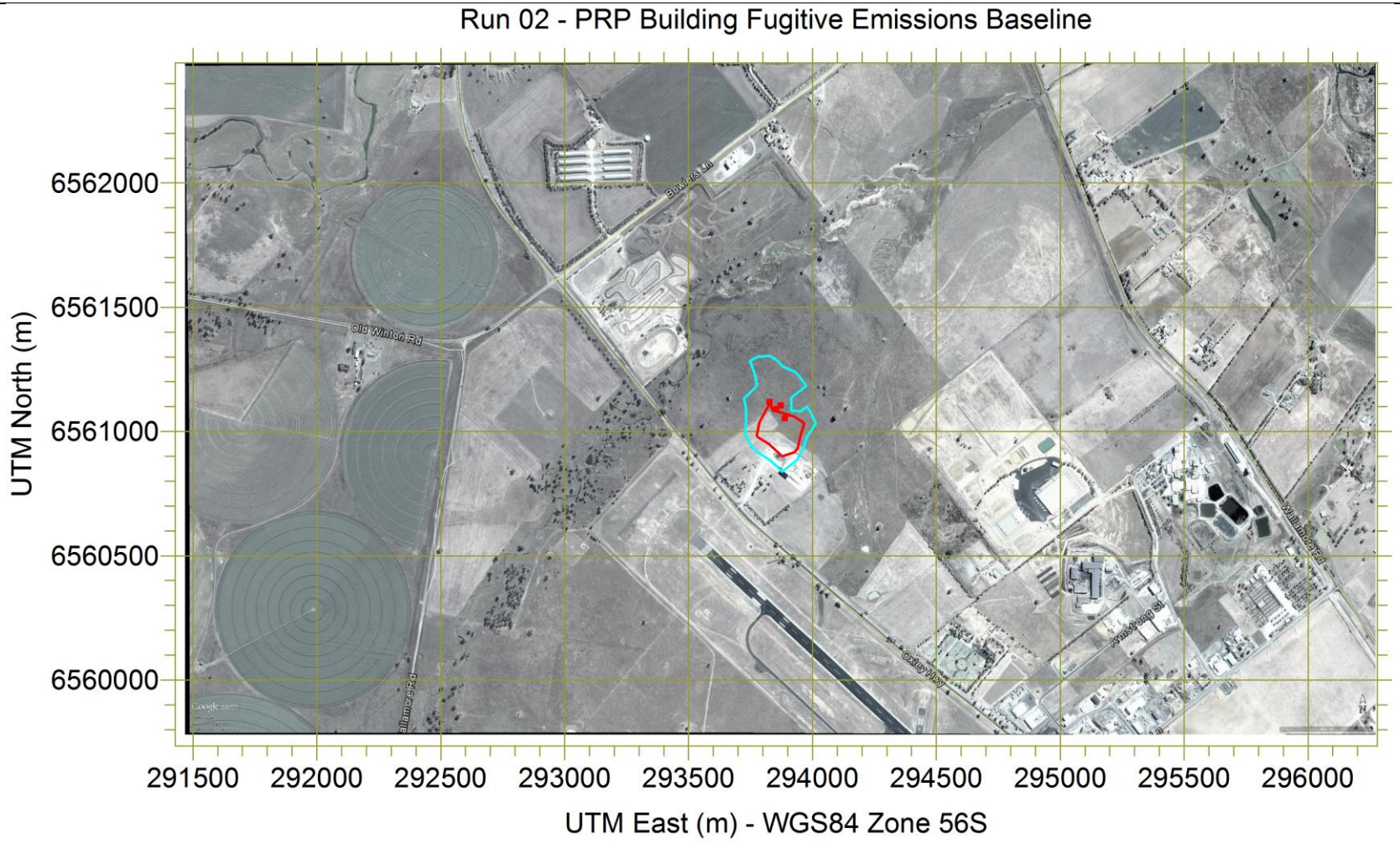

Figure 3.2: Projected ground level odour concentration for PRP Building fugitive emissions

4 SUMMARY AND CONCLUSIONS

The Odour Unit (Qld) Pty. Ltd. was formally commissioned on 8th November 2013 by PSA Consulting on behalf of Baiada Poultry Pty. Ltd. to carry out an odour impact assessment for the proposed replacement of the fire damaged Oakburn Protein Recovery Plant (PRP) located near Oxley Highway, Westdale NSW.

It is understood that the odour control design and management at Oakburn PRP is to be based upon a similar low-temperature PRP located at Hanwood NSW that had been recently commissioned in early November 2013 alongside an existing high temperature PRP. It has been assumed that the low temperature Hanwood PRP is site-representative of Oakburn PRP for the purposes of this odour impact assessment.

TOU has conservatively assumed that the Oakburn PRP biofilter design capacity is the same as Hanwood biofilter design capacity of 86,000 m3/h. The treated odour level is expected to range from a mean of 200 ou upon commissioning to a mean of 500 ou as the medium degrades. The modelled odour emission rate from each individual biofilter cell was based on the maximum of the expected treated odour concentration range (i.e. 500 ou).

The Oakburn PRP has been estimated to produce a similar fugitive emission rate that was modelled for the Hanwood low temperature PRP. The fugitive emission factor used of 2% of the odour load rate, measured at the Hanwood biofilter inlet, is the lowest that TOU feel is justified, and was scaled linearly to represent Oakburn PRP based on daily processing rates of 110 t/day for Hanwood and 150 t/day for Oakburn (1.36 x 4,212 = 5,743 ou.m^3/s).

As a result of the proposed demolishment and replacement of the existing fire damaged PRP at Oakburn with a new PRP of modern design, the net contribution to regional background odour should at the very least be completely offset. The biofilter and PRP odour characters should not combine in the atmosphere (i.e, insignificant cumulative or additive odour effects).

The modelling results show clear compliance with the Impact Assessment Criteria of 5.2 ou for the residential dwellings along Wallamore Road and 7.0 ou elsewhere in the modelled domain. The ground level odour concentrations as a result of the biofilter emissions and PRP building are unlikely to be a significant issue at the nearest sensitive places.

The sensitivity of the fugitive emission estimate could be tested by also modelling a 3% and 5% release. However, the project time constraints did not allow for this. It is apparent from the results that there is scope to accommodate a larger level of fugitive odour emissions in the unlikely event should they occur.

Based upon the above findings it can be concluded that no adverse odour impacts are expected to be experienced as a result of the replacement Oakburn PRP.

References:

- DEC, 2005, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*
- DEC, 2006, *Technical framework (and notes): assessment and management of odour from stationary sources in NSW.*
- The Odour Unit, 2012, *Proposed Bartter Processing Plant Intensification Odour Impact Assessment.* Prepared for PSA Consulting on behalf of Bartter Enterprises Pty Limited.

Appendix A: AUSPLUME text output files

1

131126 Oakburn Run01 - Biofilter Baseline

Concentration or deposition	Concentration
Emission rate units	OUV/second
Concentration units	Odour_Units
Units conversion factor	1.00E+00
Constant background concentration	0.00E+00
Terrain effects	Egan method
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.300 m
Averaging time for sigma-theta values	60 min.

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.100m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	PRIME method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIMES
1 hour

1

131126 Oakburn Run01 - Biofilter Baseline

SOURCE CHARACTERISTICS

STACK SOURCE: BIOW

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
293810	6561173	384m	3m	13.80m	40C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	45	42	37	32	27	33	39	42	45	47	35	34
Effective building height	13	13	13	13	13	13	13	13	13	13	3	3
Along-flow building length	47	47	45	42	41	44	47	48	47	45	32	28
Along-flow distance from stack	-53	-55	-55	-54	-52	-51	-50	-47	-42	-36	-8	-7
Across-flow distance from stack	14	8	3	-3	-8	-14	-18	-23	-27	-29	5	6

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	32	32	34	47	48	47	45	42	37	32	27	33
Effective building height	3	3	3	13	13	13	13	13	13	13	13	13
Along-flow building length	24	21	26	38	43	45	46	47	45	43	41	44
Along-flow distance from stack	-6	-7	-10	-1	2	4	7	9	10	12	11	7
Across-flow distance from stack	7	8	9	-27	-23	-19	-14	-8	-3	3	8	14

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	38	42	45	47	35	34	25	33	41	47	52	47
Effective building height	13	13	13	13	3	3	14	16	16	16	16	13
Along-flow building length	47	48	47	45	32	28	43	51	56	58	59	45
Along-flow distance from stack	3	-1	-5	-9	-24	-21	-111	-117	-121	-122	-119	-49
Across-flow distance from stack	19	23	27	29	-5	-6	11	21	4	-12	-28	19

(Constant) emission rate = 6.87E+03 OUV/second
No gravitational settling or scavenging.

STACK SOURCE: BION

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
293821	6561184	384m	3m	13.80m	40C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	45	42	37	32	27	33	39	32	34	35	35	34
Effective building height	13	13	13	13	13	13	13	3	3	3	3	3
Along-flow building length	47	47	45	42	41	44	47	37	36	34	32	28

Along-flow distance from stack	-66	-69	-70	-69	-67	-67	-64	-22	-20	-18	-15	-11
Across-flow distance from stack	23	15	7	-2	-10	-18	-25	-9	-9	-9	-9	-9

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	32	32	34	36	37	47	45	42	37	24	21	33
Effective building height	3	3	3	3	3	13	13	13	13	3	3	13
Along-flow building length	24	21	26	30	32	45	46	47	45	32	32	44
Along-flow distance from stack	-8	-5	-6	-7	-8	15	19	23	25	-8	-9	22
Across-flow distance from stack	-8	-7	-6	-5	-4	-30	-23	-15	-7	4	6	18

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	38	32	34	35	35	34	31	22	41	47	52	56
Effective building height	13	3	3	3	3	3	3	14	16	16	16	16
Along-flow building length	47	37	36	34	32	28	24	41	56	58	59	58
Along-flow distance from stack	18	-15	-16	-17	-17	-17	-16	-113	-125	-129	-128	-123
Across-flow distance from stack	25	9	9	9	9	9	8	11	19	2	-15	-32

(Constant) emission rate = 6.87E+03 OUV/second
No gravitational settling or scavenging.

STACK SOURCE: BIOE

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
293828	6561176	384m	3m	13.80m	40C	0.0m/s

_____ Effective building dimensions (in metres) _____

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	123	42	37	32	27	33	39	42	34	35	35	34
Effective building height	13	13	13	13	13	13	13	13	3	3	3	3
Along-flow building length	106	47	45	42	41	44	47	48	36	34	32	28
Along-flow distance from stack	-140	-64	-67	-68	-67	-69	-68	-65	-27	-26	-24	-21
Across-flow distance from stack	-49	24	17	9	2	-7	-15	-23	-1	-3	-4	-5

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	32	32	34	36	37	36	34	42	37	32	21	33
Effective building height	3	3	3	3	3	3	3	13	13	13	3	13
Along-flow building length	24	21	26	30	32	34	35	47	45	43	32	44
Along-flow distance from stack	-18	-16	-16	-17	-17	-16	-15	18	22	25	-8	24
Across-flow distance from stack	-7	-8	-8	-9	-9	-9	-9	-24	-17	-9	-5	7

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	38	42	34	35	35	34	31	22	41	47	52	56
Effective building height	13	13	3	3	3	3	3	14	16	16	16	16
Along-flow building length	47	48	36	34	32	28	24	41	56	58	59	58
Along-flow distance from stack	21	17	-9	-9	-8	-7	-6	-102	-115	-119	-119	-115
Across-flow distance from stack	15	23	1	3	4	5	7	11	21	6	-10	-25

(Constant) emission rate = 6.87E+03 OUV/second
No gravitational settling or scavenging.

STACK SOURCE: BIOS

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
293816	6561166	384m	3m	13.80m	40C	0.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	45	42	37	32	27	33	39	42	45	47	46	34
Effective building height	13	13	13	13	13	13	13	13	13	13	13	3
Along-flow building length	47	47	45	42	41	44	47	48	47	45	42	28
Along-flow distance from stack	-47	-50	-52	-52	-52	-53	-53	-51	-48	-43	-37	-16
Across-flow distance from stack	21	16	12	6	1	-5	-10	-15	-20	-23	-27	9

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	64	32	34	36	48	47	45	42	37	32	27	33
Effective building height	13	3	3	3	13	13	13	13	13	13	13	13
Along-flow building length	134	21	26	30	43	45	46	47	45	43	41	44
Along-flow distance from stack	22	-16	-19	-22	-7	-3	1	4	7	10	12	9
Across-flow distance from stack	-29	8	7	6	-28	-25	-21	-16	-12	-6	-1	5

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	38	42	45	47	47	34	25	33	41	47	52	47
Effective building height	13	13	13	13	13	3	14	16	16	16	16	13
Along-flow building length	47	48	47	45	42	28	43	51	56	58	59	45
Along-flow distance from stack	7	4	1	-2	-5	-12	-102	-108	-112	-113	-111	-42
Across-flow distance from stack	10	15	20	24	27	-9	10	21	6	-9	-23	25

(Constant) emission rate = 6.87E+03 OUV/second
No gravitational settling or scavenging.

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131126 Oakburn Run01 - Biofilter Baseline

RECEPTOR LOCATIONS

The Cartesian receptor grid has the following x-values (or eastings):

291429.m 291479.m 291529.m 291579.m 291629.m 291679.m 291729.m
291779.m 291829.m 291879.m 291929.m 291979.m 292029.m 292079.m
292129.m 292179.m 292229.m 292279.m 292329.m 292379.m 292429.m
292479.m 292529.m 292579.m 292629.m 292679.m 292729.m 292779.m
292829.m 292879.m 292929.m 292979.m 293029.m 293079.m 293129.m
293179.m 293229.m 293279.m 293329.m 293379.m 293429.m 293479.m
293529.m 293579.m 293629.m 293679.m 293729.m 293779.m 293829.m
293879.m 293929.m 293979.m 294029.m 294079.m 294129.m 294179.m
294229.m 294279.m 294329.m 294379.m 294429.m 294479.m 294529.m
294579.m 294629.m 294679.m 294729.m 294779.m 294829.m 294879.m
294929.m 294979.m 295029.m 295079.m 295129.m 295179.m 295229.m
295279.m 295329.m 295379.m 295429.m 295479.m 295529.m 295579.m
295629.m 295679.m 295729.m 295779.m 295829.m 295879.m 295929.m
295979.m 296029.m 296079.m 296129.m 296179.m 296229.m 296279.m

and these y-values (or northings):

6559734.m 6559784.m 6559834.m 6559884.m 6559934.m 6559984.m 6560034.m
6560084.m 6560134.m 6560184.m 6560234.m 6560284.m 6560334.m 6560384.m
6560434.m 6560484.m 6560534.m 6560584.m 6560634.m 6560684.m 6560734.m
6560784.m 6560834.m 6560884.m 6560934.m 6560984.m 6561034.m 6561084.m
6561134.m 6561184.m 6561234.m 6561284.m 6561334.m 6561384.m 6561434.m

6561484.m 6561534.m 6561584.m 6561634.m 6561684.m 6561734.m 6561784.m
6561834.m 6561884.m 6561934.m 6561984.m 6562034.m 6562084.m 6562134.m
6562184.m 6562234.m 6562284.m 6562334.m 6562384.m 6562434.m 6562484.m

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METEOROLOGICAL DATA : BoM AWS Data BoM Tamworth Clouds Moree Uair Surface
R

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.72E+01	20,27/01/10	(293779, 6561134, 0.0)
2	1.70E+01	18,28/02/10	(293779, 6561134, 0.0)
3	1.68E+01	19,28/02/10	(293779, 6561134, 0.0)
4	1.67E+01	20,28/02/10	(293779, 6561134, 0.0)
5	1.54E+01	23,25/01/10	(293779, 6561134, 0.0)
6	1.54E+01	20,22/12/10	(293779, 6561134, 0.0)
7	1.52E+01	19,22/01/10	(293879, 6561134, 0.0)
8	1.49E+01	20,05/02/10	(293779, 6561134, 0.0)
9	1.48E+01	17,28/03/10	(293779, 6561134, 0.0)
10	1.47E+01	17,17/03/10	(293779, 6561134, 0.0)
11	1.47E+01	19,28/03/10	(293779, 6561134, 0.0)
12	1.47E+01	11,07/02/10	(293779, 6561134, 0.0)
13	1.45E+01	21,27/01/10	(293779, 6561134, 0.0)
14	1.42E+01	15,27/01/10	(293779, 6561134, 0.0)
15	1.41E+01	14,17/03/10	(293779, 6561134, 0.0)
16	1.41E+01	20,12/01/10	(293879, 6561234, 0.0)
17	1.39E+01	01,06/01/10	(293779, 6561134, 0.0)
18	1.39E+01	18,10/02/10	(293779, 6561134, 0.0)
19	1.37E+01	17,22/01/10	(293829, 6561134, 0.0)
20	1.37E+01	22,25/01/10	(293779, 6561134, 0.0)
21	1.37E+01	18,04/12/10	(293779, 6561134, 0.0)
22	1.36E+01	16,28/03/10	(293779, 6561134, 0.0)
23	1.36E+01	04,10/12/10	(293779, 6561134, 0.0)
24	1.36E+01	16,24/01/10	(293829, 6561184, 0.0)
25	1.35E+01	24,27/11/10	(293779, 6561134, 0.0)
26	1.35E+01	21,24/11/10	(293779, 6561134, 0.0)
27	1.33E+01	18,26/01/10	(293829, 6561184, 0.0)
28	1.33E+01	16,03/01/10	(293779, 6561134, 0.0)
29	1.32E+01	22,21/01/10	(293779, 6560984, 0.0)
30	1.31E+01	14,16/11/10	(293779, 6561134, 0.0)
31	1.30E+01	17,13/01/10	(293829, 6561184, 0.0)
32	1.28E+01	16,07/03/10	(293779, 6561134, 0.0)
33	1.28E+01	01,14/01/10	(293779, 6561134, 0.0)
34	1.28E+01	23,08/12/10	(293779, 6561134, 0.0)
35	1.28E+01	11,07/03/10	(293779, 6561134, 0.0)
36	1.28E+01	18,14/03/10	(293779, 6561134, 0.0)
37	1.27E+01	20,11/11/10	(293579, 6561034, 0.0)
38	1.27E+01	19,23/01/10	(293829, 6561184, 0.0)
39	1.27E+01	16,29/11/10	(293779, 6561134, 0.0)

40	1.27E+01	14,14/01/10	(293779,	6561134,	0.0)
41	1.25E+01	13,15/04/10	(293779,	6561134,	0.0)
42	1.25E+01	21,23/12/10	(293779,	6561134,	0.0)
43	1.25E+01	19,18/03/10	(293829,	6561284,	0.0)
44	1.25E+01	24,08/12/10	(293779,	6561134,	0.0)
45	1.24E+01	19,30/11/10	(293779,	6561134,	0.0)
46	1.24E+01	23,02/01/10	(293779,	6561134,	0.0)
47	1.24E+01	20,09/01/10	(294029,	6561034,	0.0)
48	1.24E+01	01,22/03/10	(293779,	6561134,	0.0)
49	1.23E+01	13,11/02/10	(293779,	6561134,	0.0)
50	1.23E+01	12,08/12/10	(293779,	6561134,	0.0)
51	1.22E+01	18,24/11/10	(293779,	6561134,	0.0)
52	1.22E+01	20,11/02/10	(293879,	6561284,	0.0)
53	1.21E+01	19,26/01/10	(293829,	6561184,	0.0)
54	1.21E+01	18,24/01/10	(293829,	6561184,	0.0)
55	1.21E+01	16,22/01/10	(293829,	6561184,	0.0)
56	1.20E+01	22,24/11/10	(293779,	6561134,	0.0)
57	1.20E+01	12,14/01/10	(293779,	6561134,	0.0)
58	1.19E+01	12,04/02/10	(293779,	6561134,	0.0)
59	1.19E+01	04,16/02/10	(293779,	6561134,	0.0)
60	1.19E+01	13,07/03/10	(293779,	6561134,	0.0)
61	1.19E+01	22,28/01/10	(293779,	6561134,	0.0)
62	1.18E+01	23,07/12/10	(293779,	6561134,	0.0)
63	1.18E+01	23,29/11/10	(293779,	6561134,	0.0)
64	1.17E+01	18,22/01/10	(293929,	6561234,	0.0)
65	1.17E+01	18,11/01/10	(293779,	6561184,	0.0)
66	1.17E+01	17,24/01/10	(293829,	6561184,	0.0)
67	1.17E+01	01,13/12/10	(293779,	6561134,	0.0)
68	1.17E+01	24,06/06/10	(293729,	6560934,	0.0)
69	1.15E+01	21,05/02/10	(293779,	6561134,	0.0)
70	1.14E+01	12,07/02/10	(293779,	6561134,	0.0)
71	1.14E+01	01,15/02/10	(293779,	6561134,	0.0)
72	1.14E+01	18,28/03/10	(293779,	6561134,	0.0)
73	1.14E+01	15,12/01/10	(293829,	6561184,	0.0)
74	1.14E+01	14,23/12/10	(293779,	6561134,	0.0)
75	1.14E+01	10,06/03/10	(293779,	6561134,	0.0)
76	1.14E+01	04,01/12/10	(293779,	6561134,	0.0)
77	1.14E+01	19,14/03/10	(293779,	6561134,	0.0)
78	1.13E+01	22,12/10/10	(293779,	6561134,	0.0)
79	1.13E+01	20,26/01/10	(293829,	6561184,	0.0)
80	1.13E+01	24,21/03/10	(293779,	6561134,	0.0)
81	1.13E+01	21,09/04/10	(293779,	6561134,	0.0)
82	1.13E+01	17,23/01/10	(293829,	6561184,	0.0)
83	1.13E+01	11,20/02/10	(293779,	6561134,	0.0)
84	1.12E+01	12,18/03/10	(293779,	6561134,	0.0)
85	1.12E+01	24,26/01/10	(293779,	6561134,	0.0)
86	1.12E+01	01,10/03/10	(293529,	6560984,	0.0)
87	1.12E+01	16,25/01/10	(293829,	6561184,	0.0)
88	1.12E+01	16,10/08/10	(293779,	6561134,	0.0)
89	1.11E+01	15,20/09/10	(293779,	6561134,	0.0)
90	1.11E+01	23,22/12/10	(293779,	6561134,	0.0)
91	1.11E+01	14,27/01/10	(293779,	6561134,	0.0)
92	1.11E+01	14,27/11/10	(293779,	6561134,	0.0)
93	1.10E+01	17,14/01/10	(293829,	6561184,	0.0)
94	1.10E+01	19,26/03/10	(293979,	6561284,	0.0)
95	1.10E+01	02,01/11/10	(293779,	6561134,	0.0)
96	1.09E+01	18,13/01/10	(293829,	6561184,	0.0)

97	1.09E+01	13,07/06/10	(293779, 6561134,	0.0)
98	1.09E+01	19,05/01/10	(293879, 6561134,	0.0)
99	1.09E+01	12,25/11/10	(293779, 6561134,	0.0)
100	1.09E+01	20,23/12/10	(293779, 6561134,	0.0)

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131126 Oakburn Run02 - PRP Baseline

Concentration or deposition	Concentration
Emission rate units	OUV/second
Concentration units	Odour_Units
Units conversion factor	1.00E+00
Constant background concentration	0.00E+00
Terrain effects	Egan method
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Roughness height at the wind vane site	0.300 m
Averaging time for sigma-theta values	60 min.

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.100m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	PRIME method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES
Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIMES
1 hour

1

131126 Oakburn Run02 - PRP Baseline

SOURCE CHARACTERISTICS

VOLUME SOURCE: PRPA

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
293826	6561119	384m	6m	9m	3m

(Constant) emission rate = 2.26E+03 OUV/second
No gravitational settling or scavenging.

VOLUME SOURCE: PRPB

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
293853	6561090	384m	8m	12m	4m

(Constant) emission rate = 4.86E+03 OUV/second
No gravitational settling or scavenging.

VOLUME SOURCE: PRPC

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
293888	6561053	384m	6m	12m	3m

(Constant) emission rate = 3.99E+03 OUV/second
No gravitational settling or scavenging.

VOLUME SOURCE: PRPD

X(m)	Y(m)	Ground Elevation	Height	Hor. spread	Vert. spread
293872	6561106	384m	7m	8m	4m

(Constant) emission rate = 2.10E+03 OUV/second
No gravitational settling or scavenging.

1

131126 Oakburn Run02 - PRP Baseline

RECEPTOR LOCATIONS

The Cartesian receptor grid has the following x-values (or eastings):

291429.m 291479.m 291529.m 291579.m 291629.m 291679.m 291729.m
291779.m 291829.m 291879.m 291929.m 291979.m 292029.m 292079.m
292129.m 292179.m 292229.m 292279.m 292329.m 292379.m 292429.m
292479.m 292529.m 292579.m 292629.m 292679.m 292729.m 292779.m
292829.m 292879.m 292929.m 292979.m 293029.m 293079.m 293129.m
293179.m 293229.m 293279.m 293329.m 293379.m 293429.m 293479.m
293529.m 293579.m 293629.m 293679.m 293729.m 293779.m 293829.m
293879.m 293929.m 293979.m 294029.m 294079.m 294129.m 294179.m
294229.m 294279.m 294329.m 294379.m 294429.m 294479.m 294529.m
294579.m 294629.m 294679.m 294729.m 294779.m 294829.m 294879.m
294929.m 294979.m 295029.m 295079.m 295129.m 295179.m 295229.m
295279.m 295329.m 295379.m 295429.m 295479.m 295529.m 295579.m
295629.m 295679.m 295729.m 295779.m 295829.m 295879.m 295929.m
295979.m 296029.m 296079.m 296129.m 296179.m 296229.m 296279.m

and these y-values (or northings):

6559734.m 6559784.m 6559834.m 6559884.m 6559934.m 6559984.m 6560034.m
6560084.m 6560134.m 6560184.m 6560234.m 6560284.m 6560334.m 6560384.m
6560434.m 6560484.m 6560534.m 6560584.m 6560634.m 6560684.m 6560734.m
6560784.m 6560834.m 6560884.m 6560934.m 6560984.m 6561034.m 6561084.m
6561134.m 6561184.m 6561234.m 6561284.m 6561334.m 6561384.m 6561434.m
6561484.m 6561534.m 6561584.m 6561634.m 6561684.m 6561734.m 6561784.m
6561834.m 6561884.m 6561934.m 6561984.m 6562034.m 6562084.m 6562134.m
6562184.m 6562234.m 6562284.m 6562334.m 6562384.m 6562434.m 6562484.m

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METEOROLOGICAL DATA : BoM AWS Data BoM Tamworth Clouds Moree Uair Surface
R

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1 Peak values for the 100 worst cases (in Odour_Units)
Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	3.67E+01	21,03/11/10	(293929, 6560984, 0.0)
2	3.62E+01	20,03/11/10	(293929, 6560984, 0.0)
3	3.55E+01	20,15/12/10	(293929, 6560984, 0.0)
4	3.55E+01	18,19/07/10	(293929, 6560984, 0.0)
5	3.55E+01	05,17/08/10	(293929, 6560984, 0.0)
6	3.46E+01	20,30/06/10	(293929, 6560984, 0.0)
7	3.46E+01	22,07/10/10	(293929, 6560984, 0.0)
8	3.35E+01	22,03/11/10	(293929, 6560984, 0.0)
9	3.33E+01	23,01/11/10	(293979, 6560984, 0.0)
10	3.31E+01	21,15/12/10	(293929, 6560934, 0.0)
11	3.30E+01	20,29/06/10	(293929, 6560934, 0.0)
12	3.26E+01	18,29/06/10	(293929, 6560934, 0.0)
13	3.26E+01	23,15/12/10	(293929, 6560934, 0.0)

14	3.21E+01	23,29/04/10	(293929,	6560984,	0.0)
15	3.17E+01	19,29/06/10	(293929,	6560934,	0.0)
16	3.17E+01	22,15/12/10	(293929,	6560934,	0.0)
17	3.09E+01	20,18/07/10	(293929,	6560934,	0.0)
18	2.96E+01	03,12/04/10	(293929,	6560934,	0.0)
19	2.90E+01	21,25/06/10	(293879,	6560984,	0.0)
20	2.90E+01	22,25/06/10	(293879,	6560984,	0.0)
21	2.90E+01	20,25/06/10	(293879,	6560984,	0.0)
22	2.90E+01	24,25/09/10	(293879,	6560984,	0.0)
23	2.89E+01	23,30/10/10	(293879,	6560984,	0.0)
24	2.88E+01	21,25/11/10	(293979,	6561034,	0.0)
25	2.87E+01	06,06/08/10	(293879,	6560984,	0.0)
26	2.87E+01	23,07/10/10	(293879,	6560984,	0.0)
27	2.86E+01	24,25/11/10	(293979,	6561034,	0.0)
28	2.83E+01	21,07/05/10	(293879,	6560984,	0.0)
29	2.83E+01	19,18/07/10	(293879,	6560984,	0.0)
30	2.80E+01	20,25/11/10	(293979,	6561034,	0.0)
31	2.79E+01	19,25/06/10	(293879,	6560984,	0.0)
32	2.79E+01	03,24/09/10	(293879,	6560984,	0.0)
33	2.76E+01	23,06/03/10	(293929,	6561034,	0.0)
34	2.74E+01	04,18/06/10	(293879,	6560984,	0.0)
35	2.73E+01	22,12/04/10	(293879,	6560984,	0.0)
36	2.70E+01	01,11/09/10	(293929,	6561034,	0.0)
37	2.69E+01	21,18/07/10	(293929,	6560884,	0.0)
38	2.68E+01	06,18/08/10	(293879,	6560984,	0.0)
39	2.68E+01	20,31/08/10	(293879,	6560984,	0.0)
40	2.68E+01	04,09/12/10	(293879,	6560984,	0.0)
41	2.68E+01	21,20/01/10	(294029,	6561034,	0.0)
42	2.67E+01	23,07/11/10	(294029,	6561034,	0.0)
43	2.64E+01	22,20/01/10	(294029,	6561034,	0.0)
44	2.64E+01	04,17/10/10	(294029,	6561034,	0.0)
45	2.62E+01	04,12/04/10	(293929,	6560884,	0.0)
46	2.62E+01	22,18/07/10	(293929,	6560884,	0.0)
47	2.62E+01	22,11/12/10	(293929,	6560884,	0.0)
48	2.62E+01	23,21/01/10	(293879,	6560984,	0.0)
49	2.60E+01	23,20/01/10	(294029,	6561034,	0.0)
50	2.55E+01	24,03/08/10	(293829,	6561284,	0.0)
51	2.54E+01	23,10/01/10	(293829,	6561284,	0.0)
52	2.48E+01	24,17/07/10	(293879,	6560984,	0.0)
53	2.48E+01	21,14/08/10	(293779,	6560984,	0.0)
54	2.47E+01	18,26/04/10	(293829,	6561234,	0.0)
55	2.42E+01	24,08/04/10	(293779,	6560984,	0.0)
56	2.40E+01	05,16/06/10	(293879,	6560984,	0.0)
57	2.37E+01	01,29/09/10	(293829,	6560984,	0.0)
58	2.37E+01	02,16/02/10	(293829,	6560934,	0.0)
59	2.37E+01	05,12/06/10	(293829,	6560934,	0.0)
60	2.34E+01	24,06/06/10	(293829,	6560984,	0.0)
61	2.32E+01	04,27/09/10	(293879,	6560984,	0.0)
62	2.32E+01	05,17/06/10	(293779,	6561284,	0.0)
63	2.32E+01	22,21/01/10	(293829,	6560934,	0.0)
64	2.31E+01	04,15/11/10	(293779,	6560984,	0.0)
65	2.30E+01	01,09/04/10	(293879,	6561234,	0.0)
66	2.30E+01	01,07/06/10	(293779,	6560934,	0.0)
67	2.29E+01	24,11/02/10	(293879,	6561234,	0.0)
68	2.29E+01	04,17/06/10	(293779,	6561284,	0.0)
69	2.28E+01	04,26/05/10	(293929,	6561034,	0.0)
70	2.28E+01	24,06/03/10	(293929,	6561034,	0.0)

71	2.28E+01	06,16/06/10	(293829, 6560934,	0.0)
72	2.27E+01	02,02/04/10	(293879, 6561234,	0.0)
73	2.26E+01	17,06/03/10	(293929, 6561034,	0.0)
74	2.26E+01	17,01/07/10	(293929, 6561034,	0.0)
75	2.25E+01	01,12/02/10	(293879, 6561234,	0.0)
76	2.24E+01	02,12/05/10	(293879, 6560984,	0.0)
77	2.23E+01	23,08/09/10	(293779, 6561284,	0.0)
78	2.21E+01	03,11/12/10	(293879, 6561034,	0.0)
79	2.20E+01	20,24/05/10	(293879, 6561234,	0.0)
80	2.20E+01	06,25/06/10	(293879, 6561234,	0.0)
81	2.20E+01	21,11/11/10	(293779, 6561034,	0.0)
82	2.19E+01	04,11/12/10	(293879, 6561034,	0.0)
83	2.19E+01	05,11/12/10	(293879, 6561034,	0.0)
84	2.19E+01	02,10/03/10	(293779, 6561034,	0.0)
85	2.17E+01	08,16/05/10	(293879, 6561034,	0.0)
86	2.16E+01	03,10/07/10	(293779, 6561034,	0.0)
87	2.16E+01	02,29/04/10	(293779, 6561034,	0.0)
88	2.16E+01	19,11/11/10	(293779, 6561034,	0.0)
89	2.15E+01	23,18/10/10	(293879, 6561234,	0.0)
90	2.15E+01	06,17/06/10	(293779, 6561284,	0.0)
91	2.15E+01	22,08/09/10	(293779, 6561284,	0.0)
92	2.13E+01	06,14/11/10	(293929, 6561034,	0.0)
93	2.11E+01	04,18/10/10	(293779, 6560984,	0.0)
94	2.10E+01	19,11/09/10	(294029, 6561034,	0.0)
95	2.10E+01	04,26/12/10	(293779, 6561234,	0.0)
96	2.08E+01	02,08/05/10	(293779, 6561034,	0.0)
97	2.05E+01	01,13/05/10	(293779, 6560984,	0.0)
98	2.05E+01	21,20/07/10	(293779, 6560984,	0.0)
99	2.04E+01	04,04/07/10	(293779, 6561234,	0.0)
100	2.03E+01	06,13/07/10	(293729, 6560984,	0.0)

Appendix B: pDs Consultancy meteorological dataset report

Site-Representative Input Meteorological data file for AUSPLUME

Tamworth-2010

This file was exclusively compiled for **The Odour Unit** Pty Ltd By pDs Consultancy Service.

pDs Consultancy
@1999-2013

Introduction

Gaussian plume models such as AUSPLUME/AERMOD require hourly averaged meteorological data from a single site that is preferably within the model domain ('on-site' or site-specific data). However, data from the nearest 'off-site' meteorological station can be used when no on-site data are available, and the off-site data are representative of the area of concern (i.e. the meteorological parameters characterise the transport and dispersion conditions of the location in question).

It is also preferable that:

- The compilation of the input meteorological data file is done in accordance with 'best practice', with procedures and algorithms recommended or set by environment regulators.
- The instrumentation collecting mandatory data such as wind speed, direction, sigma-theta (calculated from wind direction measurements) and ambient temperature, meet Australian Standards AS2923 (ambient air guide for measurement of horizontal wind for air quality applications).

pDs Consultancy has been engaged by **The Odour Unit** to compile an 'AUSPLUME-type' meteorological file for a site at **Westdale** in New South Wales using a representing year within the last 5 year window.

Tamworth weather stations found to be the best available data sources maintained by Bureau of Meteorology to source mandatory data and supplementary data. Upper air (Radio Sonde) data obtained from BoM's **Moree** weather station to compile site-representative input meteorological data file for intended AUSPLUME modelling work over **Westdale**.

Vertical Temperature and Moisture Profiles from **Moree** Airport (maintained by Australian Bureau of Meteorology) were used to determine convective mixing height.

This input meteorological data file has been compiled following the EPA, Victoria guideline: "Construction of meteorological data files for AUSPLUME (Publication No.1459)".

DETERMINATION OF REPRESENTING YEAR:

CRITERIA:

Representing year is the year whose frequency distribution of wind speeds and directions is most similar to that of the last five years or more.

TECHNIQUE :

The similarity of the frequency distribution was determined using a standard statistical parameter called the chi-square (X2), calculated as

$$X^2 = \sum_{i=1}^{n} \frac{(O-E)^2}{E}$$

where O is the observed count of the occurrence of a wind speed and direction combination for a specific year,

and

E is the long-term frequency of that combination.

The most representative year is that with the lowest X2 value. The results of this method for **Tamworth** are shown in Figure 1. The year 2010 found to be meeting this set criteria.

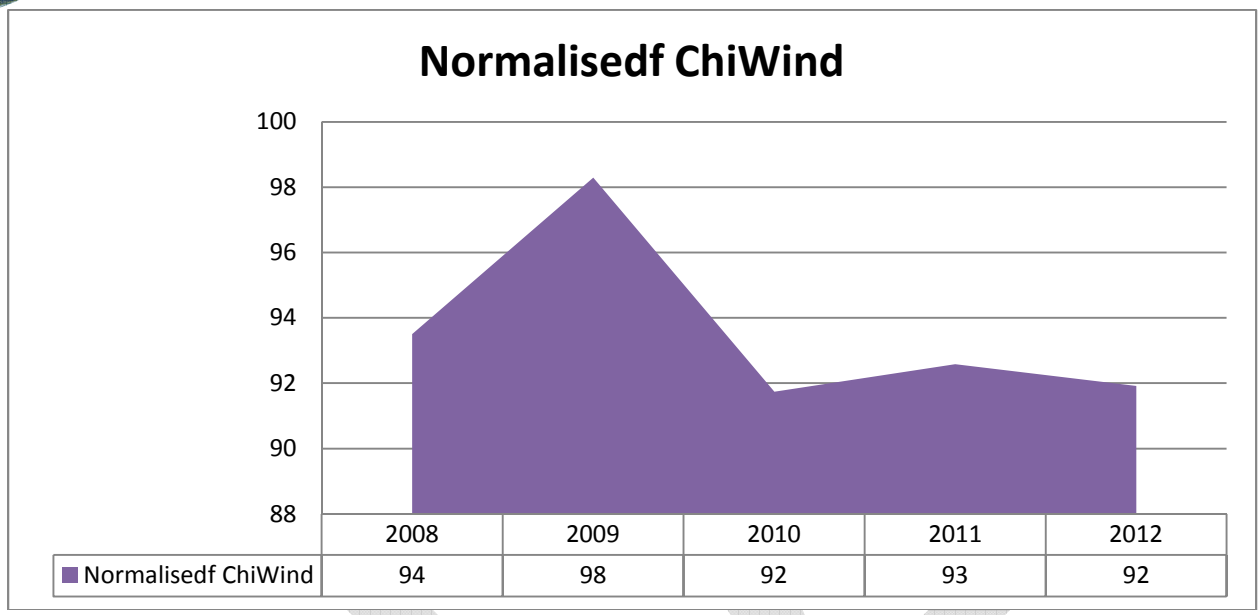


Figure 1:Annual Variation of Normalised Chi-Square of Winds over Tamworth, NSW.

LOCATION: WESTDALE, NSW

DATA PROCESSING

Data Source

1. **Tamworth Airport** AWS Data- BoM, NCC(Melbourne).

2. **Moree** Airport Vertical temperature Profiles -National Climate Centre (NCC)- Bureau of Meteorology, Melbourne.

Input Information

- Mandatory (**Tamworth)** parameters
    - Wind speed (km/h)
    - Wind direction
    - Ambient Temperature
- Supplementary (**Tamworth**)
    - Total Cloud amount
    - Surface Pressure
    - Dew point

Wind was measured at 10m (Anemometer Height), surface roughness assumed to be 0.3m at the wind measurement site.

Moree (NSW)

1. Vertical temperature profiles; Temperature, Dew point (1 profile per day)

QA/QC ON RAW DATA

This data set was treated as follows

- Incomplete days removed.
- Suspected wind stalls (both wind direction and speed) removed and filled appropriately preserving the temporal consistency.
  - Note that BoM Syncrotec Anemometer's lowest detection limit of wind speed is 2 KM/Hour
  - Last 10 minute averaged winds are registered against the timestamp.
- Small gaps filled with previous or following data (See Appendix A for gap filling procedure).
- Pressure, Dew point Temperature and cloud amount were checked for unusual values.

365 days were recovered for the representative year 2010

MOREE (BOM) VERTICAL TEMPERATURE PROFILES

- Gaps in vertical temperature profiles were filled with previous or following day data for the completeness.

DETERMINATION OF SECONDARY PARAMETERS

VERTICAL STABILITY

Solar Radiation for day time and Modified Pasquill Stability Class outlined in the reference, Davis and Singh, Jl of Hazardous Materials, 11 was used to determine night-time stability class. Solar radiation was theoretically calculated using off site cloud observations.

Table 1 for daytime and part of Table 2 for night-time were used.

TABLE 1: STABILITY CLASSIFICATION FOR DAYTIME USING SOLAR RADIATION AND WIND SPEED

	Solar Radiation (W/m²)			
Wind Speed(m/s)	≥925	≥675	≥175	< 175
< 2	A	A	B	D
< 3	A	B	C	D
< 5	B	B	C	D
< 6	C	C	D	D
≥ 6	C	D	D	D

Table 2: Modified Pasquill stability calsses

Surface Wind Speed (m/s) At 10m	Daytime incoming solar radiation				Within 1 Hour before sunset or after sunrise	Night-time cloud amount (Octas)		
	Strong (>600)	Moderate (300-600)	Slight (<300)	Overcast		0-3	4-7	8
< 2	A	A-B	B	D	D	F	F	D
< 3	A-B	B	C	D	D	F	E	D
< 5	B	B-C	C	D	D	E	D	D
< 6	C	C-D	D	D	D	D	D	D
≥ 6	C	D	D	D	D	D	D	D

MIXING HEIGHT (CONVECTIVE & MECHANICAL)

DEFINITION:

The mixing height, the depth of the surface mixed layer is the height of the atmosphere above the ground, which is well mixed due either to mechanical turbulence or convective turbulence. The air layer above this height is stable.

The mixing height was determined by using the methodology of Benkley and Schulman (Journal of Applied Meteorology, Volume 18, 1979,pp 772-780). **Moree** upper air observation containing temperature and moisture profiles were used to determine daytime mixing height.

Surface wind speeds and roughness at **Moree** are used to calculate the depth of the mechanically forced boundary layer during the night time.

MixHm=0.185* Ustar/Cterm

Where Ustar=.35*Usfc/Ln (Htanemo/Z0)

Cterm = Coriolis Term =2 Ω Sin(ϕ)

Where Ω is the angular velocity of the earth

ϕ is the latitude

Htanemo= Anemometer Height, Z0 is the roughness

Height of the convective boundary layer was determined using daytime temperature sounding (Vertical temperature and dewpoint profiles) in between sunrise and sunset. Surface meteorological conditions at **Tamworth** and temperature profiles at **Moree** were used to estimate hourly mixing heights. Larger value of the mechanical turbulence or convective turbulence was taken as mixing height for the daylight hours.

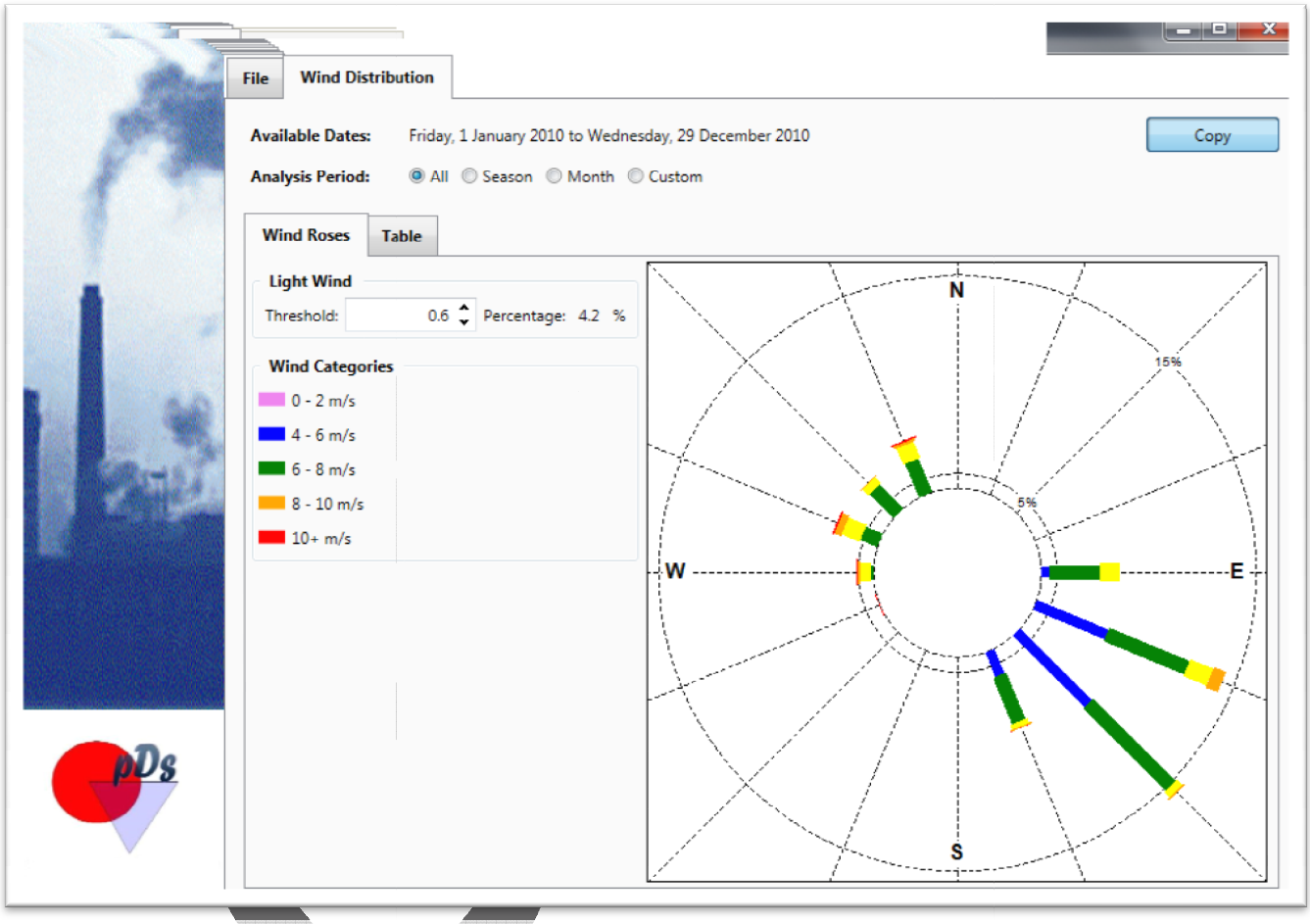
ANALYSIS

DATA COVERAGE

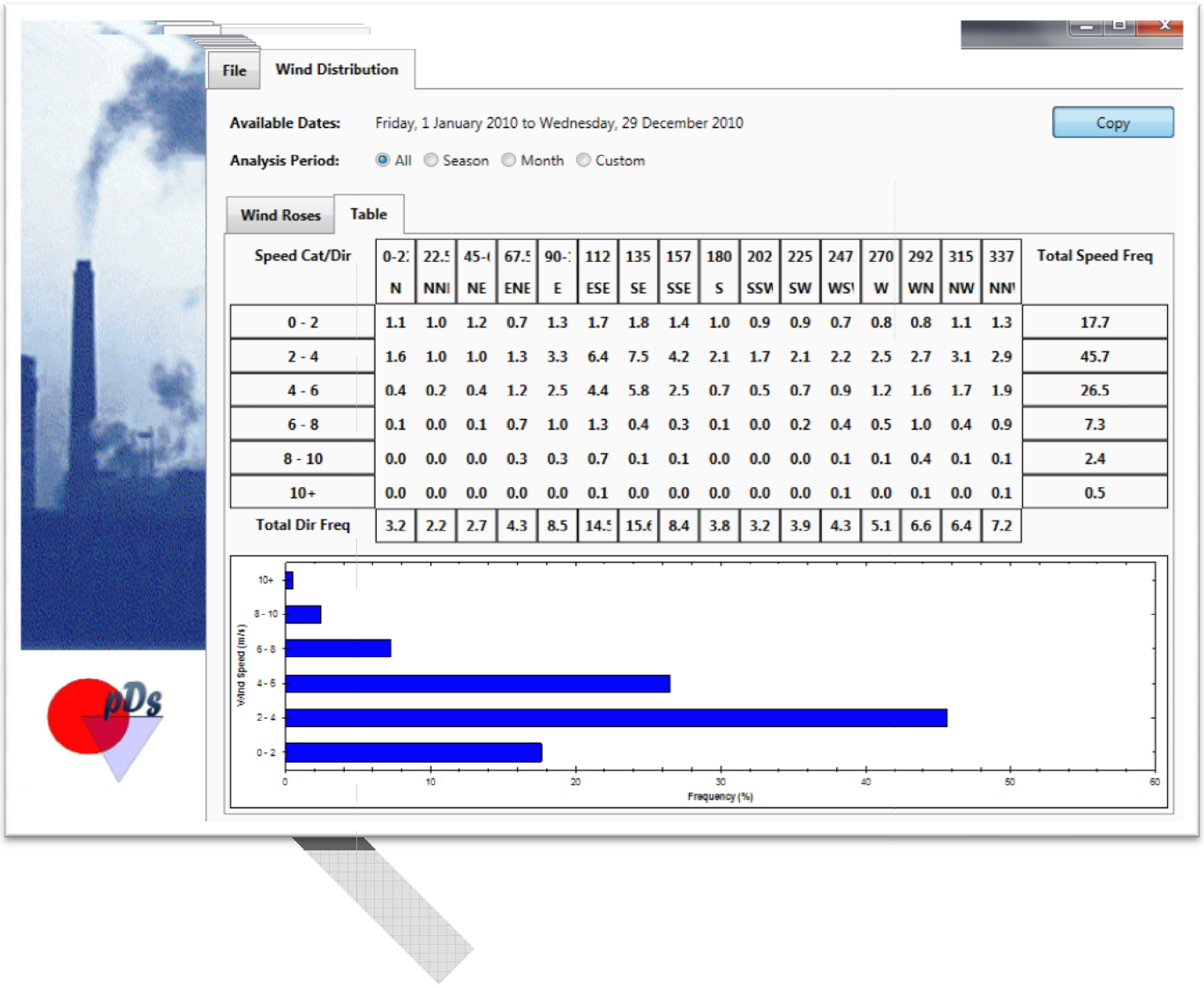
Season/Year	No of Days	No of Days in the file	Percentage Covergage %
Summer	90	90	100
Autumn	92	92	100
Winter	92	92	100
Spring	91	91	100
Total	**365**	**365**	**100**

All seasons are well represented. Data coverage is meeting the regulatory requirements (>90%).

ANNUAL WINDROSES

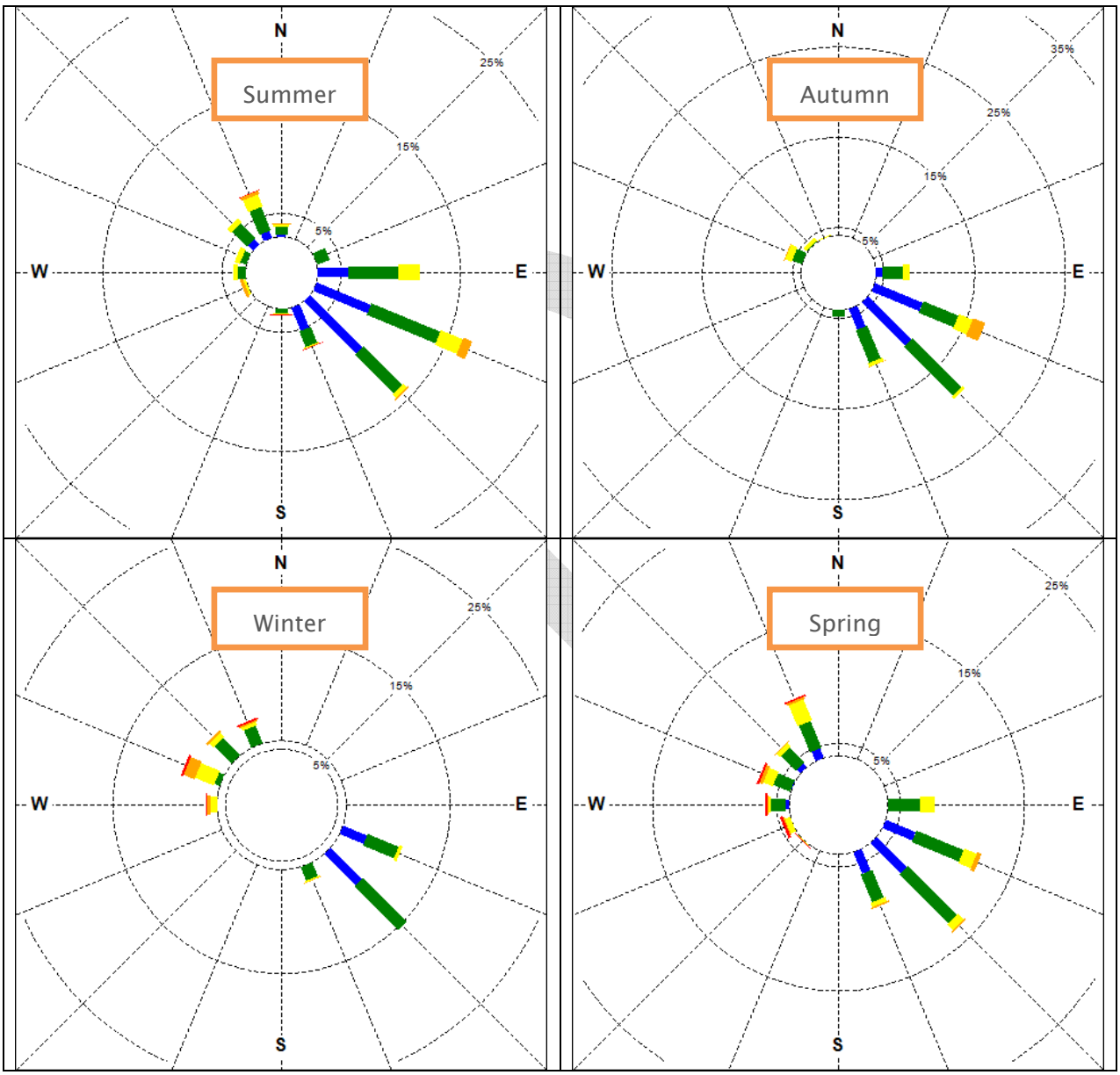


ANNUAL WIND FREQUENCY



Speed Cat/Dir	0-2 N	22.5 NNE	45-(NE	67.5 ENE	90-1 E	112 ESE	135 SE	157 SSE	180 S	202 SSW	225 SW	247 WSW	270 W	292 WN	315 NW	337 NNW	Total Speed Freq
0 - 2	1.1	1.0	1.2	0.7	1.3	1.7	1.8	1.4	1.0	0.9	0.9	0.7	0.8	0.8	1.1	1.3	17.7
2 - 4	1.6	1.0	1.0	1.3	3.3	6.4	7.5	4.2	2.1	1.7	2.1	2.2	2.5	2.7	3.1	2.9	45.7
4 - 6	0.4	0.2	0.4	1.2	2.5	4.4	5.8	2.5	0.7	0.5	0.7	0.9	1.2	1.6	1.7	1.9	26.5
6 - 8	0.1	0.0	0.1	0.7	1.0	1.3	0.4	0.3	0.1	0.0	0.2	0.4	0.5	1.0	0.4	0.9	7.3
8 - 10	0.0	0.0	0.0	0.3	0.3	0.7	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.4	0.1	0.1	2.4
10+	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.5
Total Dir Freq	3.2	2.2	2.7	4.3	8.5	14.5	15.6	8.4	3.8	3.2	3.9	4.3	5.1	6.6	6.4	7.2	

SEASONAL WINDROSES



ANNUAL STABILITY DISTRIBUTION

Stability Category	% Distribution	Avg Wind Speed	Avg Temperature	Avg Mixing Height
A	4	1.6	22.2	1169
B	10	2.8	20.2	1218
C	17	3.6	18.6	1145
D	39	4.4	17.2	893
E	14	3.7	14.5	687
F	16	1.8	12.	359

STATISTICS OF WESTDALE (NSW) INPUT METEOROLOGICAL DATA FILE-2010

Stability Class	STATs	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A	Max of Temp	32.0	31.0	30.0	23.0	24.0		16.0	17.0	22.0	24.0	27.0	29.0	32.0
	Min of Temp	13.0	21.0	14.0	15.0	11.0		13.0	7.0	10.0	9.0	11.0	15.0	7.0
	Average of Temp	26.2	26.6	24.3	19.9	18.3		14.5	12.3	17.1	18.5	21.2	23.3	22.2
	Max of WS	2.5	2.5	2.5	1.4	1.4		0.6	1.4	2.5	2.5	2.5	2.5	2.5
	Min of WS	0.6	0.6	0.6	0.6	1.1		0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Average of WS	1.9	1.7	1.7	1.1	1.3		0.6	1.1	1.4	1.7	1.7	1.7	1.6
	Max of MixH	2469	2608	2026	1489	2061		602	1947	1707	2230	2613	2598	2613
	Min of MixH	225	248	544	187	488		550	302	337	234	234	182	182
	Average of MixH	1227	1481	1488	766	965		576	877	925	935	1218	1162	1169
B	Max of Temp	36.0	32.0	33.0	27.0	25.0	17.0	18.0	20.0	24.0	26.0	28.0	30.0	36.0
	Min of Temp	7.0	17.0	11.0	6.0	4.0	-1.0	1.0	2.0	5.0	4.0	5.0	6.0	-1.0
	Average of Temp	27.2	26.0	24.2	21.2	16.1	8.5	11.8	11.6	16.2	19.0	21.3	22.6	20.2
	Max of WS	4.7	4.7	4.7	4.7	4.7	1.4	4.2	4.7	4.7	4.7	4.7	4.7	4.7
	Min of WS	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	1.1	0.6	0.6
	Average of WS	3.2	3.4	2.7	2.7	1.9	1.1	1.4	2.3	3.0	3.1	3.3	3.0	2.8
	Max of MixH	2914	2865	2796	2711	2341	1507	2081	2343	2571	2552	2652	2750	2914
	Min of MixH	112	150	201	112	112	201	136	179	235	220	182	248	112
	Average of MixH	1369	1450	1459	1256	995	658	766	907	1150	1212	1460	1184	1218
C	Max of Temp	37.0	33.0	34.0	28.0	26.0	20.0	20.0	19.0	24.0	28.0	29.0	30.0	37.0
	Min of Temp	10.0	13.0	12.0	7.0	6.0	1.0	2.0	0.0	2.0	1.0	8.0	9.0	0.0
	Average of Temp	25.4	25.2	22.5	19.3	16.4	13.0	12.3	11.7	15.4	17.8	20.1	22.3	18.6
	Max of WS	9.2	10.3	10.8	5.8	5.8	5.8	5.8	5.8	5.8	10.8	8.3	9.2	10.8
	Min of WS	0.6	1.1	1.1	0.6	0.6	0.6	0.6	1.1	1.1	1.1	0.6	0.6	0.6
	Average of WS	3.7	4.4	4.1	3.2	3.2	3.1	3.2	3.5	3.3	3.9	3.9	3.7	3.6
	Max of MixH	2919	2889	2905	2657	2480	1857	2100	2064	2429	2911	2743	2788	2919
	Min of MixH	225	454	337	388	112	257	299	337	234	327	337	365	112
	Average of MixH	1173	1325	1264	1197	1073	946	940	1030	1109	1243	1327	1152	1145
D	Max of Temp	37.0	33.0	33.0	28.0	26.0	19.0	20.0	21.0	25.0	28.0	29.0	31.0	37.0
	Min of Temp	8.0	13.0	11.0	4.0	-3.0	-4.0	-3.0	-1.0	0.0	2.0	6.0	7.0	-4.0
	Average of Temp	24.9	23.7	21.9	18.7	13.7	11.2	11.1	10.8	14.6	16.7	19.5	20.8	17.2
	Max of WS	13.3	11.4	11.7	8.6	9.7	9.2	12.2	11.7	11.4	12.8	8.6	12.2	13.3
	Min of WS	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Average of WS	4.9	4.9	4.9	4.2	3.7	3.7	3.7	5.0	4.0	5.2	4.5	4.4	4.4
	Max of MixH	2233	2646	2623	2812	2336	1971	1995	2356	2690	2399	2286	2679	2812
	Min of MixH	150	136	112	206	136	112	136	187	187	136	200	200	112
	Average of MixH	968	984	981	876	752	735	731	985	811	1019	915	895	893
E	Max of Temp	34.0	31.0	32.0	26.0	20.0	16.0	17.0	16.0	20.0	26.0	29.0	29.0	34.0
	Min of Temp	12.0	13.0	13.0	5.0	2.0	0.0	1.0	0.0	4.0	6.0	9.0	12.0	0.0
	Average of Temp	22.2	20.8	19.6	15.8	10.9	8.1	8.3	7.7	10.7	15.2	16.7	19.7	14.5

	Max of WS	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
	Min of WS	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
	Average of WS	3.7	3.8	3.9	3.8	3.8	3.6	3.6	3.5	3.6	3.8	3.7	3.8	3.7
	Max of MixH	1207	1066	1024	1076	973	921	987	926	893	1015	945	973	1207
	Min of MixH	440	412	313	374	337	299	309	337	365	365	337	388	299
	Average of MixH	693	713	709	708	701	670	655	626	651	694	685	718	687
F	Max of Temp	34.0	32.0	31.0	26.0	23.0	16.0	17.0	16.0	20.0	27.0	27.0	27.0	34.0
	Min of Temp	10.0	16.0	13.0	5.0	-2.0	-3.0	-1.0	-1.0	1.0	3.0	6.0	8.0	-3.0
	Average of Temp	22.2	22.3	20.8	13.9	8.7	6.1	6.7	6.2	10.6	15.2	17.2	18.2	12.0
	Max of WS	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	Min of WS	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Average of WS	1.9	1.7	1.9	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.7	1.8	1.8
	Max of MixH	622	664	767	622	688	613	660	622	697	674	547	622	767
	Min of MixH	200	112	112	112	112	112	112	173	112	112	112	182	112
	Average of MixH	388	358	406	347	344	341	350	367	366	386	342	359	359

APPENDIX A

PROCEDURES FOR SUBSTITUTING VALUES FOR MISSING METEOROLOGICAL DATA

INTRODUCTION

The Meteorological data required to compile input meteorological data files for dispersion modelling consist of

1. hourly surface observations
2. Morning and afternoon Vertical Temperature profiles (Radio sonde data).

Data acquired from the National Climatic Centre (NCC) and Regional Meteorological Services occasionally have periods of missing data. If the lengths of these periods are not excessive, reasonable values may be substituted without seriously degrading the quality of the data set.

As with on-site data, a data set which is less than 90% complete should not be used for air quality modelling purposes. Substitutions for missing data should only be made to complete the data set for modelling applications, and should not be used to achieve the 90% criterion.

The procedure for providing substitute values for missing data has two parts.

The first part is an objective procedure, which applies to single isolated hours with missing surface data and single isolated days of missing radio sonde data. Substitutions for those data are accomplished using procedures described below.

The second part is a subjective procedure which applies to longer sequences of missing data. Substitutions for those data require judgement, and should be accomplished by an air quality meteorologist based on scientific knowledge and professional experience. The procedures, described in detail below, are generally consistent with procedures used historically by US EPA.

STEP 1: THE OBJECTIVE PROCEDURE

SURFACE DATA

Hourly surface weather observations of temperature, wind direction, and wind speed, surface pressure and dew point temperature as well as 3 hourly cloud cover are required. Substitutions for missing surface data are made as follows:

Note :Total cloud cover should be used if opaque cloud cover is not available.

Data from the preceding hour should be used, provided that values from both the preceding and the succeeding hours are present (i.e., only a single hour is missing).

If two or more consecutive hours of data are missing, then the subjective procedure outlined below should be used.

If **temperature** is missing, then a value interpolated between the preceding hour and the succeeding valid hour should be substituted. If two or more consecutive hours of temperatures are missing, then the subjective procedure outlined below should be followed.

If a single hour of **wind direction and speed** is missing then the average direction and average speed from the four hours surrounding that hour should be substituted. Except for the first two and last two hours of the year, this average should be derived from the two **hours before and two hours after** the hour of the missing value. In the interest of simplicity, the average wind direction is obtained from the mean unit vector wind. If two or more consecutive hours of either wind direction or wind speed are missing, then the subjective procedure outlined below should be used.

RADIOSONDE DATA

Both a morning Radio sonde and an afternoon Radio sonde are required for each day of the year. Objective substitutions for missing Radio sonde data are made as follows:

If a single afternoon Radio sonde is missing, the value interpolated between the preceding and successive afternoon Radio sonde are used. Similarly, if a single Radio sonde is missing, the value interpolated between the preceding and succeeding Radiosonde should be used.

If two or more consecutive afternoon Radio sondes or two or more consecutive morning Radio sondes are missing, then the subjective procedure outlined below should be used.

STEP 2: THE SUBJECTIVE PROCEDURE

When the objective procedure does not provide a substitute value for some parameters, the data are reviewed by an air quality meteorologist. If technically

appropriate, a substitute value should be identified, based on the following procedure, using sound scientific knowledge and professional experience.

Surface Data

The following procedures are recommended for substituting values for missing surface data when the objective procedure described above is not appropriate.

Sound meteorological judgment and professional experience is required to developing appropriate substitute data values.

If temperature is missing, then the temperature values on either side of the data void are reviewed. Often an interpolation can be made for up to a few hours. However, these values may need to be adjusted to be consistent with the other meteorological factors. Near times of daily maxima or minima, one can adequately simulate daily maxima or minima for other days of similar meteorological conditions.

If a wind direction value is missing, the data values a few hours (perhaps five or so) on either side of the data void are reviewed. It is important to maintain not only consistency of wind direction, but also some consistency of wind variability. Otherwise, a few hours with the wind from the same direction will result, which can produce unreasonably high estimates of 4-hour, 8-hour and 24-hour average concentrations.

If wind speed is missing, the five values both before and after the data void are reviewed. Any obvious patterns of wind speed should be

continued and adjusted, if needed, to make the substitute data realistic from an air quality modelling viewpoint.

RADIO SONDE DATA

The following procedure is recommended for substituting values for missing morning or afternoon Radio sonde data, when the objective procedure described above is not appropriate. The procedure with Radio sonde data, as with surface data, requires careful meteorological judgment and professional experience in order to derive appropriate substitute values.

As a general rule, a sequence of missing Radio sonde data of five days or more should not be filled in. Also, any missing sequence of four days which does not have adequate continuity (at least five full days on either side of the data void) should also not be filled in.

DISCLAIMER

Compilation of input meteorological data file for AUSPLUME was done under the supervision of qualified and experienced meteorologists. Although all due care has been taken, we cannot give any warranty, nor accept any liability (except that required by law) in relation to the information given, its completeness or its applicability to a particular problem. These data and other material are supplied on the condition that you agree to indemnify us and hold us harmless from and against all liability, losses, claims, proceedings, damages, costs and expenses, directly or indirectly relating to, or arising from the use of or reliance on the data and material which we have supplied.

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APPENDIX 5: ORIGINAL DEVELOPMENT APPROVAL

Notice of Modification

Section 96(2) of the *Environmental Planning & Assessment Act 1979*

As delegate of the Minister for Planning, I modify the development consent DA 53/97 referred to in Schedule 1, subject to the conditions set out in Schedule 2, 3 and 4.

Chris Wilson
Executive Director
Major Project Assessment

Sydney 27 FEBRUARY 2009

The consent is modified by:

1. Replacing Schedule 1 and Schedule 2 with the following:

SCHEDULE 1

Development Application:	DA 53/97.
Applicant:	Baiada Poultry Pty Ltd.
Consent Authority:	Minister for Planning.
Land:	Lot 100 DP 1094741, Oakburn, in the Tamworth local government area.
Development:	A poultry processing complex to be developed in two stages.

DEFINITIONS

AEMR	Annual Environmental Management Report
Applicant	Baiada Poultry Pty Ltd, or its successor
BCA	Building Code of Australia
Council	Tamworth Regional Council
DA	Development Application DA 53/97
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
DECC	Department of Environment and Climate Change
Department	Department of Planning
Director-General	Director-General of the Department (or delegate)
DWE	Department of Water and Energy
EIS	Environmental Impact Statement
SEE	Statement of Environmental Effects titled *Statement of Environmental Effects, Section 96(2) Modification Application, Oakburn Processing Complex, Lot 100 in DP 1097471, Oxley Highway, Tamworth NSW*, volumes 1 and 2, dated 28 May 2008 and additional information dated 29 September 2008 and 13 November 2008.
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning & Assessment Regulation 2000*
EPL	Environmental Protection Licence
Evening	The period from 6pm to 10pm
Minister	Minister for Planning
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
Development	A chicken processing facility (with an input capacity of 1 million birds per week), a deboning plant, processed product plant, protein recovery plant and associated infrastructure
Reasonable and Feasible	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements. Feasible relates to engineering considerations and what is practical to build
RTA	Roads and Traffic Authority
Applicant	Baiada Poultry Pty Ltd
Site	Land to which the development application applies
Stage 1	Construction and operation of the Protein Recovery Plant
Stage 2	Construction and operation of the Poultry Processing Facility including a processed products plant, deboning plant and processing plant with a kill capacity of 1 million birds per week.

SCHEDULE 2

ADMINISTRATIVE CONDITIONS

Obligation to Minimise Harm to the Environment

1) The Applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or decommissioning of the development.

Terms of Approval

2) The development shall be carried out generally in accordance with:
   a) Development Application 53/97 and supporting Environmental Impact Statement titled "*An Environmental Impact Statement for a Poultry Processing Complex at 'Oakburn', Oxley Highway Tamworth NSW"* prepared by Ellis Environmental Services Pty Ltd. dated September 1997.
   b) DA 53/97 Mod 1, dated 22/02/1999;
   c) DA 53/97 Mod 2, dated13 August 2001;
   d) DA 53/97 Mod 3 and supporting Statement of Environmental Effects titled "*Statement of Environmental Effects, Section 96(2) Modification Application, Oakburn Processing Complex, Lot 100 in DP 1097471, Oxley Highway, Tamworth NSW";*
   e) Site plan (see Appendix A); and
   f) The conditions of this consent.

3) If there is any inconsistency between the above, then the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this consent shall prevail to the extent of any inconsistency.

4) Approval for stage 2 of the development shall lapse if the Applicant does not commence construction of stage 2 within 5 years of the date of DA 53/97 Mod 3.

5) The Applicant shall comply with any reasonable requirement/s of the Director-General arising from the Department's assessment of:
   a) any reports, plans, strategies, programs or correspondence that are submitted in accordance with this approval; and
   b) the implementation of any actions or measures contained in these reports, plans, strategies, programs or correspondence.

Limits on Approval

6) The Applicant shall ensure the development does not exceed a maximum processing volume of:
   a) 120 tonnes of material per day in the protein recovery plant; and
   b) 1 million birds per week in the processing plant (Stage 2).

Management Plans/Monitoring Programs

7) With the approval of the Director-General, the Applicant may submit any management plan or monitoring program required by this approval on a progressive basis.

Structural Adequacy

8) The Applicant shall ensure that any new buildings and structures on the site are constructed in accordance with the relevant requirements of the BCA.

   Notes:
   - *Under Part 4A of the EP&A Act, the Applicant is required to obtain construction and occupation certificates for the proposed building works.*
   - *Part 8 of the EP&A Regulation sets out the requirements for the certification of the development.*

Protection of Public Infrastructure

9) The Applicant shall:
   a) prepare a dilapidation report of the public infrastructure in the vicinity of the site (including roads, gutters, footpaths, etc) in consultation with Council and the RTA to the satisfaction of the Director-General, prior to the commencement of construction of Stage 2;
   b) repair, or pay the full costs associated with repairing, any public infrastructure that is damaged by the development; and
   c) relocate, or pay the full costs associated with relocating, any public infrastructure that needs to be relocated as a result of the development.

10) Prior to the issue of a construction certificate for any utility works, the Applicant shall obtain the relevant approvals from service providers, including Council.

Operation of Plant and Equipment

11) The Applicant shall ensure that all plant and equipment used on the site is maintained and operated in a proper and efficient manner, and in accordance with relevant Australian Standards.

Compliance

12) Prior to the commencement of construction of Stage 2, and again prior to the commencement of operations of Stage 2, or within such period otherwise agreed by the Director-General, the Applicant must certify in writing to the satisfaction of the Director-General, that it has complied with all conditions of this consent applicable prior to that event.

13) Notwithstanding condition 12) of this consent, the Director-General may require an update on compliance with all, or any part, of the conditions of this consent. Any such update shall meet the reasonable requirements of the Director-General and be submitted within a period determined by the Director-General.

SCHEDULE 3
SPECIFIC ENVIRONMENTAL CONDITIONS

SOIL AND WATER

Discharge Limits

14) Except as may be expressly provided in an Environmental Protection Licence for the development, the Applicant shall comply with Section 120 of the *Protection of the Environment Operations Act 1997*.

15) All wastewater from staff facilities shall be discharged direct to the sewerage system to the satisfaction of Council.

Bunding

16) All chemicals, fuels, oils and wastewater shall be stored in appropriately bunded areas, with impervious flooring and sufficient capacity to contain 110% of the largest container stored within the bund. The bund(s) shall be designed and installed in accordance with the:
    a) requirements of all relevant Australian Standards; and
    b) DECC's *Storing and Handling Liquids: Environmental Protection – Participants Manual*.

Erosion and Sediment Controls

17) The Applicant shall implement Erosion and Sediment Controls for the development which must:
    a) be consistent with the requirements of Landcom's (2004) *Managing Urban Stormwater: Soils and Construction* manual;
    b) manage activities that could cause soil erosion and generate sediment;
    c) minimise soil erosion and the potential for the transport of sediment to downstream waters;
    d) be maintained throughout construction; and
    e) be upgraded if required by the Director-General.

Stormwater Management Plan

18) The Applicant shall prepare and implement a Stormwater Management Plan for the development to the satisfaction of the Director-General. The plan must:
    a) be prepared in consultation with Council and DWE, and be approved by the Director-General prior to the commencement of construction of Stage 2;
    b) be prepared in accordance with DECC's *Managing Urban Stormwater: Council Handbook*; and
    c) include details of:
        - pre and post development flows;
        - water quality;
        - the existing and proposed stormwater detention, treatment and control infrastructure; and
        - measures to maintain this infrastructure and the proposed monitoring of stormwater quantity and quality during operation of the development.

Wastewater Management

19) The Applicant shall prepare and implement a Wastewater Management Plan for the development to the satisfaction of the Director-General. The plan must:
    a) be prepared in consultation with Council and the DECC, and be approved by the Director-General within 3 months of the date of approval of DA 53/97 Mod 3;
    b) be updated and approved by the Director-General, prior to the commencement of construction of Stage 2;
    c) include the final design of the trade waste facility (for stage 2);
    d) characterise the quantity and quality of wastewater produced by the development;
    e) detail the measures to treat and dispose of wastewater;
    f) identify the criteria/limits for the disposal of treated wastewater;
    g) confirm Council are able to accept this wastewater; and
    h) include:
        - detailed plans of pipelines, pumps and other infrastructure and connections to Council's system, to be upgraded during Stage 2, ensuring the infrastructure is designed to the relevant Australian Standards and alarms and monitoring systems would detect any leaks or failures;
        - details of the additional odour capture, treatment and mitigation required as a result of the wastewater treatment plant (for stage 2);
        - a program to monitor and report the quantity and quality of treated wastewater;
        - a maintenance program and contingencies should a breakdown occur; and
        - a protocol for the investigation, notification and mitigation of identified exceedances of the criteria/limits for the disposal of treated wastewater.

WASTE

20) During the construction and operation of the development the Applicant shall implement all reasonable and feasible measures to minimise the waste generated by the development.

21) The Applicant shall ensure that all waste generated on the site is classified in accordance with the DECC's *Waste Classification Guidelines: Part 1 Classifying Waste* and disposed of to a facility that may lawfully accept the waste, or managed in accordance with resource recovery exemptions as approved by the DECC.

Waste Management Plan

22) The Applicant shall update the Solid Waste Management Plan for the site in consultation with DECC and to the satisfaction of the Director-General. This plan must:
    a) be submitted to the Director-General for approval within 3 months of the approval of DA 53/97 MOD 3;
    b) be revised and submitted to the Director-General for approval prior to the commencement of operation of Stage 2;
    c) characterise (or provide a program to characterise) all waste imported, exported and re-used on site according to the current waste classification guidelines, and include procedures for classifying each of the waste materials;
    d) include details of the quantities and destinations of all waste materials;
    e) describe the measures in place to minimise and manage waste, including any existing and proposed land application;
    f) describe the options available to further reduce and reuse waste;
    g) confirm that all waste materials are sent to sites that can lawfully accept the waste; and
    h) include a:
        - a program to monitor and report the quantity and quality of waste and any impacts associated with land application of the waste; and
        - a protocol for the investigation, notification and mitigation of identified impacts or exceedances of the criteria/limits for the disposal of treated waste.

AIR

23) The Applicant shall carry out all reasonable and feasible measures to minimise dust generated by the development.

24) During construction, the Applicant shall ensure that:
    a) all trucks entering or leaving the site with loads have their loads covered;
    b) trucks associated with the development do not track dirt onto the public road network; and
    c) public roads used by these trucks are kept clean.

Odour

25) Except as may be expressly provided in an EPL for the development, the Applicant shall ensure that the development complies with Section 129 of the *Protection of the Environment Operations Act, 1997*.

    Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the Applicant must not cause or permit the emission of any offensive odour from the site, but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

26) The Applicant shall prepare and implement an Odour Management Plan, in consultation with the DECC, outlining measures to minimise odour impacts associated with the operation. The Plan must:
    a) be approved by the Director-General with 3 months of the approval of DA 53/97 Mod 3;
    b) be revised and approved by the Director-General prior to commencement of operation of Stage 2;
    c) identify all point and diffuse sources of odour associated with the operation;
    d) confirm (with engineering details where relevant) that the odour control equipment has the design capacity to treat odour from all captured point sources (for stage 2);
    e) include best practice odour mitigation and management practices to be implemented to ensure offensive odour impacts do not occur off-site (for stage 2);
    f) include a program to monitor the effectiveness of the odour mitigation and management practices, associated with the operation of the development;
    g) detail the proposed contingency measures should odour impacts occur;
    h) detail the proposed maintenance procedures to ensure potential odour impacts are managed; and
    i) detail the odour complaints system to be implemented to record, investigate, report and action any odour complaints received.

NOISE

Construction and Operation Hours

27) The Applicant shall comply with the construction and operation hours in Table 1.

Table 1: Construction Hours

Activity	Day	Time
Construction	Monday – Friday	7am to 6pm
	Saturday	8am to 1pm
	Sunday and Public Holidays	Nil
Operation	All Days	Any time

Notes:

- *Construction activities may be conducted outside the hours in Table 1 provided that the activities are not audible at any residence beyond the boundary of the site; and*
- *Emergency work to avoid the loss of life, property and/or prevent environmental harm may be undertaken outside the hours in Table 1.*

Noise Limits

28) The Applicant shall ensure that noise generated by the development does not exceed the noise limits presented in Table 2.

Table 2: Construction and Operation Noise Limits (dB(A))

Location	**Construction**	**Operation**			
		Day	Evening	Night	
	$L_{Aeq(15\ min)}$ dB(A)	$L_{Aeq(15\ min)}$ dB(A)	$L_{Aeq(15\ min)}$ dB(A)	$L_{Aeq(15\ min)}$ dB(A)	$L_{A1(1\ min)}$ dB(A)
Girrawheen	40	35	35	35	45
Abbeylands	42	37	36	35	45
The Billabong	48	43	39	37	47
Airport South	50	45	41	39	49

Note: Noise generated by the project is to be measured in accordance with the relevant requirements of the NSW Industrial Noise Policy.

Noise Monitoring Program

29) The Applicant shall prepare and implement a Noise Validation Monitoring Program for the development to the satisfaction of the Director-General. The program must:
    a) be prepared in consultation with DECC, and be approved by the Director-General prior to the commencement of operations of Stage 2;
    b) provide for monitoring and reporting of noise from the facility;
    c) validate the monitoring data against the development noise limits; and
    d) detail the contingencies that would be implemented should complaints or exceedances occur.

TRANSPORT

Road Upgrades

30) The Applicant shall ensure the following roadworks are completed prior to the commencement of construction of Stage 2, to the satisfaction of the RTA:
    a) the existing modified type B right-turn bay must be upgraded to an AUSTROAD CHR right turn bay with adequate storage for B-Doubles;
    b) the highway must be widened to provide an AUSTROAD AUL left turn deceleration lane. The deceleration lane (including taper) must be at least 150m long; and
    c) the existing access seal needs to be further extended into the property to prevent the fouling of the highways pavement.

Vehicle Queuing, Parking and Transport

31) The Applicant shall ensure that:
    a) the internal road network and parking on site complies with Australian Standards *AS 2890.1:2004 and AS 2890.2:2002*;

b) vehicular access to the site is constructed in accordance with the requirements of Council and the RTA;
c) all parking generated by the development is accommodated on site, and that no vehicles associated with the development shall park on the public road system at any stage;
d) the development does not result in any vehicles queuing on the public road network;
e) a travel demand management plan is prepared and implemented; and
f) suitable parking for bicycles and associated facilities including change rooms are provided at the facility,

to the satisfaction of the Director-General.

ABORIGINAL AND CULTURAL HERITAGE

32) In the event that Aboriginal objects are uncovered during the course of the development, then work in the immediate areas shall cease, the Director-General, the DECC and relevant Aboriginal Groups shall be notified and expert archaeological advice must be sought from an appropriately qualified professional. Works may only commence in this area with the written approval of the Director-General.

VISUAL

Lighting

33) The Applicant shall ensure that the lighting associated with the development:
a) *complies with the latest version of Australian Standard* AS 4282(INT) - Control of Obtrusive Effects of Outdoor Lighting*; and*
b) is mounted, screened and directed in such a manner that it does not create a nuisance to surrounding properties, the airport or the public road network.

Airport

34) The external materials and finishes of the buildings shall be non-reflective to the satisfaction of the Council, to avoid distraction to air crews.

35) All water and effluent storage tanks, dams and solid waste receptacles must be constructed and covered so as not to present an attraction to birds.

Landscape

36) The Applicant shall prepare and implement a revised Landscape Management Plan for the development to the satisfaction of the Director-General. The plan must:
a) be prepared in consultation with Council and be approved by the Director-General prior to the commencement of construction of Stage 2;
b) specify the number and species of trees to be planted along key boundaries, ensuring the plan uses endemic species only; and
c) provide for the maintenance of landscaping on the site.

37) Any proposed landscaping, fencing or signage is not to impede the desired sight lines of all road users including pedestrians and cyclists.

Advertising Structures

38) The Applicant shall not install any signage, advertising or fencing, without the written approval of the Director-General. In seeking this approval the Applicant shall:
a) submit detailed plans of the proposed signage, advertising or fencing, which have been prepared in consultation with Council; and
b) demonstrate that the proposed signage, advertising or fencing is consistent with the relevant requirements in the DCP.

HAZARDS

39) During the detailed design of the development the Applicant must consider the potential hazards on site in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and the Department's publication "*Applying SEPP 33*". The Applicant must prepare hazards report to be approved by the Director-General prior to the commencement of operation of Stage 2. The report must include:
a) details of the potential hazards on site;
b) details of the ammonia refrigeration plant; and
c) the measures undertaken to minimise and manage the potential hazards of the facility.

40) The Applicant must update the Emergency Plan for the development, to the satisfaction of the Director-General prior to the commencement of operations of stage 2. The plan must:
a) identify the likely impact of breakdown and emergency scenarios;

b) describe the controls and procedures that would be implemented to prevent emergencies, including fire controls and maintenance schedules;
c) describe the management measures that would be implemented should an emergency occur.

41) The gas pipeline to the complex shall be installed with an excess flow valve at either the source of the gas, or at the property boundary to provide for the shutdown of the line due to excess flow as a result of a break in the line or other cause.

42) The Applicant must ensure fire trucks access around the development is not restricted, to minimise the risk from bushfire.

ANIMAL WELFARE

43) The Applicant must ensure the development is designed and operated in accordance with the latest version of the:
a) *Model Code of Practice for the Welfare of Animals: Livestock at Slaughtering Establishments*; and
b) *National Animal Welfare Standards at Livestock Processing Establishments Preparing Meat for Human Consumption, 2005: Standards & Work Manual*.

WATER AND ENERGY EFFICIENCY

44) The Applicant shall ensure the development is energy and water efficient, in accordance with industry best practice, to the satisfaction of the Director-General.

45) The Applicant shall prepare and implement a Water and Energy Efficiency Program for the development, to the satisfaction of the Director-General. The program must:
a) be submitted to the Director-General for approval within 6 months of the approval of DA 53/97 MOD 3;
b) compare the proposed energy and water usage ratio of the development to other existing chicken processing facilities, and set benchmarks for industry best practice;
c) investigate energy and water efficiency measures available;
d) describe the measures that would be implemented onsite, demonstrating the use of best available technology;
e) include a program to monitor and report on the efficiency of the development, ensuring the development would continue to operate at industry best practice overtime.

SCHEDULE 4
ENVIRONMENTAL MANAGEMENT AND MONITORING

ENVIRONMENTAL MANAGEMENT STRATEGY

46) The Applicant shall prepare and implement an Environmental Management Strategy for the development, to the satisfaction of the Director-General. The Strategy must:
    a) be approved by the Director-General prior to construction of Stage 2;
    b) be updated and approved by the Director-General prior to operation of Stage 2, and every 3 years thereafter, unless otherwise agreed by the Director-General;
    c) provide the strategic context for environmental management of the development;
    d) identify the statutory and other obligations that apply to the development;
    e) describe in general how the environmental performance of the development would be monitored and managed;
    f) describe the procedures that would be implemented to:
        - keep the local community and relevant agencies informed about the, construction/operation and environmental performance of the development;
        - receive, handle, respond to, and record any complaints that are received;
        - resolve any disputes that may arise during the course of the development;
        - respond to any non-compliance; and
        - respond to emergencies;
    g) describe the role, responsibility, authority, and accountability of all the key personnel involved in environmental management of the development; and
    h) incorporate the various studies, plans and programs required under this approval.

ENVIRONMENTAL MONITORING

47) The Applicant must ensure all facilities at the site, including effluent pipelines and drains, stormwater drains, pumps, sumps and bund walls, are inspected on a weekly basis and after any significant rainfall event. Maintenance work is to be carried out immediately if any facility in not operating to its design capacity.

ENVIRONMENTAL REPORTING

Incident Reporting

48) As soon as practicable, and with the 24 hours following detection of an exceedance of the limits/performance criteria in this approval or the occurrence of an incident that causes (or may cause) harm to the environment, the Applicant shall notify the Department and other relevant agencies of the exceedance/incident.

49) Within 6 days of notifying the Department and other relevant agencies of an exceedance/incident, the Applicant shall provide the Department and these agencies with a written report that:
    a) describe the date, time, and nature of the exceedance/incident;
    b) identify the cause (or likely cause) of the exceedance/incident;
    c) describe what action has been taken to date; and
    d) describe the proposed measures to address the exceedance/incident.

Annual Reporting

50) The Applicant shall submit an Annual Environmental Monitoring Report, every 12 months, to the Director-General and make copies available to the DECC, DWE and Council. This report must:
    a) be prepared by a suitably qualified expert approved by the Director-General;
    b) be prepared to the satisfaction of the Director-General;
    c) identify the standards and performance measures that apply to the development;
    d) include a summary of the complaints received during the year, and compare this to the complaints received in the previous years;
    e) include a summary of the monitoring results for the development during the past year;
    f) include an analysis of these monitoring results against the relevant:
        i. impact assessment criteria/limits specified in this consent and the EPL;
        ii. monitoring results from previous years; and
        iii. predictions in the SEE supporting DA 53/97 Mod 3;
    g) identify any trends in the monitoring results over the life of the development;
    h) identify any non-compliance during the previous year;
    i) describe what actions were, or are being, taken to ensure compliance and improve the environmental performance of the facility; and
    j) must include a copy of:
        i. the Wastewater Monitoring Report;
        ii. the Solid Waste Monitoring Report;
        iii. the Odour Monitoring Report;
        iv. the Water and Energy Efficiency Monitoring Report; and

v. the DECC EPL Annual Return.

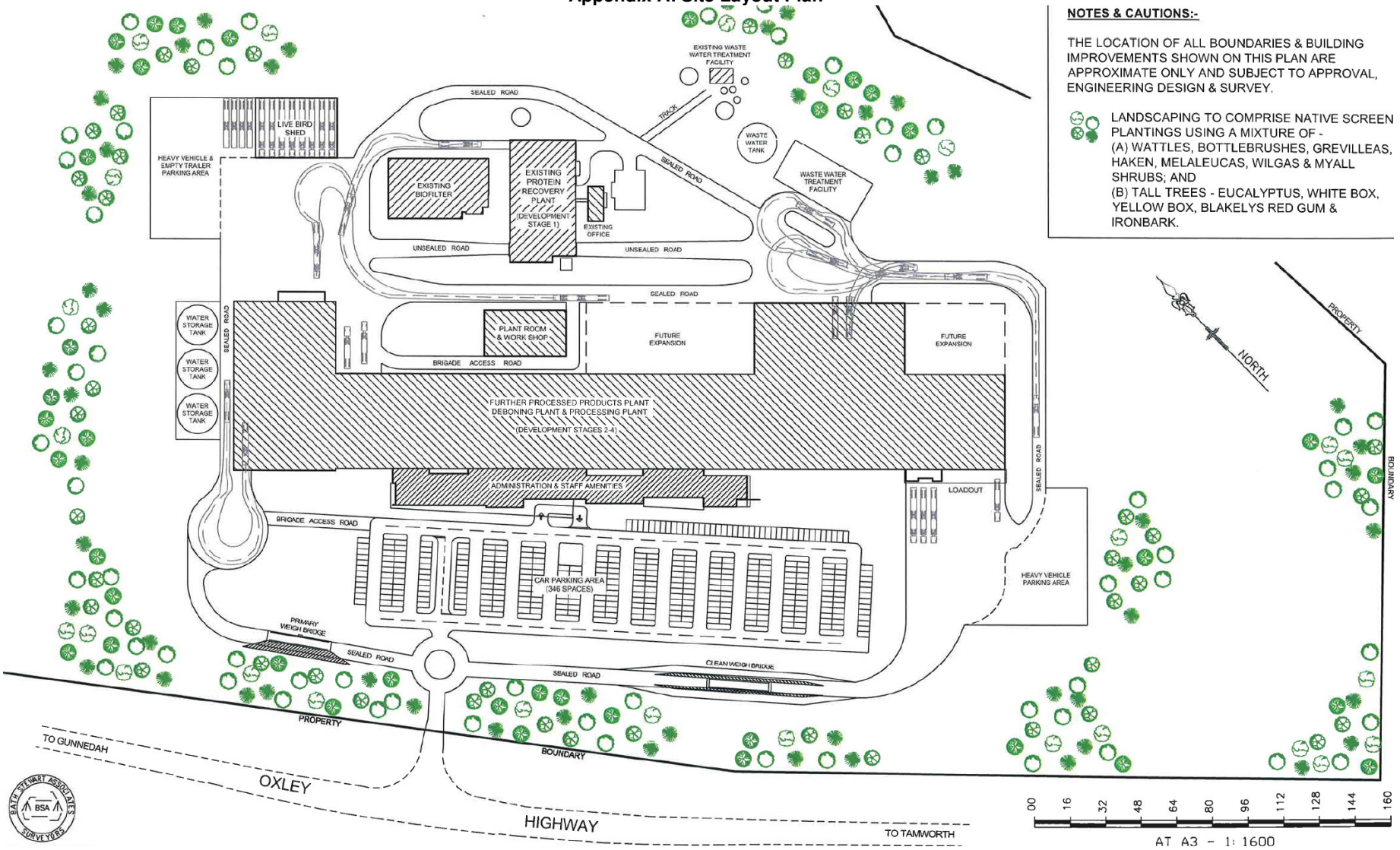
INDEPENDENT ENVIRONMENTAL AUDIT

51) Within 12 months of the approval of DA 53/97 Mod 3, and every 3 years thereafter, unless the Director-General directs otherwise, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
    a) be conducted by a suitably qualified, experienced, and independent team of experts, including an odour expert, whose appointment has been endorsed by the Director-General;
    b) be undertaken in consultation with DECC, DWE and Council;
    c) assess whether the development is being carried out in accordance with industry best practice;
    d) assess the environmental performance of the development, and its effects on the surrounding environment and sensitive receivers;
    e) assess whether the development is complying with the relevant standards, performance measures, and statutory requirements;
    f) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,
    g) recommend measures or actions to improve the environmental performance of the development, and/or any strategy/plan/program required under this approval.

52) Within 6 weeks of completing this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General with a response to any recommendations contained in the audit report.

53) Within 3 months of submitting an audit report to the Director-General, the Applicant shall review and if necessary revise the strategy/plans/programs required under this approval to the satisfaction of the Director-General.

Appendix A: Site Layout Plan



APPENDIX 6: EXISTING ENVIRONMENTAL PROTECTION LICENCE

Environment Protection Licence

Licence - 7566

Licence Details	
Number:	7566
Anniversary Date:	19-March

Licensee

BAIADA POULTRY PTY LIMITED

PO BOX 21

PENDLE HILL NSW 2145

Premises

OAKBURN PROTEIN RECOVERY PLANT

1154 OXLEY HIGHWAY

TAMWORTH NSW 2340

Scheduled Activity

Livestock Processing Activities

Fee Based Activity	Scale
Rendering or fat extraction	> 4000 T produced

Region

North - Armidale

Ground Floor, NSW Govt Offices, 85 Faulkner Street
ARMIDALE NSW 2350

Phone: (02) 6773 7000

Fax: (02) 6772 2336

PO Box 494 ARMIDALE

NSW 2350

Environment Protection Licence

Licence - 7566

Environment Protection Licence

Licence - 7566

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

BAIADA POULTRY PTY LIMITED
PO BOX 21
PENDLE HILL NSW 2145

subject to the conditions which follow.

Environment Protection Licence

Licence - 7566

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Livestock Processing Activities	Rendering or fat extraction	> 4000 T produced

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
OAKBURN PROTEIN RECOVERY PLANT
1154 OXLEY HIGHWAY
TAMWORTH
NSW 2340
LOT 100 DP 1097471

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of

monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1		Discharge to air	Large Biofilter marked as 'concrete walled biofilter' on map titled "Topographical Site Plan Lot 1 in DP 878642" received by the EPA from Baiada on the 28/04/06.

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Noise limits

L2.1 Noise from the premises must not exceed:
a) an LA10 (15 minute) noise emission criterion of 5 dB(A) above background level LA (90) dB(A) (7am to 6pm) Monday to Friday and 7am to 1pm Saturday ; and
b) an LA10 (15 minute) noise emission criterion of 5 dB(A) above background level LA (90) dB(A) during the evening (6pm to 10pm) Monday to Friday; and
c) at all other times, an LA10 (15 minutes) noise emission criterion of 5 dB(A) above background level LA (90) dB(A),
except as expressly provided by this licence.

L2.2 Noise from the premises is to be measured or computed at within one metre of the boundary of any residential premises or any other noise sensitive area to determine compliance with condition L2.1. 5dB(A) must be added to the measured level if the noise is substantially tonal or impulsive in character.

L3 Potentially offensive odour

L3.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating Conditions

Environment Protection Licence

Licence - 7566

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Recording of pollution complaints

M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M2.2 The record must include details of the following:

a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M3 Telephone complaints line

M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after:
a) the date of the issue of this licence or
b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
a) a Statement of Compliance; and
b) a Monitoring and Complaints Summary.
At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R1.8 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written

report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

7 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Environment Protection Licence

Licence - 7566

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 7566

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

Licence - 7566

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr David Dutaillis

Environment Protection Authority

(By Delegation)

Date of this edition: 06-December-2000

Environment Protection Licence

Licence - 7566

End Notes

1	Licence varied by notice 1009246, issued on 02-Jul-2001, which came into effect on 27-Jul-2001.
2	Licence varied by notice 1015846, issued on 31-Mar-2003, which came into effect on 25-Apr-2003.
3	Licence varied by notice 1039415, issued on 30-Jul-2004, which came into effect on 24-Aug-2004.
4	Licence varied by add street number to premises address, issued on 03-May-2005, which came into effect on 03-May-2005.
5	Licence varied by notice 1058313, issued on 12-May-2006, which came into effect on 12-May-2006.
6	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
7	Licence varied by notice 1097682, issued on 11-Feb-2009, which came into effect on 11-Feb-2009.
8	Licence varied by notice 1119005, issued on 13-Sep-2010, which came into effect on 13-Sep-2010.
9	Licence varied by change to Scheduled Activity name, issued on 10-Feb-2011, which came into effect on 10-Feb-2011.
10	Licence varied by notice 1514583 issued on 17-Jun-2013

APPENDIX 7: REVERB ACOUSTICS NOISE IMPACT ASSESSMENT 2007

REVERB ACOUSTICS
Noise and Vibration Consultants

Noise Impact Assessment
Proposed Upgrade to
Oakburn Processing Complex
Oxley Highway
Tamworth NSW

March 2007

Prepared for Baiada (Tamworth) Pty Limited
Report No. 06-1004-R1

Building Acoustics – Council/DEC Submissions - Modelling - Compliance - Certification

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1 INTRODUCTION

Reverb Acoustics has been commissioned to conduct a noise impact assessment for a proposal to increase the approved capacity of Baiada's Oakburn Processing Complex (Stage 4 of DA53/97) in Tamworth, from 750 000 birds per week to 1 million birds per week.

The purpose of the assessment was to determine the noise impact, construction and operation of the complex would have on the surrounding rural environment and to ensure any noise control measures required for the complex are incorporated during the design stages. The assessment is to accompany and forms part of a Statement of Environmental Effects (SEE) required as part of a Section 96(2) Application to the Department of Planning (DoP).

2 TECHNICAL REFERENCE / DOCUMENTS

Beranek, L.L and Istvan, L.V. (1992). *Noise and Vibration Control Engineering.* John Wiley and Sons, Inc.

Bies, D.A. and Hansen, C.H. (1996). *Engineering Noise Control: Theory and Practice*. London, E & F.N. Spon.

Hassall, J.R. and Zaveri, K. (1988) *Brüel & Kjaer – Acoustic Noise Measurements.* Denmark, K. Larson and Son.

Harris, C.M. (ed) (1957). *Handbook of Noise Control.* New York, McGraw-Hill.

Peterson, A.P.G. (1980). *Handbook of Noise Measurement*. Massachusetts, Genrad Inc.

Sharland, I. (1998). *Woods Practical Guide to Noise Control.* England, Woods Acoustics

AS 1055.1.2.3-1997 *"Acoustics – Description and measurement of environmental noise".*

NSW Environment Protection Authority (2000). *Industrial Noise Policy*

NSW Environment Protection Authority (1999). *Environmental Criteria for Road Traffic Noise*

NSW Environment Protection Authority (1992). *Environmental Noise Control Manual*

NSW Roads and Traffic Authority (2001). *Environmental Noise Management Manual*

HK Clarke & Associates Pty Ltd (1997). *A Noise Impact Assessment for the Proposed Poultry Processing Plant on the Oxley Highway, Tamworth.*

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

3 DESCRIPTION OF THE PROPOSAL

Baiada (Tamworth) Pty Limited are required to submit a Section 96(2) Application to DoP in order to increase the approved capacity of Baiada's Oakburn Processing Plant (Stage 4 of DA53/97), Oxley Highway, Tamworth, from 750 000 birds per week to 1 million birds per week. We understand that Stages 1, 2 and 3 of the Oakburn Complex, as approved under DA53/97 are adequate to process the additional capacity.

The Baiada processing complex that currently operates in Tamworth city will be closed and relocated to the Oakburn site to operate in conjunction with the rendering plant at the site. Potential noise sources, which may impact nearby neighbours, will include initial construction activities involving earthworks to level and prepare the site followed by construction of new buildings and associated access roads, etc. Once operation of the complex begins, noise impacts from plant and machinery, trucks are expected. Other noise sources include general site noise such as truck refrigeration units, employee vehicle movements, delivery vehicles, mechanical equipment and other maintenance and landscaping machinery. Of these, only the processing plant, rendering plant, refrigeration plant and truck movements are expected at night. With the exception of visitors' vehicles, all vehicles and trucks will enter and leave the site via a private access road to link with Goddard's Lane.

The assessment includes measurement of the existing acoustic environment by Reverb Acoustics and others, to provide baseline data and enable establishment of noise assessment criteria. Noise impacts from produce and commodity trucks are assessed at typical residences along the transport route. Plans supplied by Bath Stewart Associates show the layout of the site and the location of nearby land uses

4 BACKGROUND NOISE SURVEY

Consideration must be given to the extent of the existing acoustic environment and whether such levels are appropriate for the land use of the receiver area. Nearest residential receivers are as follows:

1. Girrawheen: Old Winton Road, 1700m west of the site.
2. Abbeylands: Bowler's Lane, 1400m north of the site.
3. The Billabong: Wallamore Road, 1800m east of the site.
4. Various Residences: New Winton Road (south of airport), 2400m south of the site.

Copies of Reverb Acoustics Calibration Certificates, for all monitoring equipment, are contained in Appendix C, while certificates for HK Clarke's instrumentation can be obtained upon request.

Background noise level surveys were conducted by HK Clarke & Associates in December 2005 at Girrawheen and in August 2006 in the residential area south of the airport along New Winton Road. Further attended background noise levels measurements were also conducted by Reverb Acoustics in January 2007 at Abbeylands and The Billabong. Table 1 shows a summary of results, with high wind/rain periods excluded prior to analysis, including the Rating Background Level (RBL) which was calculated from Assessment Background Levels (ABL's), for the day, evening and night periods, according to the procedures described in the Department of Environment and Conservation's (DEC's) Industrial Noise Policy and as detailed in Australian Standard AS1055-1997, "Acoustics - Description and Measurement of Environmental Noise, Part 1 General Procedures".

Table 1: Summary of Noise Monitoring Results, dB(A)

Background L90			Ambient Leq		
Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am
Girrahween					
30	30	31	52	52	46
Abbeylands					
32	31	29	48	46	46
The Billabong					
38	34	32	57	54	47
New Winton Road (south of airport)					
40	36	34	58	54	45
62dB(A),Leq(15hr)		55dB(A),Leq(9hr)		20m from Oxley Highway	

As can be seen by the above results, very similar and low Rating Background Levels have been determined for the day, evening and night periods, which is common in rural areas with little or no industrial activity during the day and some noise from insects, frogs, etc, at night.

5 CRITERIA

5.1 Road Traffic Noise

The Roads and Traffic Authority (RTA) base their assessment criteria on those outlined by the DEC. The DEC's Environmental Criteria for Road Traffic Noise (ECRTN) contains a number of criteria applied to a variety of road categories (freeway, collector and local roads) and situations (new, upgraded roads and new developments creating additional traffic on roads). Table 2 shows the relevant categories, taken from Table 1 of the ECRTN:

Table 2: - Extract from Table 1 of ECRTN Relevant Traffic Noise Criteria.

	Development Type	Day	Night	Where Criteria are Already Exceeded
7	Land use developments creating additional traffic on freeway/arterial roads	60 LAeq,15hr	55 LAeq,9hr	Designed not to lead to an increase in existing noise levels of more than 2dB
8	Land use developments creating additional traffic on collector roads	60 LAeq,1hr	55 LAeq,1hr	Designed not to lead to an increase in existing noise levels of more than 2dB
13	Land use developments creating additional traffic on local roads	55 LAeq,1hr	50 LAeq,1hr	Designed not to lead to an increase in existing noise levels of more than 2dB

Road categories are defined in the ECRTN as follows:

Freeway/arterial includes sub-arterial roads and refers to roads handling through traffic, with characteristically heavy and continuous traffic flows during peak periods. Through traffic is traffic passing through a locality bound for another locality.

Collector road refers to a road situated in a built up area that collects local traffic leaving a locality and connects to a sub-arterial road.

Local road-rural refers to a road situated in rural areas and handling local traffic with characteristically intermittent traffic flows.

Based on the above definitions, the Oxley Highway is classified as an arterial road.

5.2 Site Operation (Planning Noise Levels)

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the DEC's INP. However, local Councils may also apply the criteria for land use planning, compliance and complaints management. The DEC's INP specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other applies to protection of amenity of particular land uses based on the existing (Leq) noise level from industrial and commercial noise sources. Project Specific Noise Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver area is dominated by traffic on nearby roads and natural noise sources. Reference to Table 2.1 of the INP shows that the area is classified as rural, i.e. an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources). Industrial noise contributions are more than 6dB(A) below the recommended Leq, so the recommended Acceptable Noise Level (ANL) applies in this case, i.e. no ANL reduction required for industrial noise contributions. Table 2 below specifies the applicable base objectives for the proposed development.

Table 3 below specifies the applicable base objectives for the proposed development. In high traffic areas where the existing traffic noise levels are at least 10dB above the Acceptable Noise Level, the high traffic amenity criterion applies.

Table 3: - Base Noise Level Objectives

Period	Intrusiveness Criterion	Amenity Criterion
Girrawheen		
Day	35 (30+5)	50
Evening	35 (30+5)	45
Night	35 (30+5) #	40
Abbeylands		
Day	37 (32+5)	50
Evening	36 (31+5)	45
Night	35 (30+5) ##	40
The Billabong		
Day	43 (38+5)	50
Evening	39 (34+5)	45
Night	37 (32+5)	40
New Winton Road (south of airport)		
Day	45 (40+5)	50
Evening	41 (36+5)	45
Night	39 (34+5)	40
Receiver Type: Rural (See DEC's INP - Table 2.1)		

Page 5 of the DEC's *Application Notes-NSW Industrial Noise Policy* recommends that the intrusive noise level for evening be set no greater than the intrusive noise level for daytime and the intrusive noise level for night be set no greater than the intrusive noise level for evening.
Section B1.3.3 of the INP states that when the existing background level is below 30dB(A), the rating background noise level is set to 30dB(A).

Project specific noise levels, determined as the more stringent of the intrusiveness criterion and the amenity / high traffic criterion, are as follows:

Girrawheen

Day **35dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **35dB LAeq,15 Minute** 6pm to 10pm.
Night **35dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

Abbeylands

Day **37dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **36dB LAeq,15 Minute** 6pm to 10pm.
Night **35dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

The Billabong

Day **43dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **39dB LAeq,15 Minute** 6pm to 10pm.
Night **37dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

New Winton Road (south of airport)

Day **45dB LAeq,15 Minute** 7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening **41dB LAeq,15 Minute** 6pm to 10pm.
Night **39dB LAeq,15 Minute** 10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

5.3 Construction

Activities required to construct the complex include removal of topsoil, establishment of access roads, together with construction of buildings. Significant construction is expected to occur on the site for approximately 60 weeks from commencement of earthworks to commissioning. Criteria applied to the assessment were sourced from Section 171 of the DEC's ENCM which specifies noise limits at the worst affected receivers as shown in Table 4 below.

Table 4: Construction Noise Criteria

Construction Period	Level Restrictions	Recommended Criteria
Girrawheen		
Less than 4 weeks	Existing Background + 20 dB	50
Less than 26 weeks	Existing Background + 10 dB	40
More than 26 weeks	Existing Background + 5 dB	35
Abbeylands		
Less than 4 weeks	Existing Background + 20 dB	52
Less than 26 weeks	Existing Background + 10 dB	42
More than 26 weeks	Existing Background + 5 dB	37
The Billabong		
Less than 4 weeks	Existing Background + 20 dB	58
Less than 26 weeks	Existing Background + 10 dB	48
More than 26 weeks	Existing Background + 5 dB	43
Airport South		
Less than 4 weeks	Existing Background + 20 dB	60
Less than 26 weeks	Existing Background + 10 dB	50
More than 26 weeks	Existing Background + 5 dB	45

Construction criteria are only applicable for the hours 7am to 6pm Monday to Friday and 8am to 1pm Saturday. Construction activities outside these times are required to meet normal planning levels applied to operation of an industrial development, which are likely to be significantly lower at night (10.00pm to 7.00am) and marginally lower during the day on weekends and public holidays.

6 METHODOLOGY

6.1 Traffic

Due to the non-continuous nature of traffic flow to and from the site, predicted traffic noise on nearby roads for arriving and departing vehicles, was calculated using the US EPA's Intermittent Traffic Noise calculation method. This method was adopted because of the relatively infrequent traffic movements associated with the development.

Equation 1 outlines the mathematical formula used in calculating the Leq,T noise level at a typical residence at varying distances from the transport route, for a typical day and a theoretical peak day in any maximum construction and production year.

$$L_{eq},T = L_b + 10\log\left[1+\frac{ND}{T}\left(\frac{10^{(L\max - Lb)/10}-1}{2.3}-\frac{\left(L_{\max}-L_b\right)}{10}\right)\right] \quad \text{..... Equation 1}$$

Where L_b is background noise level, dB(A)
T is the time for each group of vehicles (min)
D is duration of noise of each vehicle (min)
L_{MAX} is vehicle noise, dB(A)
N is number of vehicle trips

Typical vehicle noise levels were measured during our site visit to the existing processing complex in Tamworth and compared to data for previously measured trucks and vehicles contained in our library of technical data to ensure realistic values were used, while background noise levels are those described in Section 4. The Lmax vehicle noise levels used in Equation 1 are the maximum predicted noise levels produced at the facade of the residence by vehicles entering/departing the site and travelling on public roads.

6.2 Site Noise

Future noise sources on the site cannot be measured at this time, consequently noise levels produced by plant and machinery to be used on the site were measured at the existing processing plant at Tamworth and/or sourced from manufacturers' data and/or our library of technical data, which has been accumulated from measurements taken in many similar situations on other sites for others. All noise level measurements were taken with a Svan 912AE Sound and Vibration Analyser. This instrument is Type 1 accuracy, in accordance with the requirements of AS1259, and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period.

A calibration signal was used to align the instrument train prior to measuring and checked at the conclusion. Difference in the two measurements was less than 0.5dB.

Each measurement was taken over a representative time period to include all aspects of machine/process operation, including additional start-up noise where applicable. Items of equipment, which produced a brief burst of noise, were measured for a similarly brief time period to ensure the results were not influenced by long periods of inactivity between operations.

Sound measurements were generally made around all sides of each machine, to enable the acoustic sound power (dB re 1pW) to be calculated. The sound power level of each item is then theoretically propagated to each receiver with allowances made for spherical spreading, directivity, molecular absorption, intervening topography or barriers and ground effects giving the received noise level at the receiver from that particular plant item.

Addition of the received Sound Pressure Level (SPL) for each of the individual operating sources gives the total SPL at each receiver, which is then compared to the relevant criterion. Where noise impacts above the criterion are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

The theoretical assessment is based on a worst-case scenario, where all fixed plant items are operating simultaneously in a location most exposed to the surrounding residences. In reality, most plant will be located behind structures, so actual received noise levels are expected to be less than the predictions shown in this report, or at worst equal to the predicted noise levels for only part of the time.

Calculations were performed with RTA Technology Environmental Noise Model computer software, which accepts information on ground type and topography, source and receiver locations, weather details and source sound power spectra. Ground contours were obtained from topographical maps. Results from the noise model are presented within this Report for various assessed situations.

6.2.1 Atmospheric Conditions

In the Tamworth region atmospheric conditions can exacerbate received noise levels for a percentage of the time. Temperature inversions may be expected in the area during the night and early morning at a frequency of greater than 30% of the time during winter and to a lesser degree in the warmer months. Inversion effects are strongest in the early hours of the morning but tend to weaken rapidly and may be considered to have completely dissipated by 9am or earlier. The ENM model was prepared for the following operating scenarios, as shown below:

1. Neutral atmospheric conditions for day/evening/night, i.e. no wind.
2. 3m/sec wind source to receiver (day).
3. F-class temperature inversion of 3°C/100m for night. (See Table C2, Appendix C-DEC's INP)

An F-class inversion, i.e. 3°C/100m, is typical in the Tamworth district and slightly weaker inversions are generally expected for coastal areas. Therefore, we have modelled this default inversion strength.

Wind in a particular direction causes increased received noise levels at downwind receivers, therefore the effect of noise enhancement due to wind has been considered, i.e. 3m/s source to receiver wind.

7 ANALYSIS AND DISCUSSION

7.1 Traffic Noise Assessment

Traffic due to the proposal travelling on the Oxley Highway is assessed separate to site noise and is subject to the criteria described in Section 5.1 of this Report. While noise emissions vary from one truck to another, an estimated average maximum truck sound power level of 108dB(A) has been used for a typical truck in fairly good condition operating at full power. Cars typically produce an average sound power of 92dB(A), however wide variations are noted particularly with smaller modern cars and larger V8 or diesel powered vehicles.

Table 5 shows daily traffic figures used for the assessment. It is assumed that more vehicles will visit the site between 7am and 10pm. Figures for the construction phase have been assumed based on typical construction projects of this size, while traffic movements for operation of the site are based on data supplied by Baiada (Tamworth) Pty Limited. One vehicle entering then leaving the site is considered to be 2 separate movements for the purposes of this assessment. We understand all trucks and cars will enter and leave the site via the internal access road off Goddard's Lane to link with the Oxley Highway, with the exception of visitors vehicles.

The number of employee/visitor vehicles visiting the site each day is 617, assuming a 30% car pool. It is further assumed the majority of vehicle movements will occur at the change of shift).

Live bird deliveries to the site are generally by B-doubles and articulated trucks with an expected 72 movements per day. Similarly, B-doubles and articulated trucks will dispatch stock, with an expected frequency of 29 movements per day (including the rendering plant).

Table 5: Vehicle Movements, Oxley Highway

Activity	Operation (typical/peak)		Construction (peak)	
Vehicle Type	**Cars**	**Trucks**	**Cars**	**Trucks**
Movements/day (7am-10pm)	385	65	80	30
Movements/night (10pm-7am)	232	36	-	-

Note: Hourly figures are taken at the busiest period, i.e. during change of shift, major concrete pour, etc.

Actual vehicle movements are expected to vary from day to day, particularly during construction. Peak construction traffic is expected to occur during large concrete pours or significant excavating or land filling, as concrete or dump trucks ferry material to or from the site. With care to ensure excavated and filled areas are balanced on the site, peak construction traffic will be limited to busy periods such as concrete pouring rather than the entire construction period. Construction traffic has been combined with the operational traffic at the complex.

Other vehicle movements during operation of the complex include private vehicles for occasional deliveries of maintenance, replacement equipment, etc. Approximately 385 vehicle movements and 65 truck movements are estimated during a typical day, with perhaps a further 25 vehicles (50 movements) and 5 trucks (10 movements) estimated during maintenance periods or other unusual circumstances. Worst case traffic noise generated by the proposal is therefore estimated to be 75 truck movements and 435 smaller vehicle movements per day.

The following Tables show results of traffic noise calculations, propagated to a theoretical facade at varying distances from Oxley Highway. Received noise is the combined noise impact from cars and trucks at the facade. Note that our calculations assume all vehicles will approach and depart the site from the same direction.

Table 6: Traffic Noise Calculations, dB(A) – 20 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	20					
Received Noise Level	42.0	51.6	34.6	47.6	41.5	50.6
Combined	**52.1**		**47.8**		**51.1**	
Total Received	**53.5**				**51.1**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	-		-		-	
Sum current & future	**62.6**				**56.5**	
Criteria	**64 (62 + 2)**				**57 (55 + 2)**	
Noise level increase	**0.6**				**1.5**	
Acceptable	**Yes**				**Yes**	

Table 7: Traffic Noise Calculations, dB(A) – 50 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	50					
Received Noise Level	38.0	47.6	30.7	43.7	37.5	46.7
Combined	**48.1**		**43.9**		**47.2**	
Total Received	**49.5**				**47.2**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	-		-		-	
Sum current & future	**59.5**				**53.2**	
Criteria	**61 (59 + 2)**				**54 (52 + 2)**	
Noise level increase	**0.5**				**1.2**	
Acceptable	**Yes**				**Yes**	

Table 8: Traffic Noise Calculations, dB(A) – 100 metres from Oxley Highway

Traffic and Receiver	Peak Operation (Day)		Peak Construction (Day)		Peak Operation (Night)	
Vehicle Type	Cars	Trucks	Cars	Trucks	Cars	Trucks
Movements per hour	435	75	80	30	232	36
Vehicle Sound Power	92	108	92	108	92	108
Distance to Receiver, m	100					
Received Noise Level	35.0	44.6	27.7	40.6	24.5	43.7
Combined	**45.1**		**40.9**		**44.2**	
Total Received	**46.5**				**44.2**	
Criterion	60dB(A),Leq (15hr)				55dB(A),Leq (9hr)	
Impact	-		-		-	
Sum current & future	**56.5**				**50.2**	
Criteria	**58 (56 + 2)**				**51 (49 + 2)**	
Noise level increase	**0.5**				**1.2**	
Acceptable	**Yes**				**Yes**	

The above calculations show that traffic noise levels as a result of the complex are compliant with the day and night criteria for any residence 20 metres or more either side of the transport route along the Oxley Highway, during both operation and construction periods. The DEC also requires that the combined impact from existing and future traffic must not raise the noise level by more than 2dB(A), where the criteria are already exceeded. As can be seen by the above results, traffic noise levels will only rise by 0.6dB(A) during the day and 1.5dB(A) at night. Traffic movements associated with operation and construction of the complex are therefore considered acceptable.

7.2 Construction / Operational Noise (Plant and Equipment)

The Acoustic Power Levels of plant and machinery proposed for the site during construction and operation, which were input into our computer model, are shown in Table 9. The Table gives the A-weighted sound power levels for each listed plant item, principally based on measurements during our site visit at the existing Out Street processing plant in Tamworth, and with reference to manufacturers' data or our library of technical data. Also shown is the number of plant operating at each location on the site. It should be noted that the new complex will have the following improvements incorporated into the design:

1. A tube style ice maker will not be utilised at the new complex.
2. There will be no truck staging area, i.e. no waiting.
3. All unloading and loading of live bird modules and loading of finished goods will occur within the building.
4. All refrigeration/air conditioning plant will be located in a shielded location between the existing rendering plant and the proposed complex.
5. B-double uncoupling will only occur on internal roadways.

Table 9: Operation Plant and Equipment – Day/Evening/Night

Machine/Process	Lw dB(A)	Plant Deck	Main Complex	Yard	Render Plant	Access Road
Mechanical Plant	**99**	1				
Render Plant	**97**				1	
Refrigerated Truck	**109**		2			
B-Double Truck	**108**		1	1	1	1
Boiler Burner Exhaust	**96**		1			
Fork Lift	**104**		2			

Additional plant and noise sources encountered on the site include compressors, split system air conditioners, pumps, small evaporate condensers, etc, all of which produce a sound power less than 90dB. Collectively, with up to 3 or 4 sources operating simultaneously on occasions, the sum could be as high as 95dB. This overall sum is at least 10dB below significant sources shown in Table 9, therefore they will not contribute or raise the sound level at nearby receivers.

Table 10 gives the A-weighted sound power levels for typical items of construction equipment. Also shown is the anticipated number of plant items operating on the site.

Table 10: Construction Plant and Equipment – Day

Plant Item	Lw dB(A)	No. Items
Excavator	106	2
Water Cart	113	1
Vibrating Roller	110	2
Bull Dozer	118	1
Render Plant	97	1
Concrete Agitator	107	2
Haul Truck	108	2
Framing Gun	107	2
Hammering	102	2

Tables 11 and 12 show predicted received noise levels at all nearby residential receivers under neutral and noise enhancing atmospheric conditions, during construction and operation of the complex, with no noise control in place.

Table 11: Received Noise Levels during Operation – No Noise Control

	Received Noise Levels, dB(A),Leq		
Residential Receiver	Neutral Conditions # (Day/Even/Night)	3m/sec Wind Source to Rec (Day/Evening)	3°C/100m Inversion (Night)
Girrawheen	24	27	26
Abbeylands	28	34	30
The Billabong	18	25	22
Airport South	21	24	22

No wind - 1°/100m temperature lapse.

Table 12: Received Noise Levels during Construction/Operation – No Noise Control

	Received Noise Levels, dB(A),Leq		
Residential Receiver	**Neutral Conditions # (Day)**	**3m/sec Wind Source to Rec (Day)**	**3°C/100m Inversion (Night)**
Girrawheen	34	37	-
Abbeylands	44	51	-
The Billabong	30	39	-
Airport South	29	32	-

No wind - 1°/100m temperature lapse.

Reference to the above Tables show no noise exceedances for and operation of the complex, during the day, evening or night at any receiver, under neutral (1°/100m temperature lapse) and noise enhancing (3m/s source to receiver wind for day and 3°/100m inversion at night) atmospheric conditions. Similarly, no noise exceedances during construction at the site are predicted during the day at Girrawheen, The Billabong or Southern Airport residences under neutral atmospheric conditions. However, exceedances of 7dB(A) are predicted at Abbeylands on occasion. Also, exceedances of 2dB(A)-14dB(A) may occur during construction under worst-case weather conditions (3m/s source to receiver wind) at all nearby receivers. We therefore strongly recommend that activities are closely monitored over the duration of the construction phase.

After earthworks are completed, average site noise will substantially reduce as steelwork erection and similar activities are conducted. All combustion engine plant, such as generators, compressors and welders, should be carefully checked to ensure they produce minimal noise, with particular attention to residential grade exhaust silencers and shielding around motors. Trucks and other machines should not be left idling unnecessarily, particularly when close to residences. Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made.

Impact wrenches should be used sparingly, particularly in elevated locations, with hand tools or quiet hydraulic torque units preferred. Final stages of construction, such as electrical/mechanical fitting, glazing and painting, are expected to take a further couple of months but generate insignificant noise.

Table 13 shows some common construction equipment, together with noise control options and possible alternatives.

Table 13 - Noise Control, Common Noise Sources

Equipment / Process	Noise Source	Noise/Vibration Control	Possible Alternatives
Compressor Generator	Engine	Fit residential muffler. Acoustic enclosure.	Electric in preference to petrol/diesel. Plant to be Located outside building Use centralised generator system.
	Casing	Shielding around motor. Rubber tyred or stand on waffle pads and matting.	
Concrete breaking Drilling Core Holing	Hand piece	Fit silencer, reduces noise but not efficiency Enclosure / Screening	Use rotary drill or thermic lance (used to burn holes in and cut concrete) Laser cutting technology
	Bit	Use dampened bit to eliminate ringing. Once the surface is broken, noise is greatly reduced. Enclosure / Screening.	
	Air line	Seal air leaks, lag joints	
	Motor	Fit residential mufflers.	
Circular saw Angle grinder Brick saw	Vibration of blade/product.	Use sharp saws. Dampen blade. Clamp product.	Use handsaws where possible. Retro-fitting.
Hammering	Impact on nail		Screws
Brick bolster	Impact on brick	Rubber matting under brick	Cut bricks in a shielded area.
Rotary drills Boring	Drive motor and bit.	Acoustic screens and enclosures	Thermic lance Laser cutting technology.
Explosive tools (i.e. ramset gun)	Cartridge explosion	Use silenced gun	Drill fixing.
Material handling	Material impact	Cushioning by placing mattresses, foam, waffle matting on floor. Acoustic screening.	
Waste disposal	Dropping material in bin, trolley wheels.	Internally line bins and chutes with insertion rubber, conveyor belting, or similar. Use rubber tyred trolleys.	

Note: Generally, noise reductions of 7-10dB will be achieved with the use of barriers, 15-30dB by enclosures, 5-10dB from silencers and up to 20-25dB by substitution with an alternate process.

7.3 Cumulative Noise Impacts

To assess the cumulative noise impact on residential receivers involves superimposing future noise levels associated with the Oakburn Processing Complex on existing background and ambient noise levels. The two noise sources added together (Oakburn and background) would combine to raise the total noise level at the receiver.

Predicted Cumulative Noise Impacts at Residential Receivers would be calculated as follows:

Background Noise Level + Oakburn Noise Level = Total Noise at Residence

Existing noise levels, i.e. without the Oakburn Complex operating, are detailed in Section 4, while noise levels associated with future operation of the Oakburn Processing Complex are shown in Table 11.The noise level increase at nearest receivers is shown in Table 14 below.

Table 14: Increase in Background Noise level due to Oakburn Processing Complex

Location/Situation	Background Noise Level dB(A),L90	Oakburn Noise Level Night 3°/100m Inv db(A),Leq	Total Noise at Receiver dB(A),Leq
Girrawheen	31	26	32 (+1)
Abbeylands	29	30	33 (+4)
The Billabong	32	22	32 (0)
Airport South	34	22	34 (0)

As can be seen by the theoretical calculations in Table 14, the background noise level is predicted to increase by 1dB(A) and 4dB(A) at Girrawheen and Abbeylands under worst-case atmospheric conditions once the Oakburn Processing Complex begins operations, while no background noise level increases are expected at The Billabong and Airport South. It should be noted, however, that the combined noise impact at all receivers will be below the relevant criteria during all time periods at all receivers and is therefore considered acceptable.

8 CONCLUSION

An assessment into the potential acoustic impact from a proposal to increase Baiada's Oakburn Processing Plant from the approved capacity of 750 000 birds per week to 1 million birds per week has been completed.

Results show noise from operation of the site is not expected to exceed the relevant criterion at any receiver, under neutral and noise enhancing atmospheric conditions, during the day, evening or night.

Unloading and loading of live bird modules and loading of finished goods must occur within the building. To avoid waiting, no staging area is to be allocated for trucks.

A noise monitoring program, during commissioning, or in the early life of the site is recommended. This program will verify our predictions and in the unlikely event that complaints may arise, enable noise control strategies to be implemented, where required.

Traffic noise on the Oxley Highway will be within the criterion during operation and construction of the site at all nearby receivers and also at any receiver along the transport route, which is 20 metres or more from the road.

During construction the total impact at each residence is related to the received noise level and the duration of excessive noise. Machines and equipment are expected to be at least 1400 metres from the nearest residence and continue for more than 26 weeks, implying a background +5dB(A) criterion. Theoretical calculations indicate that exceedances are expected on occasion during construction of the complex. We therefore strongly recommend that activities are closely monitored over the duration of the construction phase.

To reduce the impact in the area during construction, we recommend that louder construction activities, in particular major earthworks, are restricted to the late morning and afternoon, when most people will be active or at work and background noise levels will be higher. Additionally, machines used on the site must be maintained in good condition to minimise source noise levels. Baiada management has also advised that no work will be scheduled on weekends or public holidays.

Where practical, machines should be operated at low speed or power and should be switched off when not being used rather than left idling for prolonged periods.

Once noisy construction activity commences, it should be completed with the minimum of undue delay. In any case, all reasonable attempts should be made to complete significant noisy activities within as short a time as possible.

Residents should be notified of the intended construction timetable and kept up to date as work progresses, particularly as work changes from one set of machines and processes to another. In particular, residents should understand how long they will be exposed to each source of noise and be given the opportunity to inspect plans of the completed development. Encouraging resident understanding and "participation" gives the local community a sense of ownership in the development and promotes a good working relationship with construction staff.

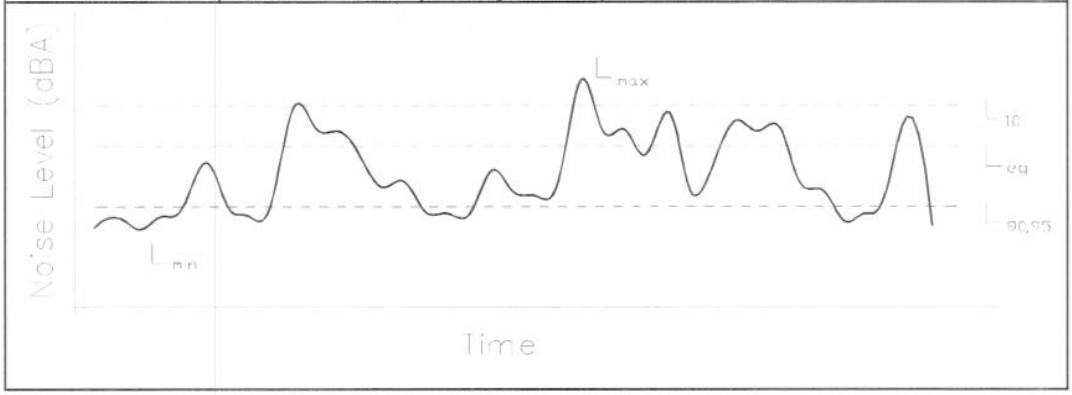
Baiada has advised that the site manager and construction company will take responsibility and be available to consult with residents and community representatives. Response to complaints or comments will be made in a timely manner and action will be reported to the concerned party. Consideration should be given to establishing and maintaining an easily accessible and well publicised complaints hotline, and develop a suitable complaints handling procedure to effectively deal with any issues.

In conclusion, construction and operation of the Oakburn site will not cause any long term excessive environmental noise at any residential properties. We therefore see no acoustic reason why the proposal should not proceed under the current design.

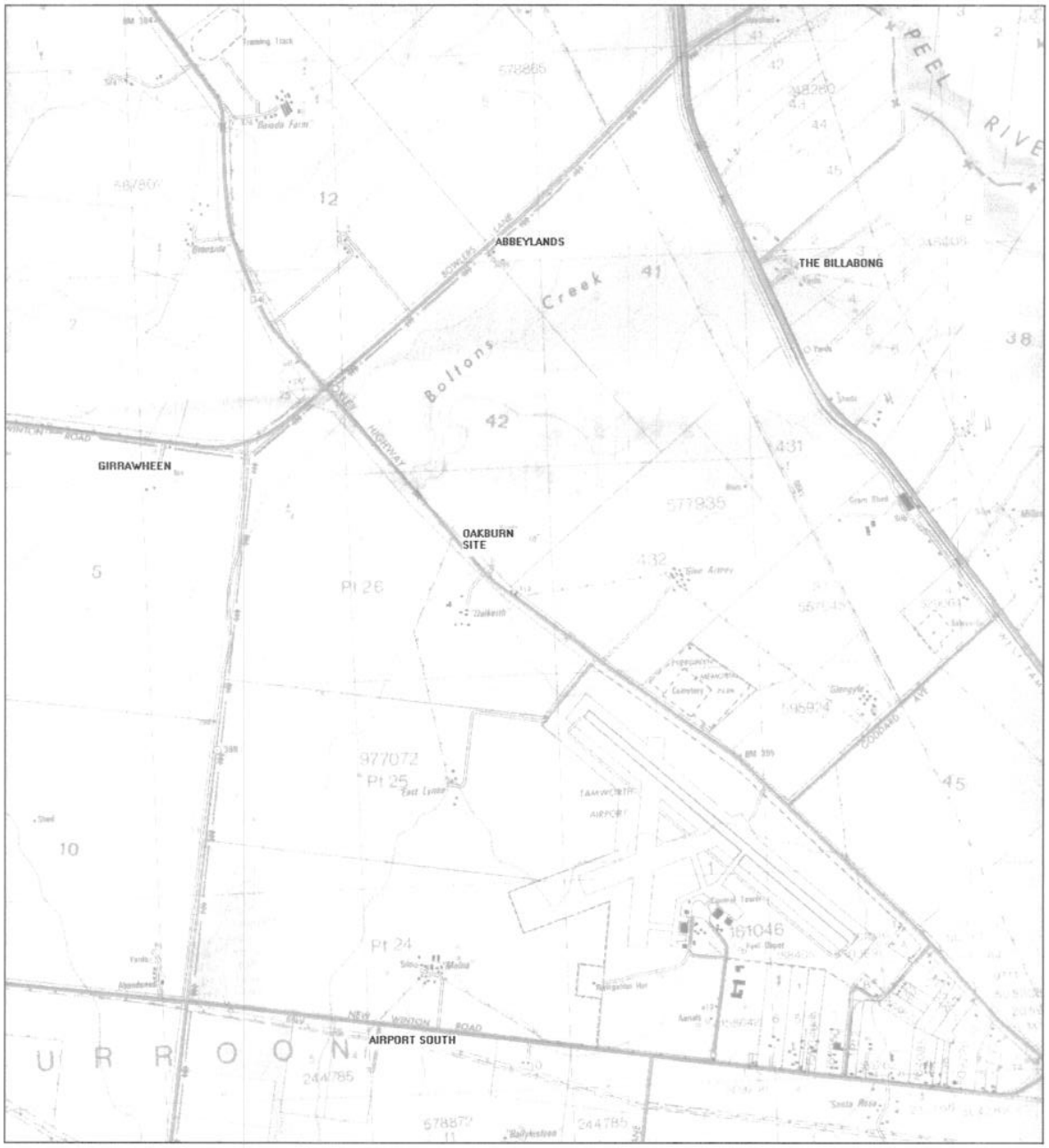
REVERB ACOUSTICS

S. Brady.

Steve Brady A.A.A.S. M.A.S.A.
Principal Consultant

	response of the human ear.
ABL	*Assessment Background Level* – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	*Rating Background Level* – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level, and is generally used in Australia as the descriptor for intrusive noise (usually in dBA).
	

APPENDIX B
Location Plan


ABBEYLANDS
THE BILLABONG
Bollons Creek
GIRRAWHEEN
OAKBURN SITE
AIRPORT SOUTH
PEEL RIVE

APPENDIX C
Calibration Certificates

NATA
WORLD RECOGNISED ACCREDITATION

Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

HEAD OFFICE
Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

CERTIFICATE OF CALIBRATION

CERTIFICATE NO.: SLM03554

Equipment Description:	Sound & Vibration Analyser		
Manufacturer:	Svantek		
Model No:	Svan-912AE	**Serial No:**	2654
Microphone Type:	40AF	**Serial No:**	32967
Filter Type:	1/3 Octave	**Serial No:**	2654
Comments:	All tests passed for type 1 Uncertainty (at the 95% c.l.) = 0.1 dB		
Owner:	Reverb Acoustics 79 Grinsell Street Kotara NSW 2289		
Ambient Pressure:	993 **mbar**		
Temperature:	23 °C	**Relative Humidity:**	50 %
Date of Calibration:	01-06-2006		
CHECKED BY: JK	**AUTHORISED SIGNATORY:** ..... Jack Kiell		

The tests, calibrations or measurements covered by this document are traceable to Australian national standards of measurement. This document shall not be reproduced, except in full. The equipment listed above has been calibrated in this laboratory. The equipment performed satisfactorily in all the tests conducted.

NATA
WORLD RECOGNISED ACCREDITATION
Accredited Lab. No. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS

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Unit 14, 22 Hudson Ave. Castle Hill NSW 2154
Tel: (02) 96808133 Fax: (02)96808233
Mobile: 0413 809806
web site: www.acu-vib.com.au

Page 1 of 2
AVCERT1 Rev.2.1 03.09.04

CERTIFICATE OF CALIBRATION

CERTIFICATE NO: 7197

EQUIPMENT TESTED: Sound Level Calibrator

B & K

Type No: 4230 **Serial No:** 1139958

Owner: Reverb Acoustics
79 Grinsell Street
Kotara NSW 2289

Tests Performed: Measured output sound pressure level was found to be:
93.97 dB re 20 uPA at 997.5 Hz
THD< 1%, Uncertainty: 0.1dB

CONDITION OF TEST:

Ambient Pressure: 1000 mbar **Relative Humidity:** 55 %
Temperature: 23 °C
Date of Calibration: 22/02/06

Test Method: IEC 60942 - 2004

CHECKED BY: JK **AUTHORISED SIGNATORY:** .....
Jack Kiel

The tests, calibrations or measurements covered by this document are traceable to Australian national standards of measurement. This document shall not be reproduced, except in full.

NATA
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Accredited Lab. 9262
Acoustic and Vibration Measurements

ACU-VIB
ELECTRONICS
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Mobile: 0413 809806
Web site: www.acu-vib.com.au

Page 1 of 1 End of Calibration Certificate
AVCERT2 Rev.1.1 03.09.04

APPENDIX 8: 2008 DEVELOPMENT APPLICATION FOR UPGRADED WWTP

Baiada Poultry (Tamworth) Pty Limited
PO Box 425
PENDLE HILL NSW 2145

Dear Sir/Madam

Environmental Planning and Assessment Act 1979
NOTICE TO APPLICANT OF DETERMINATION OF A DEVELOPMENT APPLICATION

Pursuant to Section 81(1)(a) of the Act, notice is hereby given of the determination by Council of the following development application.

Development Application No.	DA0775/2008
Subject Land:	Lot 100, DP 1097471, Gunnedah Road, WESTDALE
Description:	Wastewater Treatment Plant and Extensions to Existing Industrial Shed

In the determination of this application Council considered all matters listed under Section 79C of the Act. The development application has been determined by the **granting of consent subject to the conditions** listed below.

General Terms of Approval

1) The development shall be carried out in accordance with the General Terms of Approval issued by the Department of Environment and Climate Change, attached as Annexure A to this notice.

Prior to Work Commencing

2) Erosion and sediment controls for the construction works are to be installed and authorised before any site works begin, and be maintained effectively for the duration of the construction works.

3) Pursuant to s.81A of the Act, the following matters must be satisfied prior to the commencement of work:

   (i) obtain a construction certificate from either Council or an accredited certifier;

   (ii) appoint a Principal Certifying Authority (and advise Council of the appointment, if it is not the Council);

   (iii) give at least 2 days notice to Council of the intention to commence work.

4) A sign is to be erected in a prominent position on any work site on which work involved in the erection or demolition of a building is being carried out stating:

* Unauthorized entry to the work site is prohibited

* The name of the person in charge of the work site and a telephone number at which that person may be contacted outside working hours.

* The name, address and phone number of the PCA by the owner

The sign is to be removed when the work has been completed.

This condition does not apply to building work carried on inside an existing building, or building work carried out on premises that are to be occupied continuously (both during and outside working hours) while the work is carried out.

Prior to issue of a Construction Certificate

5) Pursuant to Section 68 of the Local Government Act 1993, the following approvals must be obtained from Council prior to the issue of a Construction Certificate:-

(i) Carry out water supply work; and

(ii) Dispose of waste into a sewer of the council.

Note: The Trade Waste approval required by (ii) above will require concurrence from the Department of Water and Energy.

General

6) All building work must be carried out in accordance with the provisions of the Building Code of Australia.

7) All proposed building, site works or property improvement indicated on the submitted plans or otherwise required under the terms of this consent shall be completed prior to occupation of the premises to ensure compliance with the provisions of the Environmental Planning and Assessment Act, 1979.

8) The development must be carried out in accordance with the Development Application and accompanying plans, drawings and other documents as amended by conditions of this consent. Any amendment to the development or to these conditions will require the consent of the Council.

The conditions have been imposed in accordance with the Environmental Planning and Assessment Act and Council's adopted policies.

This approval became effective on 10 September 2008 (Section 83 of the Act) and will lapse unless the proposed development is commenced within five (5) years of the approval date (Section 95 of the Act).

Under the provisions of Section 97 of the Act you may (within twelve [12] months of receipt of this notice) appeal to the Land and Environment Court against conditions imposed should you feel they are unreasonable.

All conditions imposed by Council shall be observed as non-compliance is an offence under the Act.

Yours faithfully

David Lewis
Development & Approvals Manager

Contact: Catherine Pyne (02) 6767 5488

Reference: CP/DA0775/2008

10 September 2008

General Terms of Approval

Notice No: 1090480

Attachment A

These General Terms of Approval reflect the conditions that will need to be added to or amended in the current environment protection licence (EPL 7566) for the Baiada Poultry Pty Limited Oakburn Protein recovery plant. The current conditions on EPL 7566 which are not amended will also be applicable to the proposed development.

E Special Conditions

E1 Verification report

E1.1 Prior to commissioning the new wastewater treatment plant, the licensee must submit a verification report to the DECC Armidale office including work as executed plans/ drawings of completed works for the upgraded wastewater treatment plant. The report must provide as constructed design specifications of the installed wastewater treatment plant and ancillary equipment including belt press, chemical storage facilities, and sludge storage facilities.

E2 Odour impact assessment and mitigation Pollution Reduction Program

E2.1 If in the opinion of a DECC authorised officer emissions of offensive odour have been released from the premises (in particular odour generated from the upgraded wastewater treatment plant proposed in the Statement of Environmental Effects, Diverse Property Solutions), this Pollution Reduction Program (PRP) must be implemented upon written request from the DECC. On triggering of this condition, the odour impact assessment and mitigation program will be included as a PRP on the licence.

E2.2 Within 3 months of the date of the written request as determined in condition E2.1, the Licensee must develop a program to investigate and implement works to ensure compliance with s129 of the POEO Act, and submit an odour impact assessment and mitigation report to the DECC Armidale office.

E2.3 A formal report on the findings must be submitted to the DECC for approval. The report must present a timeframe for implementing the mitigation works.

E2.4 Upon receiving written DECC agreement with the report at E2.3, the licensee must implement the necessary mitigation option(s) or other action approved by DECC and within a timetable approved by the DECC.

STATEMENT OF ENVIRONMENTAL EFFECTS

Baiada Poultry Pty Ltd

Oakburn Processing Complex

Oxley Highway, Tamworth

Lot 100 on DP 1097471

DIVERSE PROPERTY SOLUTIONS

P – (07) 3852 4321
F – (07) 3852 4320
PO Box 1604
Fortitude Valley QLD 4006

1.0 INTRODUCTION

Diverse Property Solutions has been engaged by Baiada (Tamworth) Pty Ltd to prepare this Statement of Environmental Effects (SEE) to accompany a Development Application seeking consent for the proposed upgrades to the Oakburn Rendering Facility including the implementation of an upgraded Waste Water Treatment Plant (WWTP) and extension to the rendering plant to enable covered storage of equipment and packaging. Importantly, the proposed upgrades will facilitate more efficient and environmentally responsive operation of the approved Oakburn Rendering Plant and enhance Baiada's ongoing operations and investment in the Tamworth Region.

Baiada has been developing the proposed WWTP in consultation with Council as part of an Effluent Improvement Plan. The proposed treatment processes has been reviewed by Council and its independent consultants who have concluded that *"the information submitted does satisfy the initial requirements for the trade waste effluent improvement plan for the site."* Accordingly, this application seeks Development Consent for the physical infrastructure required to implement the upgraded treatment measures.

This SEE provides details of the subject site and its surrounds in *Section 2* and describes the proposed development in *Section 3*. An outline of the environmental planning controls relevant to the subject site, and the proposal, are detailed in *Section 4. Section 5* assesses the potential environmental effects of the development in accordance with the relevant planning heads of consideration, under Section 79C(1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Conclusions are provided in *Section 6*.

This SEE is accompanied by architectural drawings prepared by Baiada with and technical details in relation to the Waste Water Treatment Facility provided by AJM Environmental Service Pty Ltd.

1.1 Site Details

Address	Oxley Highway, Tamworth
Property Description	Lot 100 on DP 1097471
Registered Owner	Baiada (Tamworth) Pty Ltd
Applicant	Baiada (Tamworth) Pty Ltd
Local Authority	Tamworth Regional Council
Total Site Area	57.6 Ha
Existing Use	Rendering Plant
Proposed Use	Upgrade of Waste Water Treatment Plant Building Extension (Storage)
Current Zoning	Zone 1(a) Rural

1.2 Site Owner & Operator

Baiada Poultry Pty Limited (Baiada) is a privately owned Australian company which provides premium quality poultry products throughout Australia. Baiada's operations include Broiler & Breeder Farms, Hatcheries, Processing Plants, Feed Milling and Protein Recovery. Baiada's products include the sale of live poultry (including breeding stock), poultry feed, fertile eggs, day old chickens, primary processed chicken (raw) and processed chicken products and pet food.

The company has its head office at Pendle Hill, 30km west of Sydney CBD, with major operating centres located in Queensland, South Australia, New South Wales (including Tamworth) and Victoria. Baiada have a current employee base of approximately 2500 people.

Baiada's Tamworth district operations are vertically integrated and include the following:

- Grandparent and Parent Breeder Farms
- Broiler Farms
- Chicken Hatcheries
- Feedmill
- Livestock Administration Office
- Contract Growers
- Processing Plant
- Protein Recovery Plant (Oakburn Facility Stage 1)

2.0 THE SITE AND SURROUNDS

2.1 Site Location

The proposed development site is known as "Oakburn" and is identified as Lot 100 on DP1097471, Parish of Murroon and County of Parry. The Oakburn site has an area of approximately 57.6 Hectares and is located on the Oxley Highway, approximately 11km North-west of the Tamworth Central Business District.

The site contains Baiada's Protein Recovery Plant, developed in accordance with DA 53/97 as outlined in Section 2.2 below. The Protein Recovery Plant converts raw waste products generated by Baiada's other Tamworth operations into products such as tallow and meal.

Figure 1 Site Aerial

Source: Google 2008

2.2 Site History

Consent for the overall Poultry Processing Complex was granted by the Minster for the Department of Urban Affairs and Planning on 9 February 1998 (DA53/97). A copy of this Approval and the Approved Plan of Development are attached as *Appendix 1* and *Appendix 2* respectively.

The Approval included the following four (4) separate stages that could be developed in any order:

- Stage 1 Protein Recovery Plant
- Stage 2 Further Processed Product
- Stage 3 Deboning
- Stage 4 Processing Plant

At present, only Stage 1 of the complex (The Protein Recovery / Rendering Plant) has been constructed and is operational. This application relates solely to Stage 1 of the Approval.

Subsequent to construction of the Rendering Plant and original WWTP, Baiada has been working towards improving the effluent quality discharged from the site as part of an agreed Effluent Improvement Plan (EIP). This process resulted in the recent submission and approval of the proposed upgraded treatment plant and Baiada is now pursuing the required Development Consent and Trade Waste Permits to implement the new treatment processes.

2.3 Surrounding Development

The site is located in a rural area which is predominantly used for traditional agricultural and grazing activities. Other land uses within proximity to the site include beef (1300m SE) and lamb (1100m SE) abattoirs, the Tamworth Lawn Cemetery and Crematorium (800m SE), the Tamworth Airport, Oakburn Park Raceway (500m NW), Flour Mill (1100m N) and Baiada's Bowlers Lane Broiler Farm.

The land uses within proximity of the site can be broadly described as agri-business within a predominantly rural setting. It is considered that no significant land use conflicts exists between these uses and the proposal.

2.4 Site Access

Access to the site is achieved via the existing connection to the Oxley Highway. This access has been designed and constructed in accordance with the original development consent conditions. No change to the site access are proposed or required as part of this application.

2.5 Physical Infrastructure

The site is supplied with all required infrastructure including Telecommunications, Electricity, Natural Gas, Waste Supply and Sewage (for staff amenities). No changes to the site access are proposed or required as part of this application.

2.6 Stormwater

Stormwater run-off from the site is collected via a series of internal drainage lines and directed off site into the intermittent water course located on the adjoining property to the East. No change to the current stormwater drainage system is proposed as part of this application. Importantly, the proposed WWTP is a closed system and no interaction between the treated water and stormwater is possible.

2.7 Liquid Trade Waste

In accordance with the existing Trade Waste Agreement, liquid waste currently generated by the Protein Recovery Plant is treated on site, prior to being directed to Council's Westdale Wastewater Treatment Plant. The on-site treatment currently consists of a Dissolved Air Flotation Unit which includes 3 major processes:

- Chemical Treatment
- Aeration / Solids Separation
- Sludge Removal

Sludge generated on site during the treatment is dewatered in a belt press before being taken under license for land application, hence removing the need for disposal at the Tamworth landfill site. Treated waste water is discharged to the sewer via a discharge tank and flow meter.

Since implementation of the Tamworth Regional Council - Liquid Trade Waste Policy, Baiada has been working with Council to upgrade the on-site treatment processes as part of an agreed EIP. Accordingly, this application seeks Development Consent for the physical infrastructure required to implement the upgraded treatment measures.

3.0 THE PROPOSED DEVELOPMENT

3.1 Waste Water Treatment Plant

In accordance with the existing Trade Waste Agreement, between Council and Baiada, liquid waste generated by the Protein Recovery Plant is currently treated by the existing WWTP utilising a Dissolved Air Flotation (DAF) Unit, before being directed to Council's Westdale Wastewater Treatment Plant.

Subsequent to implementation of the Liquid Trade Waste Policy, Baiada has been working with Council towards upgrading the on-site treatment processes as part of the EIP and has recently confirmed with Council the proposed system to be adopted. The upgraded WWTP is described in detail in the attached Oakburn Wastewater Treatment Plant Proposal prepared by AJM Environmental Services Pty Ltd and attached as *Appendix 3*.

Similar to the existing plant, the process uses screening followed by DAF and an aerobic process. However, the proposed WWTP involves the implementation of a Sequential Biological Reactor (SBR) as a secondary treatment unit, as well as an upgrade of some of the existing equipment used in the treatment processes to deliver the improved effluent quality prior to discharge.

As indicated in the AJM Proposal, the final effluent quality from the system will comply with Council's targets specified below:

Analyte	Current Council Requirements mg/L	Target mg/L
Amonia	50	50
BOD	600	500
O&G	100	80
TKN	100	80
Total P	20	20
SS	600	500
TDS	1000	1000

The proposed WWTP has been reviewed by Council and it's independent consultants who have concluded that *"the information submitted does satisfy the initial requirements for the trade waste effluent improvement plan for the site"* (See letter dated 10 April 2008 attached as *Appendix 4*).

This letter and subsequent conversations with Council Officers (Cathy Pyne) indicated that the physical infrastructure associated with the plant would require Development Consent, and accordingly, this application seeks planning approval for the works associated with the proposed WWTP.

Physically, the proposed WWTP is located in the immediate vicinity of the existing plant, consistent with Original Plan of Approval. The proposal involves the reuse and upgrade of several of the existing components as well as the addition of new equipment to facilitate the enhanced treatment regime.

The existing treatment plant is shown on the attached *Topographical Site Survey Plan* (*Appendix 5*) and the proposed plant is shown on the *Proposal Plan* (*Appendix 6*). As shown in this plan, the proposal includes the following additions:

- 50kl Anoxic Tank
- 100kl Balance Tank
- 400kl SBR Tank
- 64m^2 Machinery Shed (8m x 8m x 4.2m High)

The two existing 100kl tanks, a number of the smaller tanks and the existing machinery shed onsite will be retained and reused in their current location.

3.2 Building Extension – Storage Area

During the operational phase of the Rendering Plant, it has also become apparent that additional all-weather storage space is required to protect portable machinery, equipment and packaging that is currently being stored on an uncovered concrete hardstand area and exposed to the elements.

It is proposed that this storage space will be facilitated via a 540m^2 extension to the rear of rendering plant building as shown on the proposed Storage Extension Plan attached as *Appendix 7*.

As shown in the attached plans, the building extension will have a maximum height of 9.3m and will be constructed of colorbond roofing and panels, metal fascia and exposed structural steel elements in a style and colour consistent with the existing facility. The proposed extension is not be visible from the road and will not result in any changes to the existing approved rendering process.

4.0 EVALUATION UNDER SECTION 79C OF THE EP & A ACT, 1979

4.1 Introduction

The development proposal is assessed below under the relevant matters for consideration pursuant to Section 79C (1) (a) of the *Environmental Planning & Assessment Act 1979.*

4.2 Tamworth Local Environmental Plan

The subject site is zoned Rural 1 (a) under the Tamworth Local Environmental Plan (TLEP). The objectives of the zone are as follows (emphasis added):

(1) The general objectives of this zone are:

(a) to retain land for rural and related purposes, and
(b) to indicate land which is not required for, or is unsuited to, development for urban purposes.

(2) The specific objectives of this zone are:

(a) to prevent land for which it is uneconomical or impractical to provide public facilities and essential services from being used for urban purposes,
(b) to permit traditional forms of rural land uses and occupations to continue in a manner which sustains efficient and effective agricultural production potential and maintains other agricultural activities,
(c) to provide for specialist and intensive agricultural pursuits that are consistent with the level of services available and the capabilities of the land,
(d) to permit other forms of development which are associated with rural land use, or which, by virtue of their character, require siting outside urban localities, and which are in keeping with the rural character of the land and are consistent with the capabilities of the land, with the pattern of rural holdings in the locality and with the level of services and amenities available,
(e) to maintain a pattern of low density settlement,
(f) to encourage development to be carried out on land within the zone in a manner which conserves, enhances and does not adversely affect the physical character, environmental quality and scenic value of the City's rural setting, and
(g) to permit development of the land within the zone in a manner which will neither adversely affect any associated physical, chemical and ecological riverine environment nor the natural and cultural heritage values of any associated riverine environment.

(3) Development for the purpose of the following is usually not consistent with the objectives of this zone:

car parks; commercial premises; depots; hazardous industries; hazardous storage establishments; health consulting rooms; industries; liquid fuel depots; materials recycling yards; medical centres; offensive industries; offensive storage establishments; restaurants; service stations; shops; vehicle body repair workshops; vehicle repair stations; warehouses or distribution centres.

The existing Rendering Plant and the proposed upgrades is a specialist agricultural industry / business that, by its' nature, necessitates its location outside of an urban locality. As indicated above, the rendering plant is similar to a number of agri-businesses located in proximity to the site and is considered to comply with the objectives sought for the Rural 1 (a) Zone.

Importantly, the proposed upgrades will facilitate more efficient and environmentally responsive operation of the Approved Oakburn Rendering Plant.

Specifically, this application seeks approval for a Waste Water Treatment Plant and Building Extension (Storage Purposes) which, as confirmed with Council Officers, is considered to be 'Development Only with Consent.'

4.3 Development Control Plans

The following Development Control Plans (DCPs) are considered to be applicable to the proposed development:

- Tamworth DCP No. 1 – Traffic & Parking Requirements.

The proposed WWTP and storage extension will not result in any change to the intensity of the rendering process, number of employees or vehicle movements on site. As such, no change to site access or internal parking areas are necessary.

The storage area extension located at the rear of the rendering plant will require a slight modification to the alignment of the existing internal access road. This modified access road will be developed in a manner consistent with the existing road in accordance with the provisions of DCP No. 1 and No. 4. The proposed alignment change will ensure that all required vehicles can enter and exit in forward gear and safely manoeuvre on site.

- Tamworth DCP No. 4 – Guidelines for Industrial Development.

As indicated above, the proposed WWTP and storage extension are also considered to be consistent with the provision of DCP No. 4 Guidelines for Industrial Development, as demonstrated in the following table.

DCP Provision	Applicant Response
(a) Allotment Size	The site has an area of 57.6 Hectares and is considered to be sufficient to accommodate the Approved Oakburn Complex.
(b) Site Coverage	The proposed development includes a 460m^2 extension to the current Rendering Plant footprint and 100m^2 Maintenance Shed and additional tanks located in the WWTP area. The extension to site coverage is considered to be generally consistent with the Original Approval and equates to approximately 0.1% of the site area.
(c) Design & Appearance	High quality construction materials consistent with the existing approved buildings on site will be utilised.
(d) Building Construction	All building works will comply with the requirements of the Building Code of Australia.
(e) Building Setbacks	The storage extension maintains a 31m setback from the closest (rear) site boundary. The additional components of the WWTP are setback a minimum of 23m from the rear boundary and in the immediate vicinity of the existing plant. All proposed works are substantially separated from public vantage points and are not anticipated to impact on the visual amenity or use of adjoining sites.
(f) Landscape Treatment	No change to the existing screening landscaping is proposed or considered to be necessary.
(g) Access and Road Construction	The proposed WWTP and storage extension will not result in any change to the intensity of the rendering process, number of employees or vehicles movements on site. As such, no change to site access or internal parking areas are necessary. The storage area extension located at the rear of the rendering plant will require a slight modification to the alignment of the existing internal access road. This modified access road will be developed in a manner consistent with the existing road in accordance with the provisions of DCP No. 1 and No. 4. The proposed alignment change will ensure that all required vehicles can enter and exit in forward gear and safely manoeuvre on site.
(h) Parking	The proposed development will not require any amendment to the existing approved car parking arrangements.
(i) Loading Facilities	The proposed development will not require any amendment to the existing approved loading arrangements.
(j) Flood Liable Land	The proposed development is not located on flood liable land.

(k) Land Contamination	Based on previous investigations, it is understood that the proposed development is not located on contaminated land.
(l) Residential Areas	The site is not located within the vicinity of any residential areas. The nearest residential dwelling appears to be located on Bowlers Lane, approximately 1200m from the site. The Westdale Residential Area has been previously identified as the closest urban area.
(m) Advertising	No advertising is proposed as part of this application.
(n) Services and Drainage	The site is supplied with all required infrastructure including Telecommunications, Electricity, Natural Gas, Waste Supply and Sewage (for staff amenities). This application seeks approval for the upgraded WWTP developed in accordance with the EIP to improve the quality of liquid waste discharged from the site into Council's treatment system. Stormwater run-off from the site is collected via a series of internal drainage lines and directed off site into the intermittent water course located on the adjoining property to the East. No change to the current stormwater drainage system is proposed as part of this application. Importantly, the proposed WWTP is a closed system and no interaction between the treated water and stormwater is possible.
(o) Fire Fighting Precautions	Fire Services will be implemented and maintained in accordance with the BCA.

4.4 Environmental Planning Legislation

The relevant State planning legislation is the Environmental Planning & Assessment Act, 1979 (EP&A Act, 1979). Section 79C of this Act, together with the EP&A Regulations 2000, provide the basis and content of this statement.

4.5 State Environmental Planning Policies

It is understood that there are no State Environmental Planning Policies applicable to this application.

4.6 Regional Environmental Plans

It is understood that there are no applicable Regional Environmental plans to the subject site or proposed use of premises.

4.7 Any matter prescribed by the Regulations

The Oakburn Rendering Plant (Livestock Processing – Rendering) is identified as a premise-based activity under Schedule 1 of the POEO Act. The applicant currently holds an Environmental Protection License (License Number 7566).

Discussions held with the Department of Environment and Climate Change (DECC) indicate that they are triggered as an Integrated Development Authority as there may be implications for odour capture and treatment from the new WWTP that may lead to modification of the Environmental License.

It is anticipated that the proposed WWTP will have significantly less odour than the current design. All of the on-site tanks will be covered and sealed and the current Trommel screen will be relocated shortly to the western side of the plant independent to the other waste water treatment apparatus and ducted to the main biofilter.

With the reduction in water temperatures already achieved via other process modifications, the remaining DAF plant is not anticipated to require odour control. However, this will be verified via the existing system well before the commissioning of the new plant and should odour control be required, a suitably designed and sized biofilter will be built and a variation to the Environmental Protection License be sought.

5.0 LIKELY IMPACTS OF THE DEVELOPMENT – SECTION 79C(1)(b)

This section provides an environmental assessment of the proposal using the relevant heads of consideration under Section 79c(1) of the EP&A Act.

5.1 Natural Environmental Impacts

Visual Amenity

The proposed WWTP is located approximately 300m from the Oxley Highway on the Eastern corner of the site, consistent with the current approved plant. The upgrade will involve the introduction of a number of additional tanks and a small shed, however, due to its separation from any public vantage points, the WWTP is considered to have negligible impact on the visual amenity of the site.

Similarly, the proposed building extension is located on the rear (eastern) side of the existing rendering plant building. The site is also located approximately 300m from the Oxley Highway and will have negligible impact on the visual appearance of the site. The extension will be constructed of Colorbond roofing and panels, metal fascia and exposed structural steel elements in a style and colour, consistent with the existing building.

Water Quality

The proposed WWTP will discharge directly into Council's reticulated sewerage system in accordance with the Effluent Improvement Plan. Importantly, the proposed WWTP is a closed system and no interaction between the treated waste water and rainwater / stormwater is possible.

The specific details in relation to the proposed WWTP are described in the documentation prepared by AJM Environmental Services and attached as *Appendix 3.* Importantly, the WWTP has been reviewed by Council and its independent consultants who have concluded that *"the information submitted does satisfy the initial requirements for the trade waste effluent improvement plan for the site."*

As demonstrated in the technical proposal provided by AJM Environmental Services, the proposed WWTP will result in a significant increase in the quality of water being discharged into Council's reticulated sewerage system, assisting in downstream processing and achieving ultimate water quality objectives.

Air Quality / Odour

The proposed facility operates under an existing Environmental Protection License (#7566) which contains conditions in relation to air quality and odour. It is anticipated that the proposed WWTP will have significantly less odour than the current design. All of the on-site tanks will be covered and sealed and the current Trommel screen will be relocated shortly to the western side of the plant independent to the other waste water treatment apparatus and ducted to the main biofilter.

With the reduction in water temperatures already achieved via other process modifications, the remaining DAF plant is not anticipated to require odour control. However, this will be verified via the existing system well before the commissioning of the new plant and should odour control be required, a suitably designed and sized biofilter will be built and a variation to the Environmental Protection License be sought.

Flora and Fauna

The subject site is located within the grounds of the existing Oakburn facility and has been cleared of any significant vegetation. Treated waste water will be discharged directly into Council's reticulated sewerage system, ensuring there will be no impact on downstream environments or receiving waters. Operating areas associated with the WWTP will be bunded to restrict any spills from interacting with the receiving waters.

Waste Management

No additional hard waste is anticipated to be generated during the operational phase of the proposed waste water treatment plant or building extension. Waste from the construction period will be re-cycled where possible or disposed off in accordance with Council requirements.

5.2 Built Environmental Impacts

Streetscape and Desired Future Character

The proposal seeks consent for extensions to the existing building. All extensions are contained within the site and maintain the appropriate setbacks. The extensions will be consistent with the style and materials of the existing building form and will not impact on the locality.

Noise and Privacy

The proposed WWTP and building extension will not generate any additional noise. No residences or other sensitive receptors are located within the immediate vicinity of the site and as such, there is limited potential to impact in terms of adverse noise, overlooking or privacy concerns.

Traffic, Access and Parking

The proposed WWTP and storage extension will not result in any change to the intensity of the rendering process, number of employees or vehicles movements on site. As such, no change to site access or internal parking areas are necessary.

The storage area extension located at the rear of the rendering plant will require a slight modification to the alignment of the existing internal access road. This modified access road will be developed in manner consistent with the existing road in accordance with the provisions of DCP No. 1 and No. 4. The proposed alignment change will ensure that all required vehicles can enter and exit in forward gear and safely manoeuvre on site.

5.3 Suitability of the Site for development - Section 79C(1)(c)

The proposed upgrade to the WWTP and extension to the building to accommodate additional storage space will lead to more efficient and environmentally responsive operation of the approved Oakburn Rendering Plant. The proposed development is permissible within the zone, consistent with the zone objectives, and compliant with the Tamworth Development Control Plans. In addition, the current uses and proposed development are considered to be consistent with the scale and character of surrounding land uses.

5.4 The Public Interest – Section 79C(1)(e)

The proposal is not considered to result in any adverse environmental impacts on the natural environment or upon surrounding properties in terms of odour, noise, visual impacts, traffic generation, or privacy. The proposed development will enable more efficient and environmentally responsive operation of the existing Oakburn Rendering Plant and enhance Baiada's ongoing operations within the Tamworth Region. The development is consistent with the nature of the rural locality and various agri-businesses located in proximity to the site, and will be operated in accordance with all relevant standards. The proposal is therefore considered to be in the public interest.

6.0 CONCLUSION

Diverse Property Solutions has been engaged by Baiada (Tamworth) Pty Ltd to prepare this Statement of Environmental Effects (SEE) to accompany a Development Application seeking consent for the proposed upgrades to the Oakburn Rendering Facility including the implementation of an upgraded Waste Water Treatment Plant (WWTP) and extension to the rendering plant to enable covered storage of equipment and packaging.

Baiada has been developing the proposed WWTP in consultation with Council as part of the Effluent Improvement Plan. The proposed treatment processes that will be utilised has been reviewed by Council and its independent consultants who have concluded that *"the information submitted does satisfy the initial requirements for the trade waste effluent improvement plan for the site."* Accordingly, this application seeks Development Consent for the physical infrastructure required to implement the proposed WWTP.

As demonstrated in the technical proposal provided by AJM Environmental Services, the proposed WWTP will result in a significant increase in the quality of water being discharged into Council's reticulated sewerage system, assisting in downstream processing and achieving ultimate water quality objectives.

The proposed development is permissible within the zone, consistent with the zone objectives, and compliant with the Tamworth Development Control Plans. In addition, the current uses and proposed upgrades are considered to be consistent with the scale and character of surrounding land uses and will facilitate more efficient and environmentally responsive operation of the Approved Oakburn Rendering Plant and enhance Baiada's ongoing operations and investment in the Tamworth Region.

It is concluded therefore, that the proposal should be approved by Council, subject to relevant and reasonable conditions.

APPENDIX 1

EXISTING APPROVAL

New South Wales Government

Department of Urban Affairs and Planning

NORTHERN REGIONS OFFICE Attn: Kevin White,

49 Victoria Street, Grafton 2460
PO Box 5 Grafton 2460

Telephone : (066) 42 0822 02 93912000

Fax No. : (066) 42 0640 Approved 9/2/98

Mr B F Pullinger
General Manager
Tamworth City Council
PO Box 555
TAMWORTH NSW 2340

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Officer Use		Notes	
Replied		Recvd	

Contact :

Our Reference : G91/00339

Your Reference :

18 FEB 2002

Dear Mr Pullinger,

DETERMINATION OF DEVELOPMENT APPLICATION NO 53/97 TO DEVELOP A POULTRY PROCESSING COMPLEX IN TAMWORTH BY BAIADA POULTRY PTY LTD

Atte

Date

I refer to the development application and environmental impact statement lodged by Baiada Poultry Pty Ltd for determination under State Environmental Planning Policy No 34 - Major Employment Generating Industrial Development.

I am pleased to advised that the Minister has now determined the application in accordance with section 91 of the Environmental Planning and Assessment Act, 1979 (the Act), by granting consent.

In approving the development, the Minister imposed 74 conditions designed to protect the environment, minimise any adverse impact on the existing and future amenity of Tamworth, modify details of the proposed development, and to provide for environmental monitoring and reporting of the future performance of the development.

A copy of the signed determination by the Minister is enclosed. Under section 93(1) of the Act, the development consent takes effect and operates 28 days from the date of the notice of determination. The Department will be giving public notice of the Minister's determination shortly. It would be appreciated if the consent is made available at the Council's office should any person wish to view the document.

Finally, I would like to take this opportunity to thank the Council and its officers for their co-operation and assistance in processing the development application.

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

DETERMINATION OF A DEVELOPMENT APPLICATION

PURSUANT TO SECTION 91 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

I, the Minister for Urban Affairs and Planning, in pursuance of section 91 of the Environmental Planning and Assessment Act 1979 and Clause 8 of State Environmental Planning Policy No 34 - Major Employment Generating Industrial Development (SEPP 34), determine the development application referred to in Schedule 1 by granting consent to that application subject to the conditions set out in Schedule 2 (File No G91/00339/002).

The reasons for the imposition of conditions are to ensure that potential hazards do not pose an unacceptable off-site risk, and to ensure the minimisation of any adverse impact from the construction and operation of the development.

Minister for Urban Affairs and Planning

Sydney, 9. 2. 1998

SCHEDULE 1

Application made by:	Baiada Poultry Pty Ltd
To:	Minister for Urban Affairs and Planning
In respect of land being:	Part Lot 18, DP 865930 and Part Lot 3, DP 857742, referred to as "Oakburn", Oxley Highway, Tamworth.
For the following development:	A poultry processing complex to be developed in four stages.
Development Application:	The Development Application (DA No 53/97) lodged with the Department of Urban Affairs and Planning on 15 September 1997 accompanied by the environmental impact statement (EIS) entitled *An Environmental Impact Statement for a Poultry Processing Complex at "Oakburn", Oxley Highway Tamworth, New South Wales* prepared by Ellis Environmental Services Pty Ltd.

4-9

ABBREVIATIONS

The Department	Department of Urban Affairs and Planning
The Director-General	Director-General of Urban Affairs and Planning
The Council	Tamworth City Council
EPA	Environment Protection Authority
DLaWC	Department of Land and Water Conservation
NSW Agriculture	Department of NSW Agriculture
NPWS	NSW National Parks and Wildlife Service
The Complex	The chicken processing complex development described under DA 53/97
The Site	16.7 ha of land on which the complex is to be constructed - Site Plan in Appendix 8 of the EIS
The Applicant	Baiada Poultry Pty Ltd
DA	Development application
BA	Building application
EIS	Environmental impact statement
TSC Act	Threatened Species Conservation Act 1995
EP&A Act	Environmental Planning and Assessment Act 1979

SCHEDULE 2

CONDITIONS OF DEVELOPMENT CONSENT

A. GENERAL

1. The Applicant shall carry out the development generally in accordance with:-

   (a) the development application DA 53/97;
   (b) the environmental impact statement titled "An Environmental Impact Statement for a Poultry Processing Complex at 'Oakburn', Oxley Highway Tamworth NSW", dated September 1997 prepared by Ellis Environmental Services Pty Ltd;
   (c) site plans for proposed poultry processing complex, dated 18 August 1997 - prepared by Blekton Pty Ltd;
   (d) the conditions of this consent.

   Note: A building application must be submitted to the Council and approval given for all buildings to be erected on the site prior to the commencement of any building works.

Staging of Development

2. Prior to proceeding to a subsequent stage of the development, the applicant shall certify in writing to the Director-General that the relevant conditions of this consent and any other statutory requirements for the previous stage(s) have been met and receive the Director-General's agreement to proceed.

Operating Capacity

3. The maximum capacity of the protein recovery plant (stage 1 of the complex) shall not exceed 120 tonnes of material per day. The kill capacity of the processing plant (stage 4 of the complex) shall not exceed a total of 750,000 birds per week.

   Note: Any increase in capacity beyond 120 tonnes of material per day or 750,000 birds per [illegible] further assessment under the EP & A Act 1979

Soil and Water Management Plan

4. Prior to commencing construction on stage 1 of the development, a **Soil and Water Management Plan** shall be prepared that will generally include the aspects contained in the Integrated Soil, Water and Landscape Plan included as Appendix 7 of the EIS. The **Plan** shall be prepared in consultation with the NPWS and the Council and approved by the DLaWC.

The **Plan** shall include the following:-

(a) the soil and water management controls identified in the EIS and any other relevant controls required to minimise erosion, sedimentation and contamination of ground and surface water;

(b) controls for dealing with any increased run-off from the site as a result of the development, including those recommended in the Integrated Soil, Water and Landscaping Concept Plan at Appendix 7 of the EIS;

(c) mechanisms for controlling any residual flows draining from the complex after a storm event;

(d) details of the rehabilitation works, including those listed on page 31 of the EIS, to be carried out if the operation of the abattoir development ceases.

- a chart showing the layout and treatment sequence including the retention times for the effluent polishing tanks;
- the volume, rate of discharge and method for disposal of waste water;
- details of the maximum pollutant levels for effluent resulting from each treatment sequence, including figures on hydraulic and organic loading;
- an estimate of raw or post treatment effluent water quality parameters;
- details of the methods and equipment proposed to be installed to eliminate odours that may emanate from the treatment system for the complex.

10. The **Plan** shall identify the method for solid waste disposal including effluent sludge. If on-site sludge drying is proposed, the **Plan** shall provide details relating to:

    - the location of the operation;
    - the details of the volume, frequency and method of sludge removal and drying;
    - the on-site storage of dried sludge; and
    - the management of the operation.

11. The **Plan** is to be implemented throughout the operation of the complex to the satisfaction of the EPA.

Emergency Plan

12. Prior to stage 1 of the complex commencing operations, an **Emergency Plan** shall be prepared in consultation with the Council and other relevant government agencies and organisations, and approved by the EPA.

    The **Plan** shall:

    - identify potential emergencies or breakdowns that may occur in each stage of the complex's development and operation;
    - include an assessment of the related sewerage treatment system;
    - identify the likely impact each breakdown or emergency scenario will have on the environment surrounding the complex;
    - identify the fire controls and procedures to be undertaken on the site and the safety related equipment to be installed in the complex;
    - detail actions or contingencies to be put in place to deal with each of the identified emergencies of breakdowns. These actions or contingencies must be designed to minimise the impact these emergencies or breakdowns will have on the surrounding environment.

    The **Plan** shall be reviewed in consultation with the relevant agencies prior to subsequent stages of the development proceeding and amended if necessary to the satisfaction of the EPA.

13. In the event of an emergency or breakdown identified in the **Plan**, the **Plan** is to be implemented to the satisfaction of the Council.

Landscape Plan

14. Prior to stage 1 of the complex commencing operations, a **Landscape Plan** shall be prepared for the site in consultation with and approved by the Council. The **Plan** shall retain as much of the existing vegetation as possible and demonstrate how the proposed siting, external building materials, design and landscape features will combine to provide an acceptable visual impact. The **Plan** is to include details of the types and location of all species to be used in the landscaping and how these species blend in with the overall theme for the site, and the materials used in the buildings and structures for the complex. The **Plan** shall be integrated with the **Soil and Water Management Plan**.

15. The **Plan** shall detail the staging of the landscaping on the site as it relates to the staging of the construction of the complex. Each stage of the landscaping shall be completed prior to commencing construction of the following stage of the complex.

C. ENVIRONMENTAL STANDARDS

Waste System

16. Waste water from the complex shall be treated in accordance with the **Waste Management Plan**. Effluent discharged from the complex to the Council's sewerage system shall not exceed the following maximum pollutant levels:

• BOD_5 and suspended solids	300mg/L each;
• COD	not to exceed BOD_5 by more than 3 times;
• Total dissolved solids	up to 4000 mg/L may be accepted;
• Temperature	less than 38 degrees;
• pH	within the range 7.0 to 9.0;
• Oil and grease	100mg/L;
• Detergents	all to be biodegradable;
• Colour	no visible colour when the waste is diluted to the equivalent dilution afforded by domestic sewerage flow;

17. The waste water treatment system for stages 1, 2 and 3 of the complex is to be designed to cater for at least 215kL of waste water per day. The final treated effluent shall be discharges to the Tamworth sewerage system to the satisfaction of the Council.

18. All waste water from staff and other facilities for stages 1, 2 and 3 of the complex shall be discharged direct to the sewerage system to the satisfaction of the Council.

19. The treatment system installed for stage 4 (processing plant) of the complex shall be designed to cater for at least 655 kilolitres of waste water per day and in accordance with current standards to the satisfaction of the EPA. The final treated effluent shall be disposed to the Tamworth sewerage system to the satisfaction of the Council.

Note: The plant will need to be designed and constructed to the satisfaction of the EPA and any system that includes on-site disposal will be subject to a fresh Development Application accompanied by an EIS.

20. All effluent storage dams or tanks shall be lined and sealed to prevent the infiltration of groundwater.

21. Solid waste from the complex including any sludge from the sewerage treatment system is to be disposed of in accordance with the **Waste Management Plan** to the satisfaction of the Council.

22. The waste water treatment systems proposed for the complex shall not be commissioned until the company has signed a Trade Waste Agreement with the Council.

Air Quality/Odour

23. Dust suppression techniques shall be implemented during the construction and operation of the complex to ensure dust generation is kept to a minimum.

24. Potentially odorous air generated from any process or activity (including the waste water treatment system) on the premises shall be controlled and treated to ensure that the development does not cause or permit the emission of any offensive odour from the complex.

    For the purpose of this condition, an offensive odour means an odour:

    (a) that by reason of its strength, nature, duration, character or quality, or the time at which it is emitted, or any other circumstance:
        i. is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or
        ii. interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it emitted, or

    (b) that is of a strength, nature, duration, character or quality, prescribed by the regulations of that is emitted at the time, or in other circumstances, prescribed by the regulations.

25. Prior to proceeding with stages 2, 3 or 4 of the development, an assessment report of the cumulative odour impact from previous stage of the complex shall be prepared. The report shall demonstrate, to the satisfaction of the EPA, that acceptable environmental performance relating to the emission of offensive odours from existing operations have been achieved. The assessment report shall detail control measures required to comply with condition 24 prior to the commencement of each stage.

Stormwater Drainage

26. Provisions for the control of stormwater from the site shall be designed so that the rate of discharge from the site for a 1 in 20 year rainfall event is not greater than the discharge which would flow from the undeveloped land.

Noise

27. The construction and operation of the development shall comply with the EPA's "Environmental Noise Control Manual" in regard to acceptable noise limits for construction and industrial sites.

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28. Prior to finalising the design of the relevant stage of the complex, an acoustic assessment of all potential noise sources shall be undertaken to ensure the EPA's Maximum Planning Noise Level is not exceeded.

29. Reversing alarms on vehicles involved in the construction and operation of the complex shall be located behind a panel at the lowest practical height above ground level and be directed towards the ground so that the maximum radiated sound pressure level does not exceed the vehicle's engine noise (including exhaust) by more than 10dB(A).

Archaeology

30. The two artefacts located on the site during the Archaeological survey shall be collected, analysed and stored at the Department of Archaeology and Palaeoanthropology at the University of New England in Armidale or other suitable location to the satisfaction of the NPWS, prior to the area around the artefact being disturbed.

31. The applicant shall meet the cost of the artefact collection and the writing of any subsequent analyses report required by the NPWS which examines the artefact.

32. A representative of the Tamworth Local Aboriginal Land Council shall be given the opportunity, in writing by the applicant, to monitor and investigate any areas disturbed by earthworks during the construction of the development. Should any additional relics be discovered during construction of the complex, works shall cease in the vicinity of that relic until suitable action has been taken in to protect and preserve the relic and an officer of the NPWS Northern Zone advises that work can recommence.

D. CONSTRUCTION

Airport Consideration

33. No buildings or other structures shall be taller than the maximum allowable height of structures for the site as set down in the Tamworth Airport Obstacle Height Limitations Plan.

34. All external lighting on the site shall be directed downwards with appropriate shields installed to the satisfaction of the Council to prevent radiation of glare in an upwards direction so as not to distract pilots on approach to the airport.

35. The materials used for external walls and roofs in the construction of any buildings or other structures on the site shall be non-reflective to the satisfaction of the Council to avoid distraction to air crews.

36. All large water/effluent storage tanks or dams and solid waste receptacles must be constructed and covered so as to not present an attraction to birds.

Fire Protection

37. Bushfire breaks shall be established and maintained around the complex as specified in the **Emergency Plan.**

Contributions

Note: A compliance certificate under Division 2 of Part 3 of the Water Supply Authorities Act 1987 must be obtained from the Council (as the local water supply authority) certifying that the requirements of that Division have been complied with. Under S. 27 (1) (d) of that Act, the Council may require a payment towards the cost of such works, or the construction of those works before it grants a compliance certificate.

All payments must be received prior to release of the Building Application and all works completed prior to the occupation of the development.

Complex Design

38. All equipment installed and used in the complex shall be operated and maintained in accordance with the manufacturers specifications and good engineering practice.

39. Stage 4 of the complex (Poultry Processing Plant) shall be designed and operated in accordance with the Model Code of Practice for Livestock at Slaughtering Establishments prepared by NSW Agriculture as it applies at the time of development of this stage and to the satisfaction of NSW Agriculture.

Dangerous Goods

40. The on-site storage and handling of dangerous goods shall be in accordance with all relevant Acts, Regulations, Australian Standards and Industry Guidelines and is to meet the licence requirements of Workcover.

41. The gas pipeline to the complex shall be installed with an excess flow valve at either the source of the gas or at the property boundary to provide for the shutdown of the line due to excess flow as a result of a break in the line or other cause.

42. Any increase in the quantity of Dangerous goods on the site shall be subject to the screening process of SEPP 33 Hazardous and Offensive Industries as outlined in the Department's publication "Applying SEPP 34" and the necessary approval procedures followed as appropriate.

    Note: *For example, the installation of an ammonia refrigeration plant during a subsequent upgrade should be subjected to the above screening procedure. The requirements of other relevant agencies such as WorkCover and the EPA may also need to be met.*

Utility Services

Water

43. The water supply to be used by the development is to be provided by the Council in accordance with its requirements.

Roads, Access and Parking

44. Roadworks are to be carried out in accordance with the specifications listed in the RTA letter dated 8 May, 1997, included in Appendix One of the EIS and to the satisfaction of the RTA.

45. The roadworks for stage 1 of the complex shall be completed prior to any construction works commencing on the site and shall include the following:

- a type "AUR" right turn treatment constructed on State highway 11 (Oxley Highway) in accordance with figure 4.8.16 of the Authority's Road Design Guide 1991. This design is to be read in conjunction with figure 4.5.3(a), Rural Type Layout, of the above publication;
- the access road shall be sealed from the property boundary to the bitumen edge of the Oxley Highway;
- the access road shall be designed in accordance with the Authority's Road Design Guide 1991 "BAL" Figure 4.8.26;
- the access road must be able to accommodate the turning movements of B-Doubles so that no portion of the B-Double will cross the centre line of the Highway when making left turns into or out of the site.

46. Road works for stages 2, 3 and 4 of the complex shall be completed prior to the completion of any construction for stage 2 of the development and shall include the following:

- a type "CHR" right turn treatment constructed on State Highway 11 (Oxley Highway) in accordance with figure 4.8.17 of the Authority's Road Design Guide 1991;
- an acceleration lane discharge will also be required from the access road onto the Oxley Highway in accordance with the Road Design Guide Figure 4.8.11.

47. Parking areas shall be established on site for all vehicles expected to use the site with a minimum of 280 car and 20 truck spaces to be provided for the total complex. A program for the provision and construction of on-site car parking shall be submitted to and approved by the Council prior to each stage. Sufficient parking spaces shall be provided for each stage of the development prior to that stage of the complex commencing.

48. All internal roads, driveways, parking areas, loading bays and vehicular turning areas are to be constructed in accordance with the requirements of the Council.

49. The access road from the Oxley Highway to the complex is to be tar sealed and designed to accommodate two passing semi-trailers to the satisfaction of the Council. A 1 metre wide, graded, gravel shoulder is to be constructed on either side of the road.

50. All parking spaces shall be marked out on the pavement surface and their location clearly indicated by appropriate directional signs.

51. The construction of all road works, access roads and parking areas for each stage of the development shall be completed prior to that stage of the complex commencing operation.

52. Internal roads, driveways, parking areas, loading bays and vehicular turning areas shall be maintained clear of obstruction and used exclusively for the purposes of parking, vehicle access and loading and unloading respectively and under no circumstances are such areas to be used for the storage of goods or waste materials or other purposes.

53. During the construction phase of the new access road and "turnout" to the Oxley Highway, warning signs advising people of road work activities are to be provided in appropriate locations along the Oxley Highway in accordance with the RTA's publication "Traffic Control at Work Sites".

54. The cost of all road works and warning signs is to be borne by the applicant.

Electricity

55. Electricity is to be provided to the site in accordance with the requirements of and to the satisfaction of NorthPower.

Note: A connection agreement is to be entered into with NorthPower which complies with the provisions of Chapter 5, Network Rules of the New South Wales Electricity Market Code.

E. MONITORING

Environmental Monitoring Program

56. Prior to stage 1 of the complex commencing operation, an **Environmental Monitoring Program** is to be prepared and approved by the Director-General in consultation with the Council, the EPA and the DLaWC. The **Environmental Monitoring Program** is to include:

- baseline information on the quality of soil and water on the site (including groundwater) and dust deposition rates prior to any earthworks being undertaken on the site;
- details of the components in the complex to be monitored;
- details of the timing and procedures for the monitoring of the complex;
- information on the people proposed to undertake the monitoring including their qualifications and experience in the particular field relating to the monitoring;
- details of the periods for monitoring the various components.

- the drainage control measures during and after major storm events;
- whether offensive odour, as defined in condition 24, has been emitted from the complex;
- the effectiveness of the **Soil and Water Management Plan**; the **Waste Management Plan** and the **Emergency Plan** prepared in accordance with conditions of this consent.

58. Prior to the commencement of further stages of the development, the **Environmental Monitoring Program** shall be reviewed and if appropriate amended, in consultation with the relevant government agencies, to include monitoring for the subsequent stages. Any amended **Program** shall be approved by the Director-General.

59. The **Environmental Monitoring Program** shall be implemented during the operation of the development to the satisfaction of the Director-General.

Note: *Base line data to the satisfaction of the EPA and the DLaWC will need to have been obtained prior to any construction occurring on the site.*

60. All monitoring required under the **Environmental Monitoring Program** is to be undertaken by a suitably qualified person agreed to by the Director-General.

61. If monitoring shows that the EPA Pollution Control Licence limits or other pollution requirement are not being met, the relevant agency is to be consulted immediately. Within a time frame set by the agency, amelioration work is to be carried out to their satisfaction as long as the work is generally consistent with this consent.

62. Within 3 months of monitoring showing that an **Environmental Management Plan** or aspects of the **Plan** are not effective, the applicant is to revise the **Plan** and re-submit it to the relevant government agency or Council for approval.

F. MONITORING REPORT

63. An annual **Environmental Monitoring Report** shall be prepared and made available to the EPA, the DLaWC, the Council and the Director-General. The **Report** shall containing all monitoring results arising from the implementation of the **Environmental Monitoring Program** including a review of the development's performance against conditions of this consent and any conditions applying to any EPA licenses. It shall also include a summary of the enquiries and complaints from the public and the dates on which they occurred and the actions taken by the applicant and the date on which the actions were performed.

64. The raw data presented in the **Report** is to be interpreted to a level which identifies the extent of the environmental impacts, if any, caused by the development to the satisfaction of the Director-General.

G. MAINTENANCE

65. All facilities at the development site including effluent pipelines and drains, stormwater and diversion drains, pumps, sumps and bund walls shall be inspected on a weekly basis and after any significant rainfall event. Maintenance work is to be carried out immediately

if any facility is not operating to its design capacity.

66. The development site is to be maintained at all times so health risks to both people and birds are avoided.

67. A record of all maintenance site inspections and any completed maintenance work is to be kept and included in the annual **Environmental Monitoring Report** required by condition 63 of this consent.

H. COMMUNITY CONSULTATION

68. The applicant shall establish a complaints protocol to the satisfaction of the Council, including the appointment of a complaints officer and the maintenance of a complaints and enquiries register which is to be used to record details of all enquiries and complaints received from members of the public and actions taken in response to such complaints. The applicant is to address all enquiries and complaints within 2 weeks of receiving them.

I. INDEPENDENT ENVIRONMENTAL AUDIT REPORT

69. The Director-General may request in writing, that the applicant make arrangements for and bear the cost of, an independent **Environmental Audit** of the development. On receipt of such a request the **Audit** is to be carried out by a qualified independent person or persons approved by the Director-General.

70. The results of any independent **Environmental Audit** are to be documented in a report which includes a review of the development's performance against conditions of consent and the conditions of any other licenses or other approval from the relevant government agency or Council.

71. Within a time frame notified by the Director-General the applicant shall comply with any requirements of the Director-General arising from, or recommended by the **Environmental Audit**.

J. DISPUTES IN CONDITIONS

72. Any dispute arising between the applicant and government agencies or Council over the interpretation of these conditions, shall be referred to the Director-General for final resolution.

General Notes

- *This approval does not relieve the applicant of the obligation to obtain other approvals required under any other Act.*
- *Any agreement referred to in this consent is expected to be implemented and will be followed up by the Department.*
- *To ascertain the date upon which the consent becomes effective refer to section 93 of the EP & A Act.*
- *To ascertain the date upon which the consent is liable to lapse refer to section 99 of the EP & A Act.*
- *Any agreement referred to in this consent is expected to be implemented and will be followed up by the Department and the Council.*

Reasons for conditions:

- *To protect the environment and minimise adverse impact.*
- *To modify details of the poultry processing complex development.*
- *To provide for environmental monitoring and reporting on the performance of the development.*
- *To ensure that concerns by the public about the operation of the complex are adequately addressed.*

Right of appeal:

- *If you are dissatisfied with this decision, section 97 of the EP & A Act gives you the right to appeal to the Land and Environment Court within 12 months after the date on which you receive this notice.*

APPENDIX 2

APPROVED PLAN OF DEVELOPMENT

1. FEATURE AREA OF PLANTING WITH BOTH SILKY OAK & JACARANDA THE TREE FLOWERING COLORS ALSO REPRESENT BAIADA PTY LTD CORPORATE COLORS

2. AREA OF ORIGINAL VEGETATION DOMINATED BY BLAKLEYS RED GUM INCREASED PLANTING OF BLAKLEYS RED GUM FOR WOODLAND EFFECT

3. ORIGINAL ..KBURN HOMESTEAD SITE DOMINATED BY KURRAJONG TREES INCREASED PLANTING OF KURRAJONG & WILGA TREES IN THIS AREA

4. SCREEN PLANTING TO CAR & TRUCK PARKING AREAS USING MIXED HAKEAS, MELALAEUCAS & BOTTLEBRUSHES IN ADDITION TO TWO NON-NATIVES

5. MOULDED GARDENS BETWEEN EACH PARKING AREA USING A MIXURE OF SMALL TO MEDIUM SIZE SHRUBS & GROUND COVERS

6. CLUMPED PLANTING OF RIVER SHE OAK OR SILVER BIRCH WITH NANDINA DOMESTICA & GOLDEN DIOSMA IN FOREGROUND

7. SCREEN PLANTINGS OF PORT JACKSON PINE & A MIXTUR OF SMALLER NATIVE SHRUBS

8. STAFF AREA WITH PLANTINGS OF DECIDUOUS TREES & SHRUBS FOR SUMMER SHADE & WINTER SUN LIGHT

9. NATIVE SCREEN PLANTINGS USING A MIXTURE OF WATTLES BOTTLEBRUSHES GREVILLEAS HAKEN MELALEUCAS WILGAS & MYALL SHRUBS & TALL TREES OF MIXED EUCALYPTUS WHITE BOX YELLOW BOX BLAKELYS RED GUM & PINK FLOWERING IRONBARK

10. NATIVE SCREEN PLANTINGS USING A MIXTURE OF WATTLES BOTTLEBRUSHES GREVILLEAS HAKEN MELALEUCAS WILGAS & MYALL SHRUBS & TALL TREES OF MIXED EUCALYPTUS WHITE BOX YELLOW BOX BLAKELYS RED GUM & PINK FLOWERING IRONBARK

11. PLANTED TO FEATURE A MIXTURE OF FLOWERING EUCALYPTUS TREES UP TO 20m HIGH

12. TALL EUCALYPT TREE PLANTINGS

SITE PLAN 1.2000

SITE PLAN FOR PROPOSED POULTRY PROCESSING COMPLEX AT OAKBURN OXLEY HIGHWAY TAMWORTH

Baiada
select poultry

STRUCTURAL ENGINEER :

W.J. BRYAN B.E. (Syd.) M.I.E. (Aust.)
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DATE: 18 AUG 1997
SCALE: 1 : 200
REF No:

APPENDIX 3

AJM ENVIRONMENTAL SERVICES PROPOSAL

Baiada Poultry Pty Ltd
642 Great Western Highway
Pendle Hill
NSW 2145

11th February 2008

Attention Grant Onley / Dean Kent

RE: Oakburn wastewater treatment plant

Dear Grant,

Further to recent correspondence, meeting and discussions we are pleased to revise the proposal for the upgrade of your wastewater treatment plant at Oakburn.

1 Design Parameters

The initial design was based on 140KL/day and BOD: N: NH3 loading of 3000:350:350 mg/L respectively. These loadings were based on a combination of test work, performance of the existing DAF and experience and are relatively conservative.

You have now advised that the flow will increase to 250KL following the installation of a new cooker. It is assumed that the water characteristics will remain the same following this upgrade.

Some of the main features of this report include

- The system offered is designed to fully comply with council discharge requirements and guarantees are offered to meet council discharge limits.
- The system is fully automated. Daily checks are required on levels, pH and DO which can be conducted via the HMI in a few minutes.
- Sludge bin movements have been limited to less than one per day for both DAF sludge and waste activated sludge combined and a new dedicated sludge handling process has been included.
- A new switchboard has been included to operate all aspects of the new plant operating via PLC with HMI. AJM will have facility to dial into the program and monitor the performance of the plant remotely. This can allow AJM to predict and prevent potential process problems.

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- Chemical dosing systems have been designed to minimise operator involvement to less than an hour a week.
- The system is designed to comply with all necessary Australian standards.
- All concrete tanks are of a high quality industrial grade complying with AS3735.
- The system is designed to comply with all other statutory requirements including OH&S guidelines for storage and handling of class 8 corrosive chemicals.
- The new building is supplied complete with ventilation, lighting, hoses and other equipment as generally considered necessary for operation of a wastewater treatment plant.

2 Performance guarantee

The final effluent quality from the system offered will comply with the target specified in the table below.

Analyte	Current council requirements mg/L	Target mg/L
Ammonia	50	50
BOD	600	500
O&G	100	80
TKN	100	80
Total P	20	20
SS	600	500
TDS	1000	1000

3 Process

The treatment processes necessary remains as screening followed by DAF and an aerobic process. There is no other economical option.

The individual process operations discussed below are:

- Screening
- Balance tank
- DAF
- Biological treatment
- Sludge dewatering
- Chemical dosing
- Electrical control system

3.1 Screen

As previously mentioned, the screen is suitable to reuse. It is proposed to maintain the existing screen in the existing shed.

3.2 Balance tank

With a flow rate of 250KL/hr, the existing balance tank is too small. Even at 130KL/day, 100KL total balancing capacity (realistically 60-70KL effective) is inadequate. The initial tender included a second 100KL tank installed next to the existing balance tank with the intended process being to transfer the wastewater from the first tank to the second tank allowing a greater degree of cooling as well as equalising the flow. Larger balancing facilities have a benefit of allowing water to be stored if any part of the plant malfunctions. This design is retained with the increase flow.

3.3 DAF

The existing DAF system is too small to accommodate the increase in flow and needs replacing. It is also a council requirement that the DAF system operates during the course of the upgrade and as such cannot be relocated without resulting in considerable cost for disposal of waste off site during any decommissioning. The DAF will be replaced with an AJM EnviroDAF4800. This is larger than the system previously offered and can handle up to 20KL/hr.

3.4 Biological system

In order to meet the discharge requirements, the SBR will need a capacity of 1.2ML with a HRT of ~4 days, This capacity is more due to the high nitrogen load rather than BOD. An anoxic tank with a capacity of 50KL is required. The anoxic tank is installed upstream of the SBR and is essential for nitrification. Sludge is returned from the SBR back to the anoxic tank periodically to ensure effective nitrification.

SBR design details

Design parameter	Design value Unit
Flow	250KL/day
Bio-adsorption tank volume	50KL
SBR working volume	1155 KL
SBR working depth (TWL)	3.3 m
Sludge retention time	30- 40 days
Reactor effluent suspended solids concentration	4000-5000 mg/L
Maximal daily oxygen requirement	410 kg O_2/d

3.5 Sludge dewatering

We discussed the sludge dewatering options during our recent meeting. AJM's original tender allowed for a second dewatering machine to dewater the waste activated sludge leaving the existing press to dewater the DAF sludge. This is the normal method of

handling primary and secondary sludge in industrial applications as the sludges possess very different characteristics and require opposite charged polymers to flocculate. If sludges are blended, the performance will be generally poor (ie quite wet and not suitable for land fill – it is understood that currently the sludge requires adding sawdust to allow compliance) and unless the sludges are blended in the same proportion at all times, the system will, without doubt fail.

The only possible way of utilising a single belt press is to batch dewater the sludge. Ie dewater DAF sludge for a period of time followed by WAS. A complication to this option is that the existing belt press is not designed with a gravity drainage zone. This means that the sludge cannot be pumped directly from the SBR onto the belt press and requires pre-thickening in a storage tank.

AJM conducted calculations on the expected volumes of sludge that will be generated by the DAF and the SBR to evaluate the operation of a belt press used in this configuration. These calculations are summarised below.

	Current	250KL/day
Sludge volume calculations		
Sludge off DAF at 8% (assumed)	6000L per day	12000L per day
DAF sludge cake volume (assumed 15%)	3T per day	6T per day
WAS mass from SBR (as DS)	n/a	364Kg per day
WAS volume removed from the SBR at 1% DS per day	n/a	21640L per day
WAS sludge storage tank required	n/a	40KL
WAS volume dewatered (at 11%)	n/a	3.308T per day
Press operating hours		
Press operating hours for DAF sludge per day	Continuous	10 hours
Press operating hours for WAS	n/a	10 hours every 2 days)
Bin Movements (based on 1 m^3 bins		
Total number of 1m^3 bins for DAF sludge per day	3 per day	6 per day
Number of 1m^3 bins required for WAS every two days	n/a	7
Total number of bin movements on day when only DAF sludge is dewatered	n/a	6
Total number of bin movements on day when DAF sludge and WAS is dewatered (every second day)		13

The calculations stated above show that in effect, on the day when WAS is to be dewatered, the press will be operating at full capacity for 20 hours and if 1 cu.m bins

are used, up to 14 bin movements will be required per day. This is considered to be unacceptable and it is necessary to investigate alternative options.

(Please note that the figures are based on a BOD load entering the SBR of 4000mg/L. This is worst case scenario as was stated in the original tender. It is possible that the WAS could be up to 25% lower.)

3.5.1 Ideal sludge arrangement

The calculations indicate that using the existing press only is not appropriate and a second dewatering system is required.

The existing press is suitable for handling the DAF sludge and it is proposed this is maintained, although sludge will be transferred from the DAF to the sludge tank to prevent the continuous operation.

The ideal WAS dewatering system is a GDD belt press. This is a unit that thickens the sludge prior to dewatering hence, allows WAS to be pumped directly from the SBR onto the press and avoiding the need for a secondary sludge thickening tank. A 0.5m unit is an adequate size system.

With two belt presses installed, based on the above calculations, up to 6T of DAF sludge will be generated per day and 3.5T of WAS. As discussed with yourself and operators using $1m^3$ bins is not acceptable.

It is therefore proposed to install the two belt presses in line with a common sludge conveyor that will transfer the sludge to a slewing conveyor. The slewing conveyor will allow the sludge to be directed into a single 6 or $10m^3$ bin without the need to manually rake sludge in the bin. Alternatively two bins can be used if the sludges have different outlets.

It is important to note that sludge bins should not be located in an open area. It is inevitable that water will seep from the bins at some stage and as such, the bin must be contained. The layout drawing shos the bin located on a concrete slab under a lean to roof.

Photographs of similar systems AJM has installed can be found at the end of this report.

3.6 Chemical dosing

A total of 5 chemicals will be used in the new design, These are, acid, ferric, caustic (commodity chemicals), anionic polymer and cationic polymer.

3.6.1 Commodity chemicals

The existing chemical usage and expected usage are stated in the table below:

	Current Advised Weekly usage (125KL/day)	Expected usage based on 250KL/day
Ferric	2000L	3000L
Acid	nil	1000L
Caustic	1000L	2000L

These chemicals will be supplied in bulky bins as per the current arrangement. AJM will supply proper bunding and new dosing pumps for all chemicals. Low level alarms for each IBC will be supplied. Any existing dosing pumps can be retained on site and used as standby in the event of failure.

3.6.2 Flocculants

The primary process of DAF and DAF sludge dewatering requires the use of a anionic polymer. A cationic polymer is used for WAS dewatering.

3.6.2.1 Anionic

The current polymer usage is probably excessive mainly due to the belt press operation and we expect that a reduction in the order of 20-30% will be made following the reconfiguration of the DAF and belt press operations. Nevertheless, the current operations of refilling the polymer tank up to 6 times a day is unacceptable from an operational point of view.

It is therefore proposed to supply a new automated polymer system. This system is designed to draw polymer from 200L drums and automatically blend and dose to the DAF and the belt press. Attention to the system will be fortnightly.

3.6.2.2 Cationic

The amount of polymer required to dewater WAS is approximately 5Kg/ton DS. Based on the above calculations of 364Kg/day DS, 1.82Kg of polymer will be required. If polymer is diluted to 0.2%, 910L of diluted polymer is required per day, hence the existing manual system that utilises 2000L tank will be suitable. It is proposed to reuse all of the existing polymer dosing system for the cationic polymer.

3.7 Electrical switchboard

The existing control system has been modified many times over the course of the last few years and now comprises 4 or 5 panels based on basic relay logic and integrated together. The panels are located outside and most do not comply with Australian standards nor have suitable IP ratings.

AJM propose that an entirely new switchboard be designed and manufactured for the complete new plant. This board will be of F2 type design with segregated mains, PLC,

VSD and circuit breaker panels and operate via PLC control. An HMI will be supplied to allow access to various timers without the need to access the PLC code via a laptop should any changes to the operation be necessary.

The panel will contain manual on/off/auto switches for all drives and all pH controllers, level indicators etc will be displayed on the board or via the HMI.

A photograph of a similar panel can be found at the end of this report.

3.8 Discharge to sewer

Treated wastewater will be discharged to sewer via the existing discharge tank and flow meter.

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4 Plant arrangement

An important consideration in the design of the upgrade is the Occupational Health and Safety of workers and operators. As previously discussed, it is proposed to isolate the screen from all other aspects of the plant by leaving it in the existing building.

The new balance tank will be located adjacent to the existing tank and access ladders supplied.

The DAF, existing belt press, new belt press, new and existing polymer systems, various process pumps and the electrical switchboard will be located in the new building. It is proposed to install the new building 1m from the existing building (not as previously shown on preliminary drawings.)

The chemical bunds will be located outside the building and facility to store up to 1 x $10m^3$ bin will be supplied on a concrete slab under a lean to roof.

The SBR and anoxic tanks will be located behind the existing discharge tank.

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5 Scope of Works

The scope of the contact offered is based on a turnkey operation, ie it includes all design works plus all mechanical electrical, ground and civil works to complete the projects including a new building.

Some parts of the current plant will be reused and these are clearly identified herein.

The only exclusion to the scope is the provision of a new power supply to the plant and ensuring that all other services meet the design requirements.

The price stated is based on constructing the plant generally in accordance with the layout drawing attached. Significant changes to this layout may result in cost variations.

5.1 Main plant and site works required

5.1.1 General ground works

The area where new tanks and concrete slabs will be installed will be subjected to a geotechnical study. Top soil will be stripped and remediated followed by road base compaction for all slabs and tank bases to suit.

AJM has not allowed to remove surplus soil from site.

5.1.2 Existing building

The existing factory sump, pipework to the screen, the screen, the screened water tank and pumps and controls that allow the screened water to be transferred to the balance tank will be maintained in their location and operational following the upgrade.

A new wash water line will be installed to allow automatic washing of the screen and using recycled water.

Once the project is completed, AJM will remove the DAF, reaction tanks and other redundant equipment from the room. This will be done in conjunction with Baiada utilising Baiada forklift to load the equipment onto a suitable vehicle. The cost of the disposal of the equipment will be to Baiada's account.

A provisional cost for installation of a suitable fan and ducting has been stated in the commercial section to allow the air inside the room to be ducted to the exiting biofilter. This work has been quoted as a provisional cost as our experience shows that estimating costs to conduct work in old and somewhat corroded buildings, is difficult.

The existing pit in the corner of the room that currently contains the pump that transfers the DAF treated water to the existing discharge tank will remain as a drainage pit. The same pump will be reused but the discharge diverted to the screened water tank.

No allowances have been made to conduct any modifications to the main building, doors, lighting or any other services in this area.

5.1.3 Balancing tank / sludge tank area

The blower and sparge pipes currently installed (but not being used) in the existing balance tank will be removed.

A new mixer will be installed on a suitable bracket to mix the balance tank. A pressure transducer will be installed to monitor the level in the balance tank. The tarp will be removed and a new galvabond steel roof will be installed.

The ground adjacent to the existing tank will be leveled and compacted for installation of a new 100KL tank. The tank will have the same dimensions as the existing tank and constructed in concrete with a galvabond steel roof.

A mixer will be installed in the tank and level control will be via a pressure transducer.

A galvanised platform will be installed with a concrete landing pad in between the two balance tanks. Access to the mixers will be available from the platform.

Two mono helical rotor feed pumps (VSD operated) will be installed adjacent to the platform.

A trench will be dug between the tank area and the new building for installation of pipework and electrical services.

A galvanised pipework support structure will be installed between the existing balance tank, sludge tank and the existing shed. This structure will support all existing pipework, new pipework and electrical conduit as necessary.

The sludge tank will be reused (as a buffer between the DAF and the belt press) The existing mixer and helical rotor pump will be used. (it is understood that Baiada will be installing a new shaft / impeller shortly.) A new pressure transducer will be installed to monitor the level in the sludge tank.

5.1.4 New Building equipment including dosing

The new building will contain the new DAF, WAS belt press, existing belt press, polymer systems, pumps and electrical switchboard. The commodity chemicals will be stored in bulky bin bunds located adjacent to the main building.

5.1.5 Building and civil works

The main building will measure approximately 8m x 8m x 4.2m high. As per the general arrangement the building will be supplied with two pedestrian doors. The sludge bin area will be covered by a lean to roof only measuring approx 5m x 8m supported off the main building.

The building will be an I/R series gable type with 10 degree roof pitch. Storm water will be directed on the ground at the rear of the building.

The ground will be excavated, levels and compacted and a concrete slab (with building footings) measuring approx 13x8m plus an additional 5m x 2.5m will be constructed as per the layout drawing for the chemical bunds. A kerb will be constructed around the entire slab with all drainage falling to a new sump.

5.1.6 DAF

The DAF system offered is an AJM EnviroDAF4800. This unit will be fully assembled and tested prior to dispatch and be fitted with the following components and accessories.

- 304 Stainless steel DAF tank
- Surface scrapers and stainless steel guards
- One 304 stainless steel reaction tank fitted with mixer
- One stainless steel pH correction tank
- 304 Recycle system comprising DAF recycle pump, dissolved air contactor, air control panel, air compressor, pressure reduction valve and stainless steel interconnecting pipework
- 1 x emergency stop pull wire
- Stainless steel drain valves
- One sludge pump (transfer DAF sludge to the existing sludge tank)
- One air compressor

The DAF will be positioned generally as shown on the layout drawing.

5.1.7 Polymer systems

One AJM FSH1000 SureBlend automatic polymer dosing system will be supplied and installed generally as shown on the drawing.

Mains water from the existing mains water tank will be connected to the polymer systems for dilution.

The anionic polymer system will be fitted with two pumps, one will delivery polymer to the DAF, immediately prior to the existing belt press.

The existing polymer system will be relocated to the new building for cationic polymer.

5.1.8 Other chemicals

Three AJM IBC bunds will be installed on the concrete slab adjacent to the new building. These are for storage of acid, caustic and ferric. Three electromagnetic dosing pumps will be supplied and mounted at the rear of the bund. Suction wands with low level alarms will be provided and installed in the IBC's. The discharge lines will be connected to the appropriate location at the DAF.

A roof will be installed over the IBC bunds.

5.1.9 Belt presses

The WAS belt press offered is the AJM Huntsman500. This is a high quality stainless steel unit fitted with a trommel for pre thickening of the sludge.

The existing belt press will be relocated into the new building.

The belt presses will be installed in line with a common conveyor at the discharge. This will convey the sludge into the inlet of a slewing conveyor located outside the building. The slewing conveyor will have the facility to discharge sludge across a $10m^3$ bin.

5.1.10 Pumps

Other pumps installed within the building include:

- Wash water pump - Grundfoss pressure system
- Waste activated sludge pump – helical rotor 1.2/s
- Return sludge pump – centrifugal 0.7L/s
- Sump pump - submersible

5.1.11 Other ancillary items supplied and installed in the building

- One safety shower will be supplied and located adjacent to the chemical bunds and one safety shower inside the building.
- One laundry style wash basin
- One 15m hose (connected to the mains water supply tank)
- Lighting to 200 lux
- Single phase GPO's located as appropriate
- 1 x three phase GPO

5.1.12 SBR, anoxic tank and discharge tank

Works associated with the sludge dewatering area include; excavation and leveling of the ground for the new tanks and construction of new concrete tanks on site.

A platform will be constructed to allow access to the top of all three tanks.

The anoxic tank will have a capacity of 50KL and be fitted with transfer pumps, a mixer, level control and pH control. No roof will be supplied.

The SBR will be fitted with a submerged weir decanter, 2 x surface aerators, level control and pH control. An actuated valve will be installed on the decant line

5.1.13 Electrical switchboard

The electrical switchboard will be a F1 mild steel epoxy coated board with F2 type segregation. Operation of the plant will via a koyo PLC and 8" HMI.

All components will be as per AJM's standard electrical component listing.

5.1.14 Access roads

The system has been designed to allow access for sludge bin removal and chemical delivery via the existing track. No modifications have been allowed.

5.2 General Installation materials

5.2.1 Pipework details

The pipework used within the plant will be suitable for the purposes intended. Pipework will be generally copper for water mains, Class 12 PVC for low pressure process lines, PVC drainage pipework for low pressure drainage lines and stainless steel for high pressure process lines (eg DAF recycle pipework).

5.2.2 Electrical installation works

AJM will conduct all electrical installation works with the exception of supply and connecting power to the new switchboard.

All electrical works will comply with AS3000.

5.2.3 Fasteners / brackets etc

All fasteners and brackets will be fit for the purposes intended and generally galvanised mild steel will be used.

5.2.4 Signs and labels

The entire plant will be labelled and signed suitably including:

- All pipework will be labelled with the product and direction of flow.
- All tanks, pumps, valves and instruments will be labelled with tag numbers for easy identification.
- Building entry doors will be suitable marked.
- All HAZCHEM signs as necessary.

5.3 Project Management

The project would be managed jointly by AJM Head Office in Sydney and the site office.

The scope of works includes the following:

- Development of site safety plan. Safety plan to incorporate procedures, inductions, hazard assessments and Incident Management.
- Development of Project Management Plan, covering aspects of design control, purchasing, inspection and corrective action.
- Detailed process, mechanical, electrical and civil design
- Preparation of P+ID
- Preparation of plant layouts, pipework layouts, civil, electrical and mechanical detail drawings
- Site co-ordination of sub-contractors
- Attendance at regular site meetings as required/practical
- Submission of comprehensive operation and maintenance manuals

- Submission of Standard Operating Procedures
- Operating training, including training manuals and classroom type tutorials
- As built documentation

5.4 Commissioning and Performance Testing

Commissioning would be carried by AJM's commissioning team, which comprises of process, electrical and mechanical engineers.

The SBR would be seeded with biomass from the local area. Steady state operation with nitrogen removal will take between 20 – 30 days. During this time, AJM shall attend site as required.

During the commissioning period Baiada staff would be involved with the day to day operation of the upgraded plant, alongside the commissioning team. This would enable the site staff to gain an understanding of the new process equipment and SBR operating procedures.

5.5 Training

Comprehensive operation and maintenance manuals would be provided to Baiada as well training sessions to fully explain the operating aspects of the treatment plant.

The training sessions would include classroom type and hands on tutorials that focus on:

- Process Design
- Functional Description
- Troubleshooting
- Optimisation
- Maintenance
- Servicing
- Control System Operation

Approximately 2 days has been allocated for training.

5.6 Other conditions of contract.

- Unless otherwise stated, the equipment will be delivered on a semi trailer or other suitable vehicle and the cost of craneage for off loading and positioning the goods is included in AJM's scope of supply. It is assumed that the client's fork lift is available for occasional use free of charge. If applicable, any costs associated with traffic management during delivery of the goods are the responsibility of the client.
- Unless otherwise nominated as being supplied by AJM, any platforms, stairs, ladders, steps to provide access to the treatment plant area and treatment plant for operation and maintenance purposes are to be designed and supplied by the client.

- The supply, installation and connection of mains power to AJM's switchboard is the responsibility of the client. This includes assessment of the suitability of the existing power supply and if necessary, any upgrade required.
- The provision any applicable services including water and sewer to the treatment plant boundary at rates, pressures or quantities as nominated by AJM is the responsibility of the client. The mains water supply must be fitted with backflow prevention to meet the requirements of local authorities.
- Any client owned existing equipment that has been identified as being suitable for reuse in the plant offered herein is assumed to be good working order. AJM has not allowed for any costs to service, upgrade or replace any parts for any such equipment.
- It is assumed that any site amenities including lunch room toilets and bins for miscellaneous rubbish and provision of construction power and water will be supplied by the client free of charge.
- No allowances for painting of pipework have been made in the quotation. Labelling of pipework will be as per AJM's standard.
- Unless otherwise stated, AJM has not allowed to supply any fire protection equipment, wash down hoses, permanent plant lighting or lightening protection equipment in this quotation.
- AJM has not allowed for dangerous goods approvals under this contact.
- AJM has not allowed for any noise testing and attenuation of any equipment unless otherwise stated herein.
- AJM has not allowed for the supply of any chemicals under this contract.
- Unless otherwise described herein, documentation supplied under this contract extends to the supply of as built electrical line diagrams, plant layout drawings, main equipment general arrangement drawings, operation and maintenance manuals and PLC code (if applicable). All documentation will be supplied under AJM's standard format. PLC cables and software have not been allowed for.
- Commissioning of the system is included. If commissioning of the system is delayed by reasons beyond the control of AJM, AJM reserve the right to claim additional costs.
- The goods and services designed and supplied will be in accordance with AJM's standards and fit for the purposes intended. If applicable, AJM reserve the right to adjust any pricing to comply with any client specifications.
- The insurance of all goods purchased goods under this contract whether installed or not, once on site are the responsibility of the client.
- Unless otherwise stated herein, it is assumed that the client will obtain all necessary council and government approvals as required.
- AJM do not conduct site works under any form of Enterprise bargaining agreement.
- No security or retention payments have been allowed for in this quotation.
- This quotation is based on normal Monday to Friday working hours. If the client requests for whatever reason that work is to be conducted outside normal working hours, additional charges will apply.

6 Commercial

6.1 Validity

This quotation is valid for thirty (30) days from the date of this letter and is subject to written re-confirmation thereafter. **AJM's "General Terms and Conditions of Sale" apply to this quotation**.

6.2 Pricing Schedule

AJM's price to supply the equipment and conduct the works as described herein is:

(One million three hundred and sixty five thousand dollars) AU$1,365,000.00

6.2.1 Price breakdown

	Item	Cost
1	All Ground works for tanks, slabs, trenching etc	$75,000
2	SBR tank 1500KL c.w aeration and decanter	$455,000
3	Balance tank c/w mixing / roof	$32,000
4	Anoxic tank with roof	$26,000
5	Main concrete slab inc bunding area, bin area, pits, kerbs, footings and miscellaneous	$78,000
6	Building inc lighting, services, hose , sink etc	$72,000
7	DAF system	$109,000
8	WAS belt press	$75,000
9	Sludge conveyors	$35,000
10	Automatic polymer system	$25,000
11	IBC bunds and new dosing equipment	$30,000
12	Misc transfer pumps / mixers	$35,000
13	Instrumentation including level, pH, DO, actuated valves, pressure	$30,000
14	Electrical switchboard including programming	$98,000
15	Mechanical and electrical installation labour and materials	$150,000
16	Testing, commissioning, manuals, project management etc	$40,000
	Total	**$1,365,000**

6.3 Good and Services Tax

All prices stated in this report do not include GST. GST will be applied to all invoices at the appropriate rate.

6.4 Construction Period

The time to practical completion is7-8 months. Commissioning will take up to 1 month. A full program can be discussed at a later stage.

6.5 Terms of payment

The following terms of payment will apply to this contract unless otherwise agreed in writing.

Thirty (30) per cent with order, payable nett 7 days followed by progressive monthly payments. 10% retention for final proof of performance.

We trust that this quotation meets your approval and look forward to further discussions with you

Regards

Andrew Miley
Director

APPENDIX 4

TAMWORTH COUNCIL CORRESPONDENCE

REGIONAL COUNCIL
Tamworth
ABN: 52 631 074 450
More than just a city. More than just one place.

Elaine Dickson
Baiada Poultry Pty Ltd
PO Box 21
Pendle Hill NSW 2145

Dear Elaine

APPROVAL OF TRADE WASTE EFFLUENT IMPROVEMENT PLAN SUBMISSION FOR BAIADA RENDERING PLANT, GUNNEDAH ROAD, TAMWORTH.

Ref: DCLF13650

Please be advised that Council has had an external consultant review the proposed effluent improvement plan as per clause 7(b) of the Agreement to Prepare an Effluent Improvement Plan for the above mentioned property. Council has concluded the information submitted does satisfy the initial requirements for the trade waste effluent improvement plan for the site. Council however accepts no liability if the proposed trade waste treatment system does not perform to the standards detailed in the effluent improvement plan submission. All liability remains with Baiada to ensure the proposed waste treatment upgrade is constructed, commissioned, maintained and operated to a standard that ensures effluent discharged to Council's sewer meets Council's trade waste acceptance criteria.

As per clause 7(c) of the agreement Council now request Baiada to apply for a trade waste approval for the property. Please find attached with this letter a liquid trade waste application to be completed as soon as reasonably practical. Baiada may also require Development Approval and should contact Council's Environment and Planning Department for clarification in regard to this.

Failure to complete the application for trade waste approval and any planning approvals within a reasonable timeframe may lead to all deferred non-compliant charges being raised and all future trade waste charges being raised as per Council's policy to discharge trade waste.

If you have any queries in relation to this matter please contact me on the details below.

Yours sincerely

Daniel Coe
Water Engineer
Contact: (02) 6767 5818

10 April 2008

APPENDIX 5

SITE SURVEY

DATE OF SURVEY: 21st–22nd October 2003
CONTOUR INTERVAL: 0.2m

10 00 10 20 30 40 50 60 70 80 90 100

REDUCTION RATIO
1:1000

I.S.G.

IMPORTANT NOTES & CAUTIONS:–

1. THE PLAN HAS BEEN PREPARED AT A REDUCTION RATIO OF 1:1000 HORIZONTAL AT A1 SIZE. THE ACCURACY OF ANY ENLARGEMENT OR OTHER REPRODUCTION MAY BE LESS THAN THAT OF THE ORIGINAL.

2. HORIZONTAL CONTROL FOR THIS SURVEY IS BASED ON A LOCAL PLANE CO–ORDINATE SYSTEM. VERTICAL CONTROL IS BASED ON THE AUSTRALIAN HEIGHT DATUM (AHD) TAKEN FROM SSM 56303 WITH A PUBLISHED HEIGHT OF 388.44m AS SUPPLIED BY THE SCIMS DATABASE. ORIENTATION HAS BEEN ADOPTED FROM MARKS SHOWN ON DP 8788642. CONTOUR INTERVAL SHOWN IS 0.2m.

3. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED BY THIS SURVEY. BEFORE COMMENCING ANY EXCAVATION OR CONSTRUCTION ON THIS SITE THE RELEVANT SERVICE PROVIDERS SHOULD BE CONTACTED FOR VERIFICATION OF THE LOCATION & DEPTH OF THEIR SERVICES.

4. NOT ALL VEGETATION HAS BEEN DEFINED BY THIS SURVEY. ONLY MAJOR TREES & SHRUBS HAVE BEEN LOCATED.

5.

THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN

Lot 2

Lot 1

Lot 3

DEP. PLAN 8 7 8 6 4 2

Registered Proprietor: Baiada (Tamworth) Pty Limited

OXLEY HIGHWAY

From Gunnedah

To Tamworth

SSM 56303
R.L.388.44 (AHD)

SSM 39850
RL 387.65

DRAWING No.: DWG3262A – 1 – 1 – TOPOGRAPHICAL SITE PLAN – LOT 1 IN DP 878642

No.	DATE	APPROVED	AMENDMENT
1			

BATH STEWART ASSOCIATES
Pty Ltd Inc in NSW A.C.N. 002 745 020
SURVEYORS – PLANNERS – PROJECT MANAGERS
239 Marius Street TAMWORTH NSW 2340
Telephone 02 67665966 Facsimile 02 67665140

CLIENT: WILEY & CO PTY LTD

PROJECT: PROCESSING PLANT AT "OAKBURN"

SURVEYED: M BARWICK
DRAWN: M BARWICK

OUR REFERENCE: 03262
DRAWING No.: DWG3262A

APPROVED: DARYL BATH

TITLE: TOPOGRAPHICAL SITE PLAN
LOT 1 IN DP 878642

REDUCTION RATIO: 1:1000

SHEET No: DWG3262A – 1 – 1

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APPENDIX 6

PROPOSED SITE PLAN

DATE OF SURVEY: 21st–22nd October 2003
CONTOUR INTERVAL: 0.2m

10 00 10 20 30 40 50 60 70 80 90 100

REDUCTION RATIO
1:1000

I.S.G.

IMPORTANT NOTES & CAUTIONS:–

1. THE PLAN HAS BEEN PREPARED AT A REDUCTION RATIO OF 1:1000 HORIZONTAL AT A1 SIZE. THE ACCURACY OF ANY ENLARGEMENT OR OTHER REPRODUCTION MAY BE LESS THAN THAT OF THE ORIGINAL.
2. HORIZONTAL CONTROL FOR THIS SURVEY IS BASED ON A LOCAL PLANE CO–ORDINATE SYSTEM. VERTICAL CONTROL IS BASED ON THE AUSTRALIAN HEIGHT DATUM (AHD) TAKEN FROM SSM 56303 WITH A PUBLISHED HEIGHT OF 388.44m AS SUPPLIED BY THE SCIMS DATABASE. ORIENTATION HAS BEEN ADOPTED FROM MARKS SHOWN ON DP 8788642. CONTOUR INTERVAL SHOWN IS 0.2m.
3. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED BY THIS SURVEY. BEFORE COMMENCING ANY EXCAVATION OR CONSTRUCTION ON THIS SITE THE RELEVANT SERVICE PROVIDERS SHOULD BE CONTACTED FOR VERIFICATION OF THE LOCATION & DEPTH OF THEIR SERVICES.
4. NOT ALL VEGETATION HAS BEEN DEFINED BY THIS SURVEY. ONLY MAJOR TREES & SHRUBS HAVE BEEN LOCATED.
5. THIS PLAN IS COPYRIGHT, & IS NOT TO BE COPIED OR REPRODUCED IN WHOLE OR IN PART WITHOUT THE PRIOR WRITTEN APPROVAL OF BATH, STEWART ASSOCIATES PTY LTD, ALTHOUGH THIS APPROVAL WILL NOT BE NECCESSARY IF THE SOURCE OF THE DATA HEREIN IS ACKNOWLEDGED ON ANY PLAN OR DOCUMENT DERIVED FROM IT.

THESE NOTES ARE AN INTEGRAL PART OF THIS PLAN

Lot 2

Lot 1

Lot 3

DEP. PLAN 8 7 8 6 4 2

Registered Proprietor: Baiada (Tamworth) Pty Limited

OXLEY HIGHWAY

From Gunnedah

To Tamworth

(60.35 Wide)

SSM 56303
R.L.388.44 (AHD)

SSM 39850
RL 387.65

SITE PLAN – LOT 1 IN DP 878642 – 1 – 1 – TOPOGRAPHICAL SITE – DRAWING No.: DWG3262A

No.	DATE	APPROVED	AMENDMENT
1			

BATH STEWART ASSOCIATES
Pty Ltd Inc in NSW A.C.N. 002 745 020
SURVEYORS – PLANNERS – PROJECT MANAGERS
239 Marius Street TAMWORTH NSW 2340
Telephone 02 67665966 Facsimile 02 67665140

CLIENT: WILEY & CO PTY LTD

PROJECT: PROCESSING PLANT AT "OAKBURN"

SURVEYED: M BARWICK
DRAWN: M BARWICK

OUR REFERENCE: 03262
DRAWING No.: DWG3262A

APPROVED: DARYL BATH

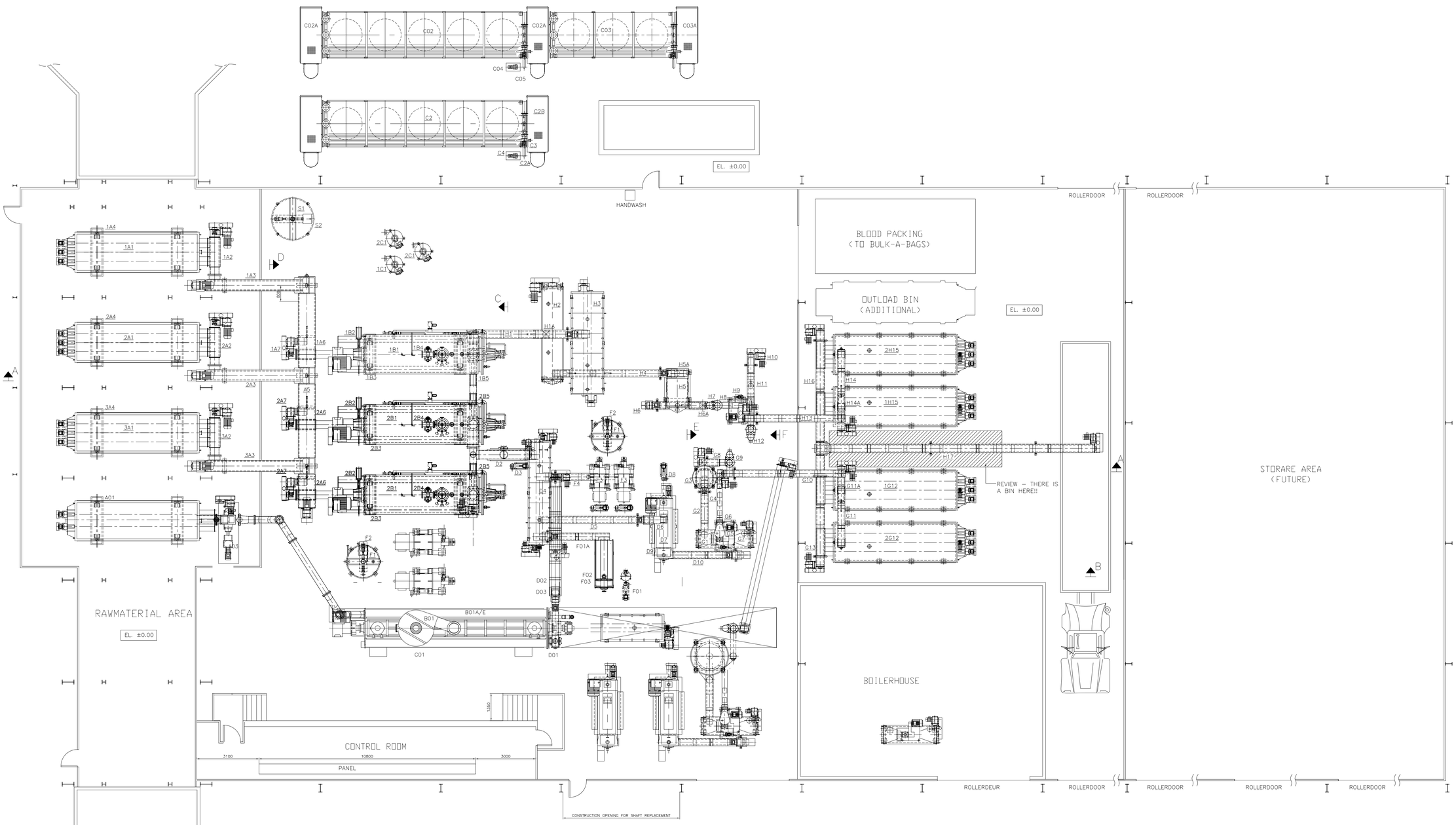
TITLE: TOPOGRAPHICAL SITE PLAN
LOT 1 IN DP 878642

REDUCTION RATIO: 1:1000

SHEET No: DWG3262A – 1 – 1

APPENDIX 7

BUILDING EXTENSION PLANS



OAKBURN RENDERING PLANT - PROPOSED STORAGE EXTENSION

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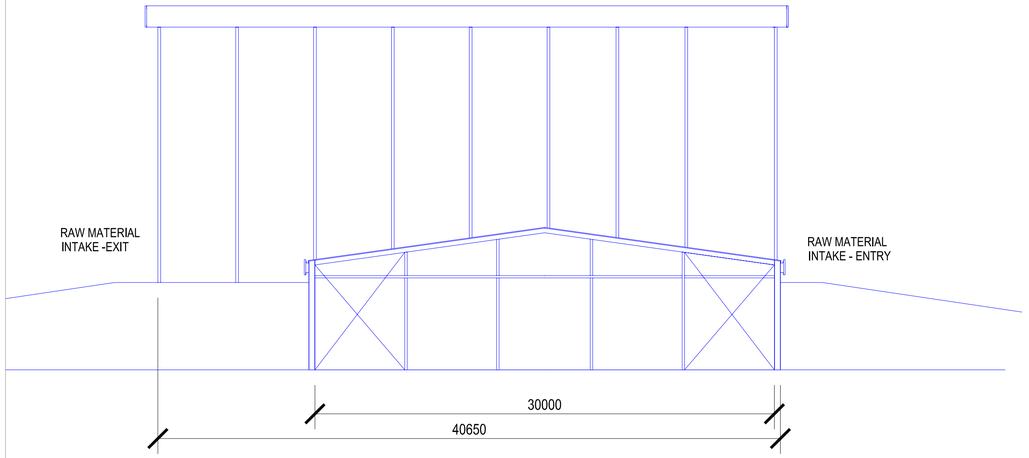
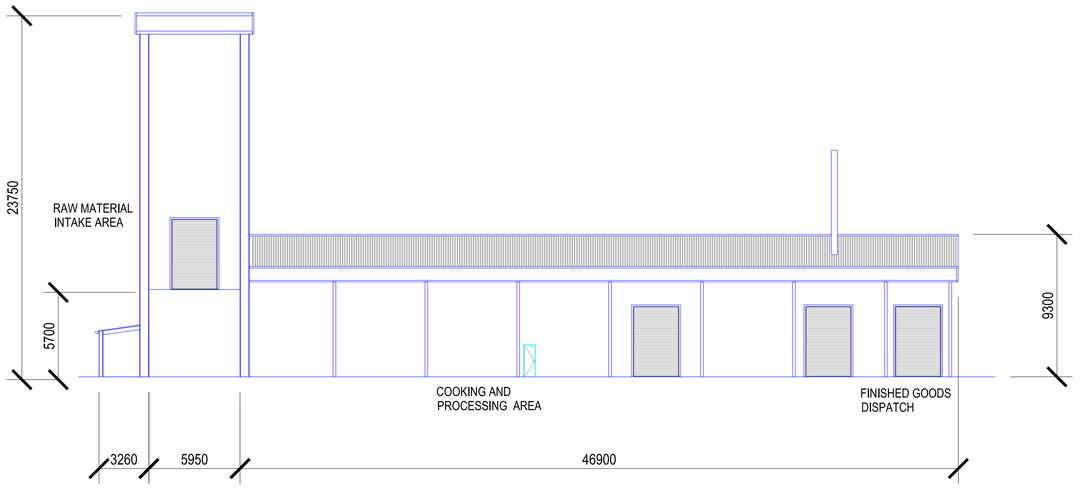
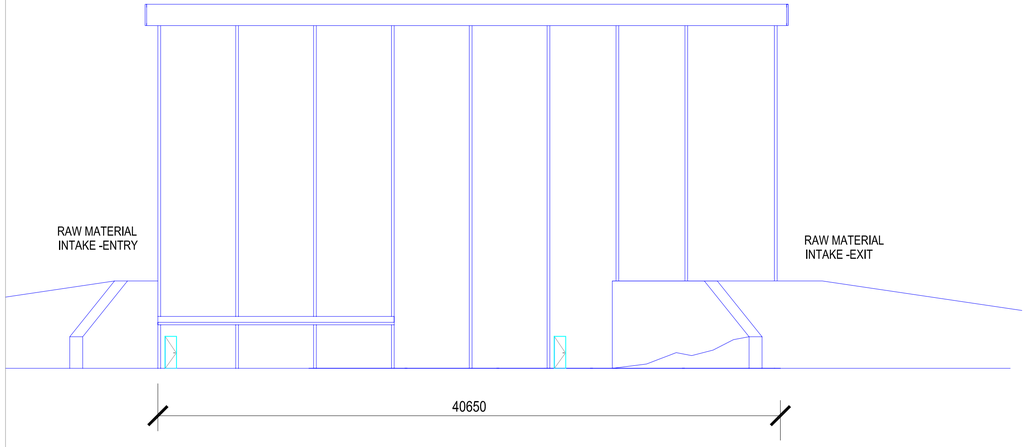


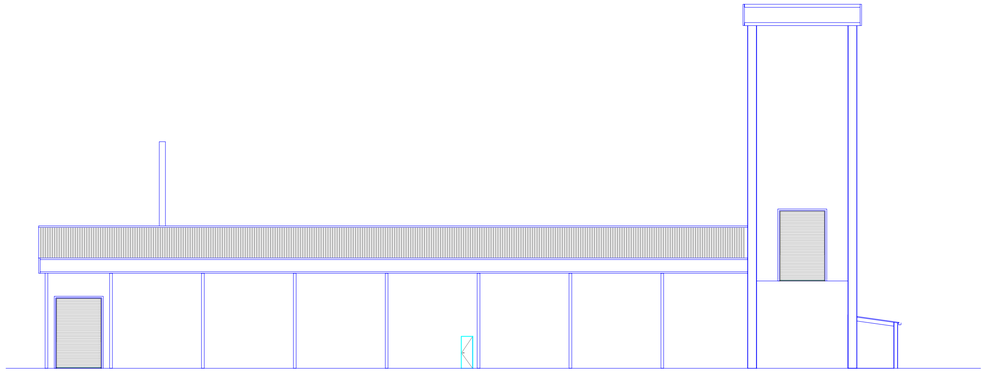
SOUTH ELEVATION



EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION

0m 6m 12m 18m

REVISION

Baiada
select poultry

Baiada Poultry Pty Ltd
642 Great Western Hwy,
Pendle Hill, NSW,2145
P 02-98421000
F 02-98424814

TITLE: EXISTING DEVELOPMENT

PROJECT: BUILDING EXTENSION

SITE: OAKBURN RENDERING FACILITY
1154 GUNAHDAH Rd.
WEST TAMWORTH, NSW

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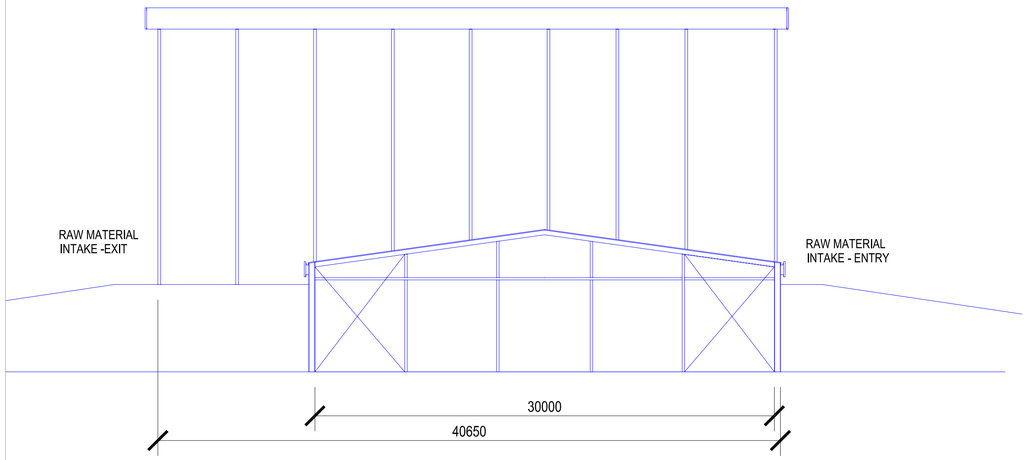
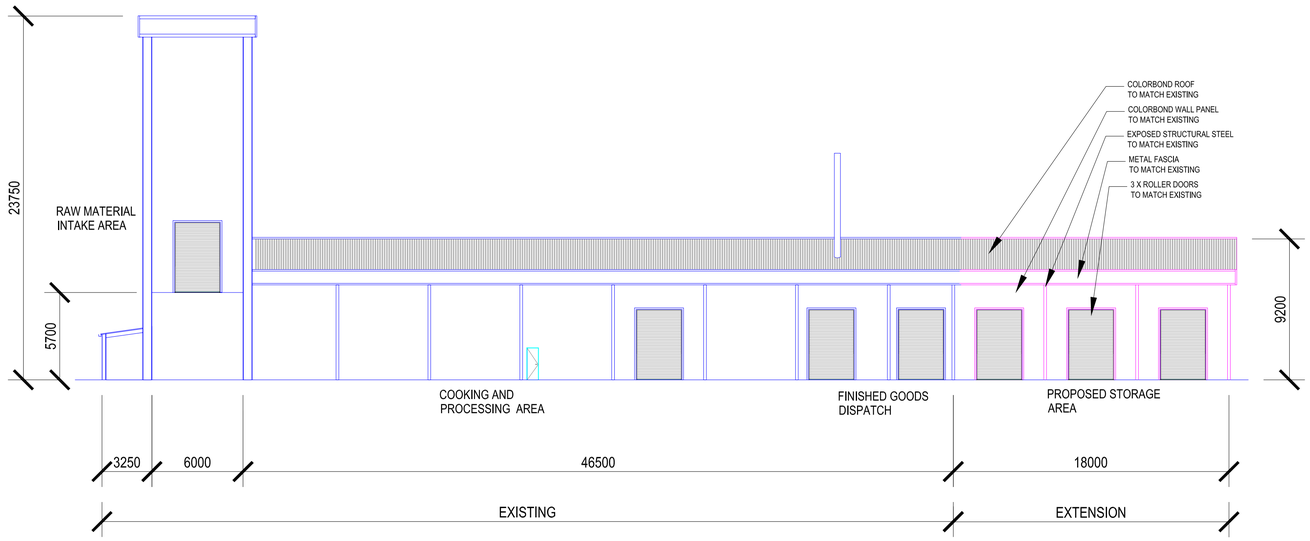
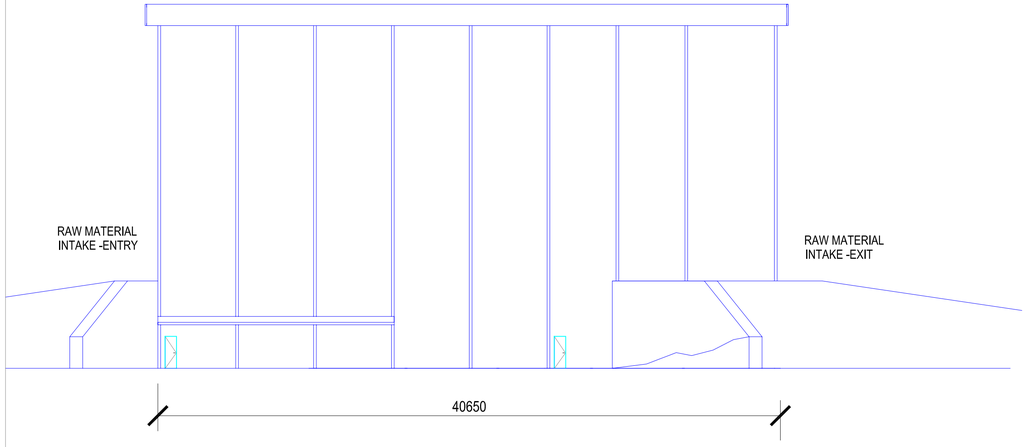


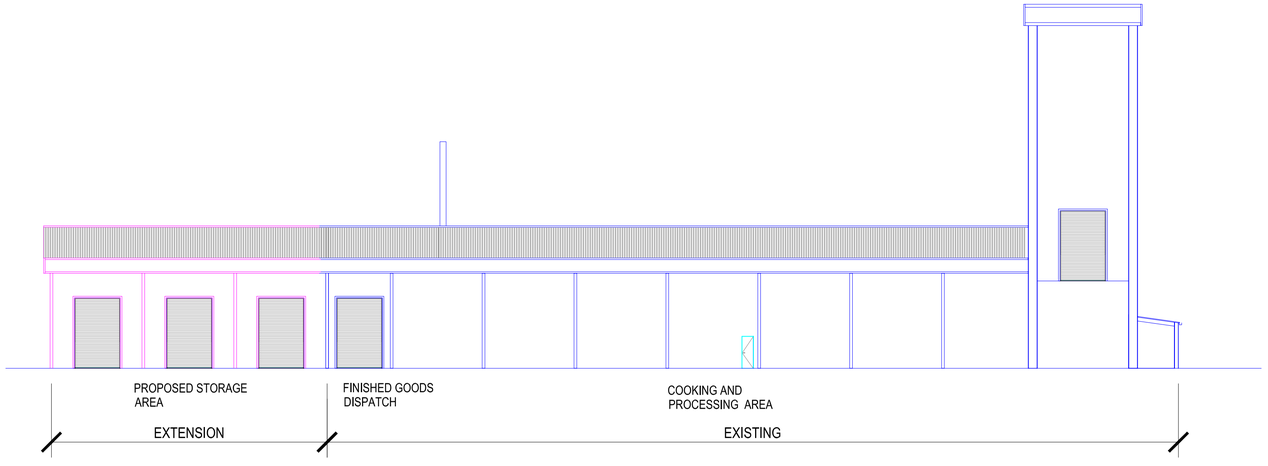
SOUTH ELEVATION
NO CHANGE TO VIEW



EAST ELEVATION– EXTENSION SHOWN



NORTH ELEVATION
NO CHANGE TO VIEW



WEST ELEVATION– EXTENSION SHOWN

0m 6m 12m 18m

REVISION

Baiada
select poultry
Baiada Poultry Pty Ltd
642 Great Western Hwy,
Pendle Hill, NSW,2145
P 02-98421000
F 02-98424814

TITLE: PROPOSED DEVELOPMENT

PROJECT: BUILDING EXTENSION

SITE: OAKBURN RENDERING FACILITY
1154 GUNAHDAH Rd.
WEST TAMWORTH, NSW

REV – 2	FILE 080528	DATE 28.05.08	SCALE 1:200 (A1)

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APPENDIX 9: FLORA AND FAUNA SURVEY (AEIA, 1997)

ARNHEM ENVIRONMENTAL
IMPACT ASSESSORS

'SANDON PARK' TILBUSTER, N.S.W 2350

PHONE: (067) 711259
FAX: (067) 711922

FLORA & FAUNA SURVEY
PROPOSED LOT 1, BEING PART OF LOT 18 DP 865930 & LOT 3 DP 857742 TAMWORTH

Prepared for

EES PTY. LTD.
&
BAIADA POULTRY PTY. LTD.

Prepared by: Dr. Paul J. R. Broese van Groenou
Arnhem Environmental Impact Assessors
TILBUSTER NSW 2350

Date: 30 July 1997

(1) TABLE OF CONTENTS

(2) EXECUTIVE SUMMARY

At the request of Mr. Terry Ellis, EES Pty. Ltd. Tamworth, Arnhem Environmental Impact Assessors performed a Flora, & Fauna Survey on the proposed Baiada Poultry Abattoir Project situated on the Oxley Highway to the north of the Tamworth airport (Figure 1) in the period from 19th to 20th July 1997

Dr Paul Broese performed the Flora Survey, whilst Mr Stephen Debus performed the Fauna Survey. This report presents the results of both surveys The Flora Survey is presented first and is followed by the Fauna Survey

A list of threatened flora and fauna was obtained from the NPWS GIS Division, and the one plant species (*Dichanthium setosum*) and 2 animal species (*Neophema pulchella* & *Xanthomyza phrygia*) listed as vulnerable or endangered were specifically targeted in the survey Since the emphasis was on a qualitative assessment of species present the survey techniques were based on intensive sampling of the entire area It was reasoned that frequent traverses of the 16 7 ha site would generate the data required more efficiently than using nested quadrats or transects which are more appropriate for quantitative assessments

The AEIA Flora Survey recorded 53 species from Lot 1, being part Lot 18 DP 865930 & Lot 3 DP 857742, Tamworth. The number of species found was as expected for the area surveyed and for the time of sampling The number of families (24) and introduced

species (22) was, however, fairly high The diversity is a reflection of the site management and of past disturbances. Most trees were remnant native trees and introduced exotics around the ruins of the old homestead. The vegetation was structurally a heavily grazed grassland with remnant native trees and introduced exotics present as shade trees.

One species (*Bothriochloa biloba*) listed in Schedule 2 (Vulnerable Species) of the *TSCA 95* (Threatened Species Conservation Act 1995) was encountered The species listed in the NPWS GIS data as vulnerable (*Dichanthium setosum*) was not encountered during the survey and is unlikely to be present on the site. No ROTAP (Rare or threatened Australian plants) species were found on the site

The 8 Part Test under s 5A *Environmental Planning & Assessment Act 1979, as amended,* was applied to the one species encountered and it was concluded that the development would not have a significant impact on the species and, therefore, a species impact statement (SIS) did not have to be prepared

It was recognised that the time of sampling was not the optimal period for a survey, but based on knowledge gained from similar areas surveyed in spring and summer and the fact that the region had experienced favourable weather conditions during spring and summer, it was reasoned that many plants would have retained the taxonomic characteristics to make a positive identification of the species possible A spring or summer survey probably would identify additional species, but it is unlikely that any will be endangered or vulnerable

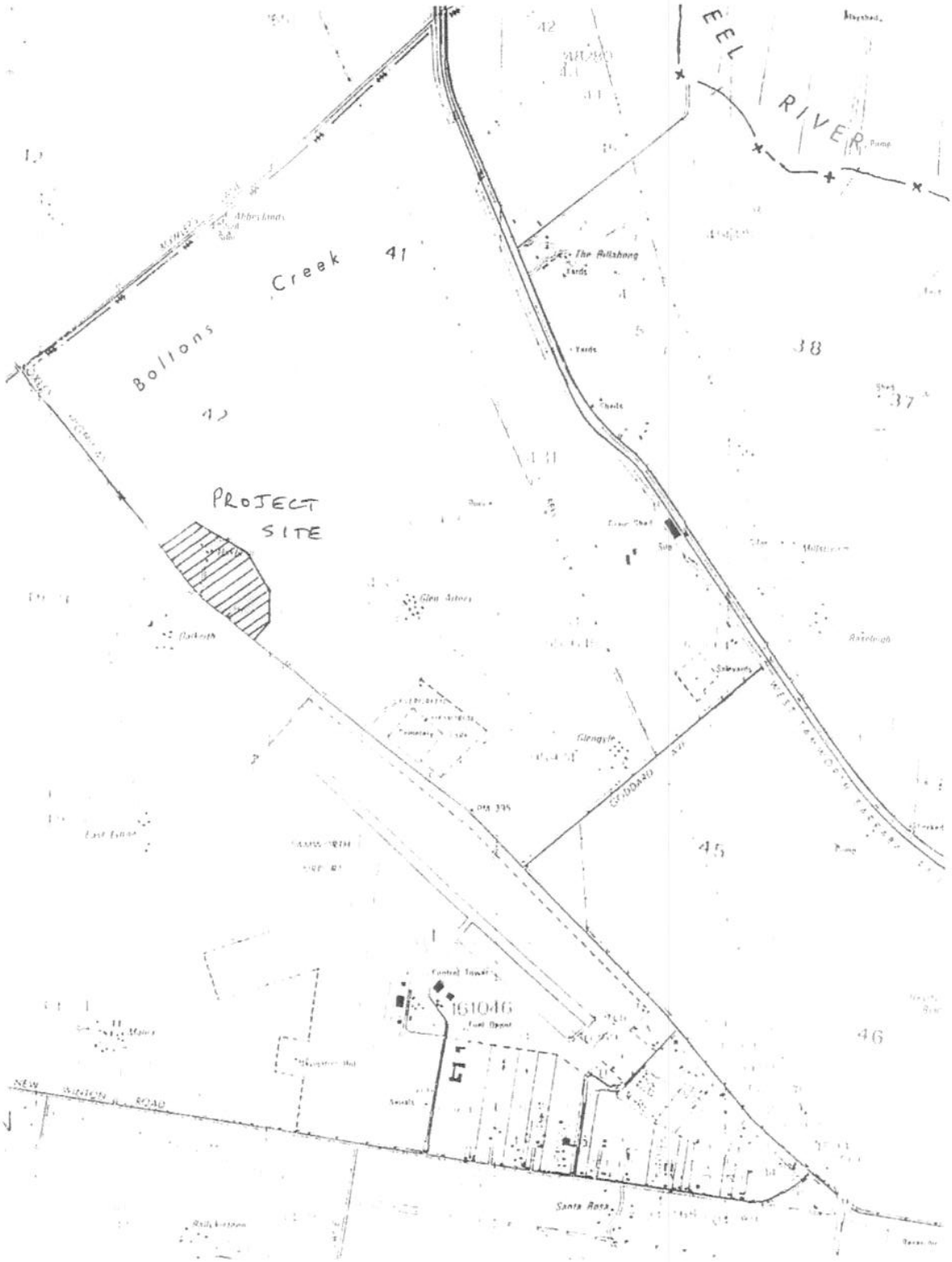


Figure 1. Location of the proposed Baiada Poultry Project to the North of the Tamworth Airport identified on a 1:100,000 topographic map.

Only 25 bird species were recorded: a very depauperate community of the most common farmland and introduced species Grassland migrant species (quails, button-quails, swallows, pipits and larks) might take the total to 30+ in spring-summer Only two mammals, both introduced pests of farmland, were recorded. No bats were recorded Common, disturbance-tolerant bat species might be detected in the warmer months Only two reptiles were recorded, a very depauperate community, but additional common, disturbance-tolerant species might be recorded in the warmer months There was no surface water on the site, nor permanent or intermittent, to support frogs No nocturnal birds or arboreal native mammals were recorded

It was concluded that the site is well suited for the proposed Baiada Poultry abattoir since no vulnerable or endangered fauna was present and the vulnerable grass (*Bothriochloa biloba*), in our opinion, should not be listed as vulnerable in the *TSCA 95* In addition, the site has good road access and the nearest neighbour is about 1600m away, so that potential complaints about noise and smell are not likely to be an issue

(3) FLORA SURVEY PROPOSED LOT 1, BEING PART LOT 18 DP 865930 & LOT 3 DP 857742 TAMWORTH

Paul J. R. Broese van Groenou, PhD.
Director & Principal Consultant, AEIA

INTRODUCTION

On 15th July 1997 AEIA was asked by Mr. Terry Ellis, EES Pty Ltd Tamworth, to do a Flora & Fauna Survey of the proposed Lot 1, being part Lot 18 DP 865930 & Lot 3 DP 857742 (Figure 2) in order to address Tamworth City Council's responsibilities under the *TSC'A 95* (Threatened Species Conservation Act 1995) and *EP&A Act 79* (Environmental Planning & Assessment Act 1979 as amended)

Consequently Dr Paul Broese carried out a Flora Survey on 19th and 20th July 1997 In addition, arrangements were made to have the fauna survey carried out at the same time by Mr Stephen Debus of the Division of Zoology, University of New England

GIS data were obtained from the NPWS Sydney office (Appendix 1) and threatened flora (*Dichanthium setosum*) and fauna (*Neophema pulchella & Xanthomyza phrygia*) were specifically targeted in order to ascertain a presence, or otherwise, on the site

Upon arrival at the site, it was immediately obvious that the appropriate habitat conditions for the Turquoise Parrot (*Neophema pulchella*) & Regent Honeyeater (*Xanthomyza phrygia*) were not present and it was thus highly unlikely that these birds were to be encountered The grass (*Dichanthium setosum*) may be present but in spite of a thorough search of the entire area the species was not found and it is unlikely that it is present.

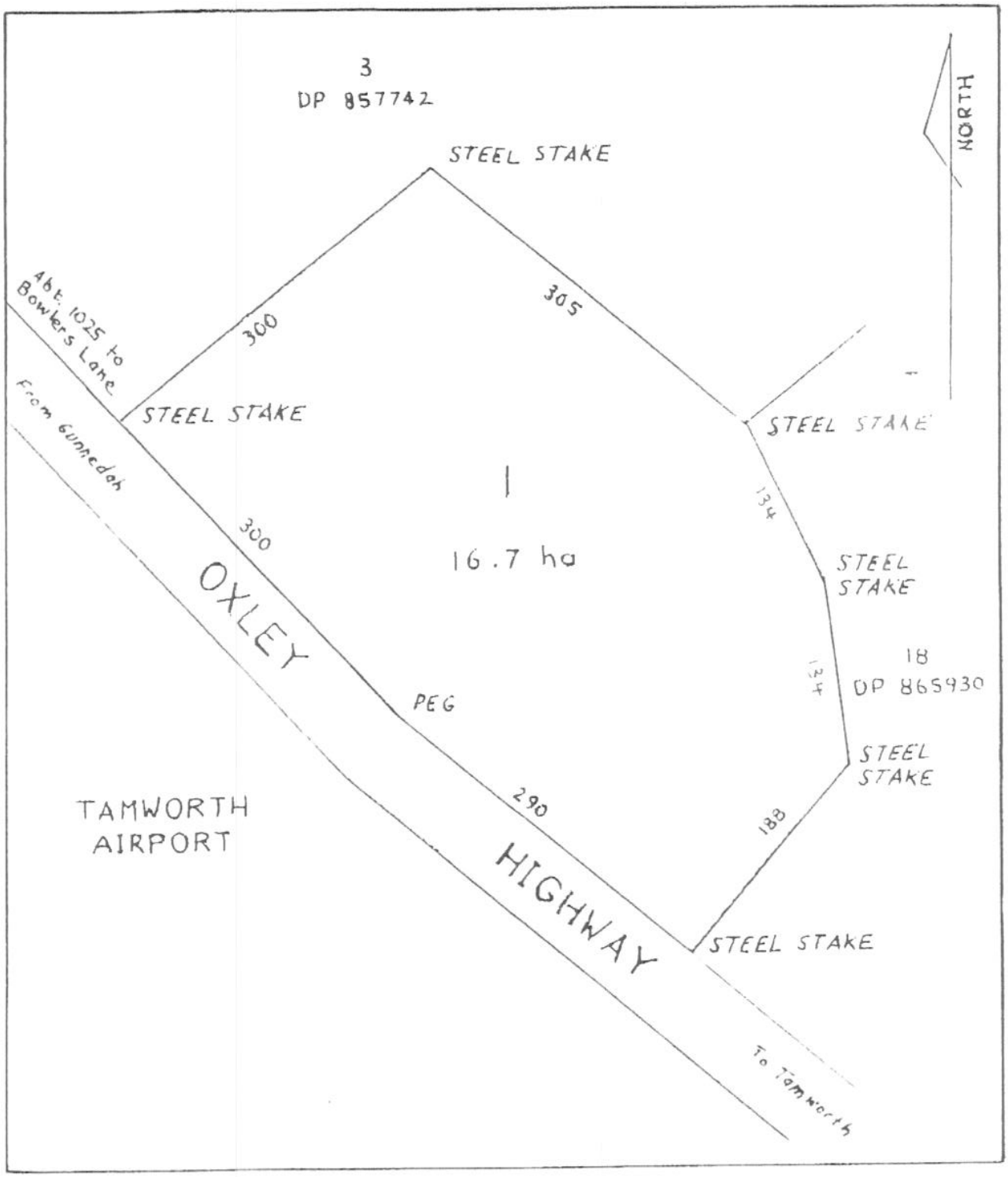


Figure 2. Site Plan of the proposed Lot 1, being part Lot 18 DP 865930 & Lot 3 DP 857742 Tamworth, as surveyed by Brown & Krippner Pty Ltd.

METHODS

Mr Terry Ellis provided AEIA with the relevant plans for the area including recently surveyed site plans by Brown & Krippner Pty. Ltd The survey plan formed the basis of the vegetation map presented as Figure 3

It was recognised that winter is not the optimal time for flora & fauna surveys, but based on knowledge gained from surveys performed in the area during spring and summer and the fact that favourable weather conditions allowed plants to flower till late in the season, it was reasoned that many of the distinguishing taxonomic characters should still be present to make positive identifications possible In addition specimens were collected from the roadside since the grazing pressure was much less and species found here would be indicative of plants present in the pasture. All specimens collected were taken back to Armidale were identifications of the plants were verified

Since the emphasis was on a qualitative assessment of species present the survey

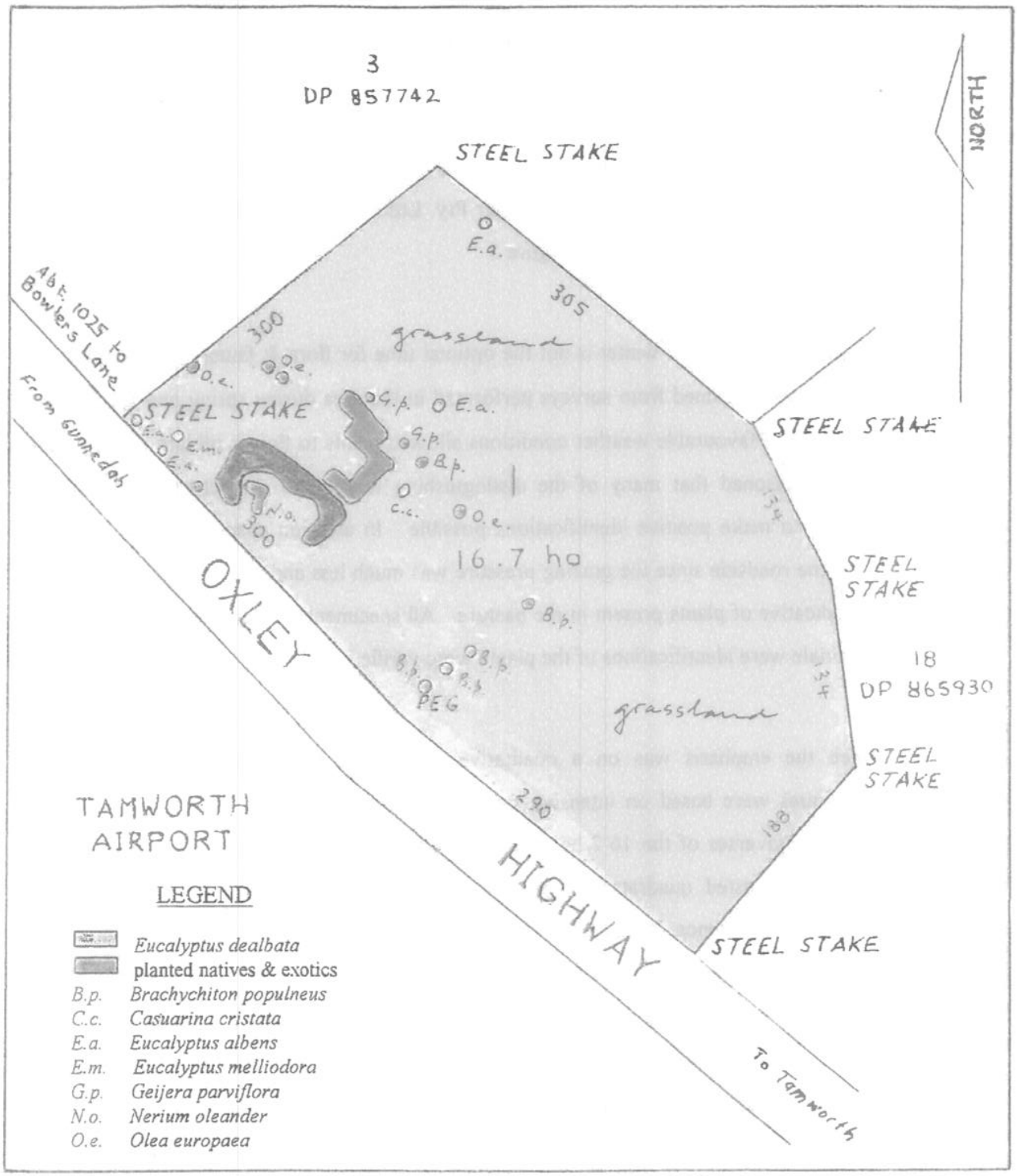


Figure 3. Vegetation Map of the proposed Lot 1, being part Lot 18 DP 865930 & Lot 3 DP 857742 Tamworth, as surveyed by Brown & Krippner Pty. Ltd..

RESULTS

The area to be surveyed was nearly flat, readily accessible and mostly cleared. Structurally the vegetation was a heavily grazed grassland with a few remnant native trees (*Eucalyptus dealbata, Eucalyptus albens, Eucalyptus melliodora* and *Casuarina cristata*) and a number of other native trees and exotic trees planted for shade and shelter. Few shrubs were present and the herbaceous layer was heavily grazed with the remaining tussocky grasses mainly dominated by *Sorghum leiocladum* and a *Stipa* sp., possibly *Stipa verticillata* (Plate 1). *Bothriochloa biloba,* a species listed on Schedule 2 of the *TSCA 95* as vulnerable, was found on the site but also occurred on the roadside and on areas surrounding the survey site. Hence an 8 Part Test under s.5A *Environmental Planning & Assessment Act 1979, as amended,* was applied to this species. Specimens collected from the site are presented in Table 1, whereas the roadside specimens are presented in Table 2.

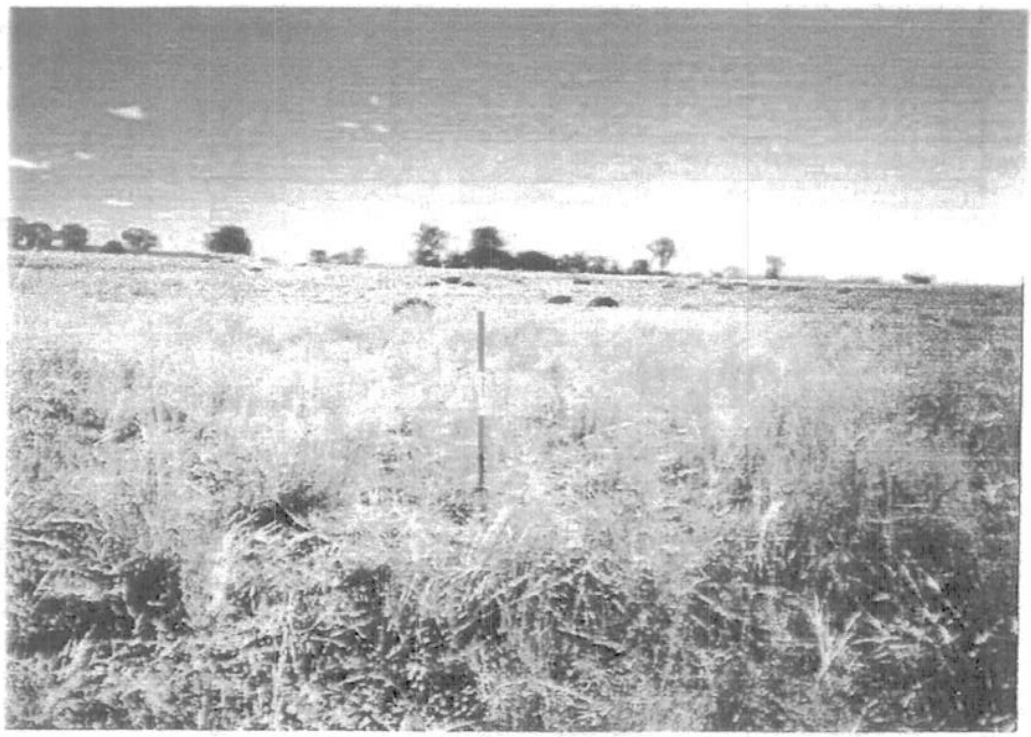


Plate 1. The proposed Baiada Poultry Project viewed from the SE corner towards the north. Note the ungrazed *Stipa* and *Sorghum* grasses in the foreground and remaining trees (in central background) around the homestead ruins.

Table 1. List of plants found on the proposed Lot 1, being part Lot 18 DP 865930 & Lot 3 DP 857742, Tamworth.

Threatened species are in **bold**, introduced species are denoted with an asterisk (*).

FAMILY	BOTANICAL NAME	COMMON NAME
ANACARDIACEAE	**Schinus areira*	Pepper Tree
APOCYNACEAE	**Nerium oleander*	Oleander
ASPHODELACEAE	**Aloe saponaria*	Soap Aloe
ASTERACEAE	*Ammobium alatum*	
ASTERACEAE	**Bidens subalternans*	Greater Beggar's Ticks
ASTERACEAE	**Carthamus lanatus*	Saffron Thistle
ASTERACEAE	**Cichorium intybus*	Chicory
ASTERACEAE	**Cirsium vulgare*	Spear Thistle
ASTERACEAE	**Conyza bilbaoana*	a Fleabane
ASTERACEAE	**Conyza bonariensis*	Flaxleaf Fleabane
ASTERACEAE	*Cymbonotus lawsonianus*	Bears-ear
ASTERACEAE	**Hypochaeris radicata*	Catsear, Flatweed
ASTERACEAE	**Silybum marianum*	Variegated Thistle
ASTERACEAE	**Soliva sessilis*	Bindyi
ASTERACEAE	*Vittadinia cuneata*	Fuzzweed
ASTERACEAE	*Vittadinia muelleri*	a Fuzzweed
ASTERACEAE	*Vittadinia sulcata*	a Fuzzweed
BRASSICACEAE	**Lepidium africanum*	a Peppercress
CAESALPINIOIDEAE	**Ceratonia siliqua*	Carob
CASUARINACEAE	*Casuarina cristata*	Belah
CHENOPODIACEAE	*Maireana brevifolia*	a Bluebush
CHENOPODIACEAE	*Sclerolaena divaricata*	Tangled Copperburr
FABOIDEAE	**Medicago polymorpha*	Burr Medic
JUNCACEAE	*Juncus subsecundus*	
MELIACEAE	*Melia azedarach*	White Cedar
MIMOSOIDEAE	**Paraserianthes lophanta*	Crested Wattle
MYOPORACEAE	*Myoporum montanum*	Western Boobialla
MYRTACEAE	*Eucalyptus albens*	White Box
MYRTACEAE	*Eucalyptus dealbata*	Tumbledown Red Gum
MYRTACEAE	*Eucalyptus melliodora*	Yellow Box
OLEACEAE	**Olea europaea*	Common Olive
OLEACEAE	*Jasminum* sp.	Jasmin
OXALIDACEAE	**Oxalis corniculata*	Creeping Oxalis
POACEAE	*Aristida vagans*	Threeawn Speargrass
POACEAE	***Bothriochloa biloba***	
POACEAE	*Bothriochloa macra*	Red Grass,
POACEAE	*Cynodon dactylon*	Couch
POACEAE	*Chloris truncata*	Windmill Grass

FAMILY	BOTANICAL NAME	COMMON NAME
POACEAE	*Danthonia* sp.	a Wallaby Grass
POACEAE	**Eragrostis cilianensis*	Stinkgrass
POACEAE	*Eragrostis leptostachya*	Paddock Lovegrass
POACEAE	*Elymus scaber* var. *scaber*	Common Wheatgrass
POACEAE	*Poa sieberiana* var. *sieberiana*	Snowgrass
POACEAE	*Sorghum leiocladum*	Wild Sorghum
POACEAE	*Stipa* sp.	a Speargrass
POACEAE	*Stipa verticillata*	a Speargrass
POLYGONACEAE	**Acetosella vulgaris*	Sheep Sorrel
PROTEACEAE	*Grevillea robusta*	Silky Oak
RUBIACEAE	*Asperula* sp.	
RUTACEAE	*Geijera parviflora*	Wilga
SOLANACEAE	**Lycium ferocissimum*	African Boxthorn
STERCULIACEAE	*Brachychiton populneus*	Kurrajong
TAMARICACEAE	**Tamarix aphylla*	Athel Tree

Note that 53 species were recorded (22 of which were introduced) from 24 families. One species (*Bothriochloa biloba*) is a threatened species and listed as vulnerable in Schedule 2 of the *TSCA 95*. The development is not likely to have a significant impact on the species and hence a species impact statement is not considered necessary. Note also that two families (Asteraceae with 14 species and Poaceae with 13 species) account for more than half the species present.

Table 2. List of plants found on the roadside opposite Tamworth Airport on Gunnedah Road.

Threatened species are in **bold**, introduced species are denoted with an asterisk (*)

FAMILY	BOTANICAL NAME	COMMON NAME
ASTERACEAE	**Bidens subalternans*	Greater Beggar's Ticks
ASTERACEAE	*Helichrysum* sp. (+)	
ASTERACEAE	**Sonchus oleraceus* (+)	Common Sowthistle
BORAGINACEAE	*Omphalolappula concava* (·)	Burr Stickseed
GERANIACEAE	*Geranium* sp. (+)	
MYRTACEAE	*Eucalyptus albens*	White Box
MYRTACEAE	*Eucalyptus dealbata*	Tumbledown Red Gum
MYRTACEAE	*Eucalyptus melliodora*	Yellow Box
POACEAE	*Aristida vagans*	Threeawn Speargrass
POACEAE	***Bothriochloa biloba***	
POACEAE	*Bothriochloa macra*	Red Grass
POACEAE	*Chloris truncata*	Windmill Grass
POACEAE	*Sorghum halepense* (·)	Johnson Grass

FAMILY	BOTANICAL NAME	COMMON NAME
POACEAE	*Sporobolus creber (+)*	Slender Rat's Tail Grass
POACEAE	*Stipa* sp.	a Speargrass
RANUNCULACEAE	*Ranunculus* sp. (+)	a Buttercup
RUBIACEAE	*Asperula* sp.	
SCROPHULARIACEAE	**Verbascum virgatum (+)*	Green Mullein
STERCULIACEAE	*Brachychiton populneus*	Kurrajong

Note that *Bothriochloa biloba* was also found on the roadside and that species found in addition to those collected from the site have been identified with (+). None of the additional species are endangered or vulnerable.

To visualise the site better Plates 2 to 4 are presented.

Plate 2. The Baiada Poultry Project site viewed from the NE corner towards the west. The emergent trees in the background are (from l to r) *Eucalyptus dealbata, Casuarina cristata,* and *Eucalyptus albens.*

Plate 3. The proposed Baiada Poultry Project viewed from the NW corner towards the SE. The small tree in the foreground is a Wilga (*Geijera parviflora*) and the prominent tree in the centre a yellow box (*Eucalyptus melliodora*). The background trees are mostly *Eucalyptus dealbata.*

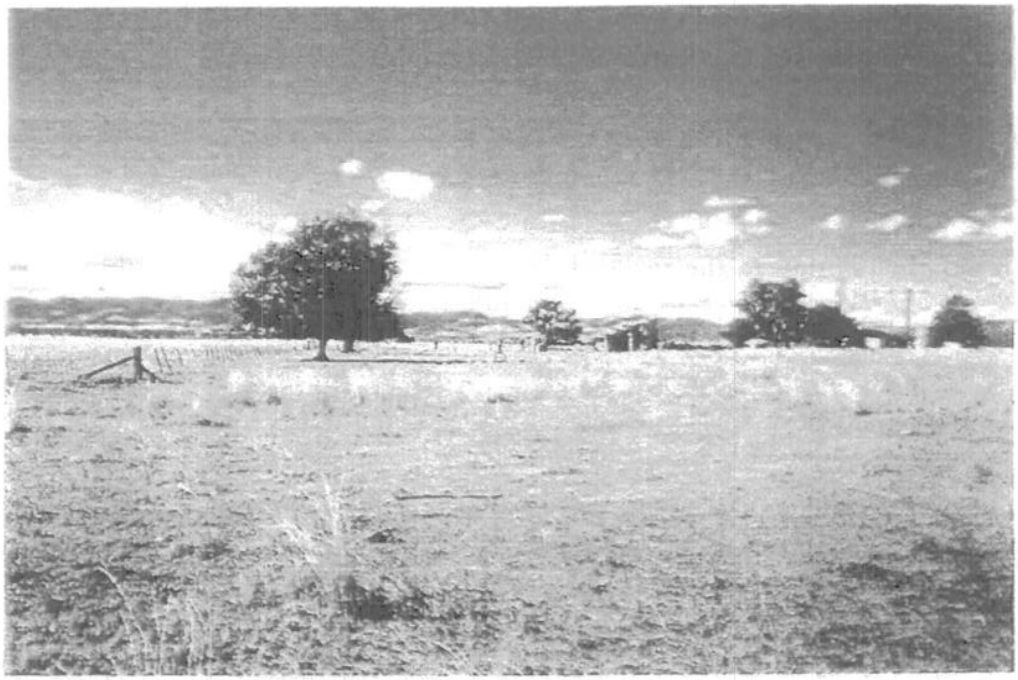


Plate 4. The proposed Baiada Poultry Project viewed from the NW corner towards the East. The tree on the left is an olive tree (*Olea europaea*) and the far right tree is a silky oak (*Grevillea robusta*). Note the heavily grazed paddock.

THREATENED SPECIES

Since *Bothriochloa biloba* was found on the site and adjacent to the Survey Site an 8 Part Test under s.5A *Environmental Planning & Assessment Act 1979, as amended,* is to be applied to the species encountered

Bothriochloa biloba

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

Unlikely, in view of the scale of habitat modification and the fact that the population was found on the site as well as outside the proposed development

(b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the local population is likely to be significantly compromised

Unlikely The local population is unlikely to be affected by the proposal since it was detected on the site as well as outside the survey area

(c) In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed

The area to be modified is not regionally significant for this species

(d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community

The proposal will not isolate the habitat, as the proposed development is relatively small in comparison to the large areas, which presumably also contain the species, surrounding the site

(e) Whether critical habitat will be affected

The project site is not known or suspected to be critical habitat for this species

(f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region

The occurrence of *Bothriochloa biloba* in Nature Reserves or National Parks is not well documented but the species appears to be distributed on the North and Central Coast, the Northern Tablelands, the North Western & Central Western Slopes, the North Western Plains and in Queensland (Harden, 1993).

(g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process

The scale of the proposal does not constitute a threatening process in the regional or local context

(h) Whether any threatened species, population or ecological community is at the limit of its known distribution

The site is not at the limit of distribution of this species as stated in (f)

The activity is not likely to affect *Bothriochloa biloba* significantly, and therefore a species impact statement (SIS) is not required

DISCUSSION

The vegetation map and the plates presented illustrate the heavily grazed grassland of the site The few remaining trees and the additional trees planted for shade and shelter for

stock make the site well suited for development. No threatened species, other than the grass *Bothriochloa biloba*, were present on the site The 8 Part Test under s.5A *Environmental Planning & Assessment Act 1979, as amended,* was applied to the one species encountered and it was concluded that the development would not have a significant impact on the species and, therefore, a species impact statement (SIS) did not have to be prepared.

The author and Dr Christine Jones as well as several other researchers at the Botany Department, University of New England, do not believe that *Bothriochloa biloba* deserves to be on the list of vulnerable species in the *TSCA 95* since it occurs more widely than was previously thought Possibly based on poor records of specimens present in Herbaria the species was included in the list of vulnerable species in the *TSCA 95.* It is our opinion that the position of the species should be reviewed when amendments are considered

CONCLUSIONS & RECOMMENDATIONS

It was concluded that the site is well suited for the proposed development and that Tamworth City Council should support and grant consent to the Development Application.

REFERENCES AND SOURCES OF INFORMATION

Anon (1997). GIS data base NSW National Parks and Wildlife Service.

Harden G.J. (Ed.) (1990). *Flora of New South Wales.* Volume 1. New South Wales University Press. Kensington, Australia.

Harden G.J. (Ed.) (1991). *Flora of New South Wales.* Volume 2. New South Wales University Press Kensington, Australia

Harden G J. (Ed.) (1992). *Flora of New South Wales.* Volume 3 New South Wales University Press. Kensington, Australia

Harden G J. (Ed.) (1993). *Flora of New South Wales.* Volume 4. New South Wales University Press Kensington, Australia.

APPENDIX 1

ATLAS OF NSW WILDLIFE - SPECIES LIST CODINGS

FLORA

Each record in your species list is in alphabetical order of Family Name.

Family Name	Scientific Name	Legal Status	Sightings per Species

KEY

Family Name: Refers to the Family Name according to the Census of Australian Plant Species (CAPS).

Scientific Name: Refers to the Genus and Species Name according to the Census of Australian Plant species (CAPS)

Legal Status: This identifies the legal status of the species within NSW, under the Threatened Species Conservation Act (1995) and the National Parks and Wildlife Act (1974).

- V Vulnerable (Schedule 2)
- E1 Endangered (Schedule 1 - part 1)
- E4 Endangered (Schedule 1 - part 4)
- P13 Protected Native Plants (Schedule 13)
- U Unprotected

Sightings per Species: This gives the number of records for this species in the search area.

Flora Map List

Report Search Criteria

Map Number = 9035

Date 18/07/1997 15:26:17 Extracted By Jennifer Burge-Lopez

These data are only indicative and cannot be considered as a comprehensive inventory, and may contain errors and omissions

Family Name (Latest Taxon)	Scientific Name (Latest Taxon)	Legal Status	Sightings Per Species
Fabaceae (Mimosoideae)	Acacia aduncа	U	1
Haloragaceae	Gonocarpus longifolius	U	1
Myrtaceae	Kunzea bracteolata	U	1
Orchidaceae	Pterostylis longicurva	U	1
Poaceae	Dichanthium setosum	V	4
Scrophulariaceae	Euphrasia sp.1	U	1
Zamiaceae	Macrozamia stenomera	U	2
		Total	11

ATLAS OF NSW WILDLIFE - SPECIES LIST CODINGS

FAUNA

Each record in your species list will be presented like this:

Class ____ __
Order ___ _
Family _____

Scientific Name	Common Name	Legal Status	Sightings per Species

KEY

Scientific Name: Refers to the Genus and Species Name according to the Census of Australian Vertebrate species (CAVS).

Common Name: Refers to the Common Name of the species.

Legal Status: This identifies the legal status of the species within NSW, under the Threatened Species Conservation Act (1995).

V	Vulnerable (Schedule 2)
E1	Endangered (Schedule 1 - part 1)
E4	Endangered (Schedule 1 - part 4)
P	Protected
U	Unprotected

Sightings per Species: This gives the number of records for this species in the search area

Fauna Map List

Report Search Criteria

Map Number = 9035

Date 18/07/1997 15:25:44 Extracted By Jennifer Burga Lopez

These data are only indicative and cannot be considered as a comprehensive inventory, and may contain errors and omissions

Scientific Name (Latest Taxon)	Common Name (Latest Taxon)	Legal Status	Sightings per Species
Limnodynastes dumerilii	Eastern Banjo Frog	P	1
Limnodynastes fletcheri	Long-thumbed Frog	P	3
Limnodynastes ornatus	Ornate Burrowing Frog	P	1
Limnodynastes salmini	Salmon-striped Frog	P	2
Diplodactylus intermedius	Eastern Spiny-tailed Gecko	P	1
Diplodactylus vittatus	Stone Gecko	P	1
Diplodactylus williamsi	Soft-tailed Gecko	P	1
Underwoodisaurus milii	Thick-tailed Gecko	P	2
Delma tincta		P	1
Lialis burtonis	Burton's Legless Lizard	P	2
Varanus varius	Lace Monitor	P	3
Egernia striolata	Tree Skink	P	3
Tiliqua scincoides	Eastern Blue-tongued Lizard	P	1
Ramphotyphlops bituberculatus		P	1
Ramphotyphlops proximus		P	1
Ramphotyphlops wiedii		P	5
Furina diadema	Red-naped Snake	P	4
Simoselaps australis	Coral Snake	P	1
Suta spectabilis dwyeri		P	2
Vermicella annulata	Bandy Bandy	P	2
Dendrocygna eytoni	Plumed Whistling-Duck	P	2
Threskiornis spinicollis	Straw-necked Ibis	P	1
Milvus migrans	Black Kite	P	3
Falco cenchroides	Nankeen Kestrel	P	1
Falco subniger	Black Falcon	P	1
Vanellus miles	Masked Lapwing	P	[illegible]
Ocyphaps lophotes	Crested Pigeon	P	2
Streptopelia chinensis	Spotted Turtle-Dove	U	[illegible]
Cacatua galerita	Sulphur-crested Cockatoo	P	1
Cacatua roseicapilla	Galah	P	1
Neophema pulchella	Turquoise Parrot	V	1
Platycercus eximius	Eastern Rosella	P	1
Cuculus pallidus	Pallid Cuckoo	P	1
Tyto alba	Barn Owl	P	1
Dacelo novaeguineae	Laughing Kookaburra	P	1
Acanthiza apicalis	Inland Thornbill	P	1
Gerygone fusca	Western Gerygone	P	1
Lichmera indistincta	Brown Honeyeater	P	1
Manorina melanocephala	Noisy Miner	P	1
Philemon corniculatus	Noisy Friarbird	P	1
Xanthomyza phrygia	Regent Honeyeater	E1	2
Petroica goodenovii	Red-capped Robin	P	1
Grallina cyanoleuca	Magpie-lark	P	2
Gymnorhina tibicen	Australian Magpie	P	3
Coracina novaehollandiae	Black-faced Cuckoo-shrike	P	1
Mirafra javanica	Singing Bushlark	P	1
Neochmia modesta	Plum-headed Finch	P	1
Passer domesticus	House Sparrow	U	2
Cinclorhamphus mathewsi	Rufous Songlark	P	1
Zosterops lateralis	Silvereye	P	1
Sturnus vulgaris	Common Starling	U	2
Oryctolagus cuniculus	Rabbit	U	1
		Total	82

(4) FAUNA SURVEY PROPOSED LOT 1, BEING PART LOT 18 DP 865930 & LOT 3 DP 857742 TAMWORTH

REPORT TO ARNHEM ENVIRONMENTAL IMPACT ASSESSORS

Stephen Debus MSc,
Zoology Department, University of New England,
Armidale NSW 2351

The Baiada site is 16 7 ha of grazing paddocks centred on old homestead ruins and garden plantings, with scattered remnant trees and shrubs of the original native species The planted trees are mostly exotics, but include several Kurrajongs and Silky Oaks

The site was surveyed over 19-20 July as follows It is recognised that winter is an unsuitable time of year to survey bats, reptiles and frogs, and that some bird species may be absent in winter

Diurnal birds: thorough habitat search and auditory survey from 1100 to 1730 h on the 19th (6 5 hours) and 0730 to 0930 on the 20th (2 hours, incorporating the early-morning chorus) All trees and shrubs were repeatedly searched, and repeat criss-cross transects of the pasture were conducted, paying particular attention to the low shrubs and better-developed tussocks in the grassland

Terrestrial fauna: there was almost no substrate (rocks, logs etc.), but every movable piece of artificial substrate (timber, corrugated iron, other waste material etc) was turned over in a thorough habitat search of the entire site over 1 hour on the afternoon of the 19th

Nocturnal fauna: an electronic bat detector (Anabat II) was deployed for 30 min at dusk and again for 30 min at 2100 h, in the most likely flight lane between trees A listening survey was conducted for an hour (50 min from sunset, 10 min. from 2100 h), followed at 2115 h by playback of the calls of Grass Owl, Barn Owl, Southern Boobook and Barking Owl, at a central point near the trees (2-3 min per species) Listening for replies for 10 min was incorporated in a spotlighting search of all the trees The habitat was deemed unsuitable for playback of the calls of forest- or woodland-dependent threatened owls; the location is outside the known distribution of most such species

Small mammals: as there was no suitable habitat or substrate for native small mammals and the site is outside the known distribution of any threatened species, it was deemed unnecessary to deploy Elliott traps Furthermore, the only small mammal present or expected was found during the substrate search for reptiles

RESULTS

Only 25 bird species were recorded: a very depauperate community of the most common farmland and introduced species (Table 1) Grassland migrant species (quails, button-

quails, swallows, pipits and larks) might take the total to 30+ in spring-summer Only two mammals, both introduced pests of farmland, were recorded. No bats were recorded Common, disturbance-tolerant bat species might be detected in the warmer months Only two reptiles were recorded, a very depauperate community, but additional common, disturbance-tolerant species might be recorded in the warmer months. There was no surface water on the site, permanent or intermittent, to support frogs. No nocturnal birds or arboreal native mammals were recorded.

FAUNAL VALUES

The location and heavily disturbed nature of the site render it of value only to the most robust, disturbance-tolerant native species Two threatened species, the Turquoise Parrot and Regent Honeyeater, have been recorded on the NPWS GIS database covering the Tamworth map sheet, but are highly unlikely on the Baiada site as the habitat is too degraded for them The Parrot is locally restricted to densely wooded areas, and there are negligible resources for the Honeyeater on the site Other threatened species, not yet on the GIS database, may occur in the region, but the habitat on the development site is unsuitable for any woodland- or wetland-dependent species. There is no suitable substrate (eg. rocks, logs, deep cracking soils) for small dasyurid marsupials, and the site is outside the known distribution of threatened species The same applies to threatened reptiles: there is no suitable habitat or substrate on the site for any threatened species that might occur in the region There is no habitat on site suitable for threatened frogs, and the site is

outside the known distribution of any threatened species. There are no critical resources for threatened bats on the site.

The developer intends to retain the existing native trees and shrubs in a landscaping plan that will use additional plantings of native flora, and the proposed construction will take place on the cleared grazing land. Therefore, the existing habitat elements will be preserved and enhanced, and there will be no adverse impact on native fauna. As no threatened species are known or expected from the site and there is no critical habitat for any threatened species, there will be no potential effect on any threatened species and therefore an eight-part test of significance is unnecessary.

Table 1. Fauna recorded on the Baiada development site, Tamworth, July 1997. #recorded off site, on adjacent land; *introduced species; ? tentative identification.

Birds:

#Australian Wood Duck *Chenonetta jubata*

Black-shouldered Kite *Elanus axillaris*

Little Eagle *Hieraaetus morphnoides*

Brown Falcon *Falco berigora*

Nankeen Kestrel *Falco cenchroides*

Masked Lapwing *Vanellus miles*

Crested Pigeon *Ocyphaps lophotes*

Galah *Cacatua roseicapilla*

Cockatiel *Nymphicus hollandicus*

Eastern Rosella *Platycercus eximius*

Red-rumped Parrot *Psephotus haematonotus*

Striated Pardalote *Pardalotus striatus*

Yellow-rumped Thornbill *Acanthiza chrysorrhoa*

#Spiny-cheeked Honeyeater *Acanthagenys rufogularis*

Noisy Miner *Manorina melanocephala*

#White-plumed Honeyeater *Lichenostomus penicillatus*

Magpie-lark *Grallina cyanoleuca*

Willie Wagtail *Rhipidura leucophrys*

Black-faced Cuckoo-shrike *Coracina novaehollandiae*

Pied Butcherbird *Cracticus nigrogularis*

Australian Magpie *Gymnorhina tibicen*

Australian Raven *Corvus coronoides*

#*House Sparrow *Passer domesticus*

*Common Starling *Sturnus vulgaris*

Mammals:

*House Mouse *Mus domesticus*

*Rabbit *Oryctolagus cuniculus*

Reptiles:

? Southern Rainbow Skink *Carlia tetradactyla*

Yellow-face Whip Snake *Demansia psammophis*

APPENDIX 10: ATLAS OF NSW WILDLIFE AND EPBC ACT SEARCH RESULTS

Search results

Which species or group?

All entities | Animals | Plants | Fungi | Communities | Threats | Endangered populations | Search for a species or group of species (e.g. birds)

No records found

Search criteria: Public Report of all Valid Records of Threatened (listed on TSC Act 1995) Plants in selected area [North: -31.01 West: 150.79 East: 150.89 South: -31.11] returned 0 records for 0 species.
Report generated on 28/11/2013 5:35 PM.

Eastern False Pipistrelle - profile

Scientific name: *Falsistrellus tasmaniensis*
Conservation status in NSW: Vulnerable
Commonwealth status: Not listed
Profile last updated: 07 Sep 2012

Description

The Eastern False Pipistrelle is relatively large with a head-body length of about 65 mm. It weighs up to 28 grams. It is dark to reddish-brown above and paler grey on its underside. It has long slender ears set well back on the head and some sparse hair on the nose.

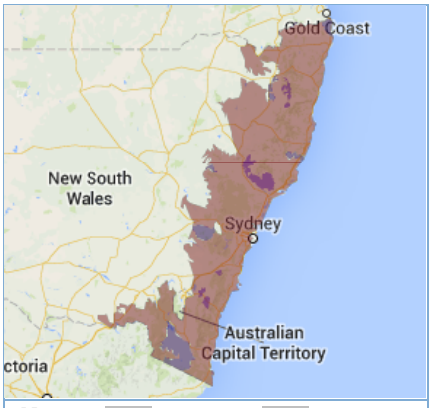
Distribution

The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania.

Habitat and ecology

- Prefers moist habitats, with trees taller than 20 m.
- Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.
- Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy.
- Hibernates in winter.
- Females are pregnant in late spring to early summer.

Indicative distribution



Key: known predicted

The areas shown in pink and/purple are the sub-regions where the species or community is known or predicted to occur. They may not occur thoughout the sub-region but may be restricted to certain areas. (click here to see geographic restrictions). The information presented in this map is only indicative and may contain errors and omissions.

Regional distribution and habitat

Click on a region below to view detailed distribution, habitat and vegetation information.

- Border Rivers-Gwydir
- Central West
- Hawkesbury-Nepean
- Hunter-Central Rivers
- Lachlan
- Murray
- Murrumbidgee
- Namoi
- Northern Rivers
- Southern Rivers
- Sydney Metro

Threats

- Disturbance to winter roosting and breeding sites.
- Loss of trees for foraging and hollow-bearing trees for roosting.
- Application of pesticides in or adjacent to foraging areas.

Recovery strategies

Priority actions are the specific, practical things that must be done to recover a threatened species, population or ecological community. The Office of Environment and Heritage has identified 16 priority actions to help recover the Eastern False Pipistrelle in New South Wales.

Activities to assist this species

- Retain native vegetation that is floristically and structurally diverse.
- Minimise the use of pesticides within or adjacent to areas where insectivorous bats occur.
- Protect roost sites from disturbance.

Information sources

- Churchill, S. (1998) Australian Bats. New Holland, Sydney.
- Strahan, R. (ed.) (1995) The Mammals of Australia. (Australian Museum and Reed Books, Sydney)

Images

Eastern False Pipistrelle
Image 1 of 2.
View slideshow.

Related information

Bat calls of NSW (PDF - 1.4MB)

Bat roosts - factsheet (PDF - 184KB)

Old Growth Forests - factsheet (PDF - 218KB)

Black Falcon - profile

Scientific name: *Falco subniger*
Conservation status in NSW: Vulnerable
Commonwealth status: Not listed
Gazetted date: 12 Apr 2013
Profile last updated: 20 Nov 2013

Description

The Black Falcon Falco subniger G.R. Gray 1843 (family Falconidae), is a large (45-55 cm in length), very dark falcon with pale grey cere, eye-rings and feet. It is uniformly dark brown to sooty black, with a pale throat and an indistinct black streak below each eye. Some individuals have faint, narrow barring under the wings and tail. The dark form of the Brown Falcon Falco berigora is sometimes mistaken for the Black Falcon. However the Brown Falcon can be distinguished by its double cheek-mark, longer legs, bicoloured, barred underwings and comparatively slow flight (Debus 1998).

Distribution

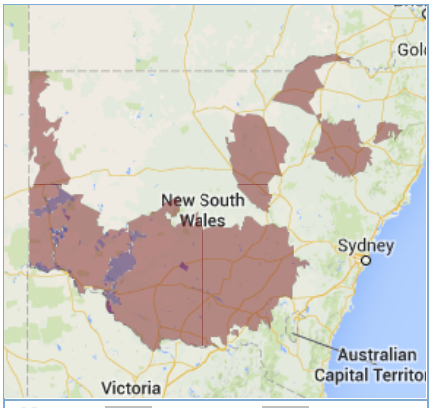
The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant & Higgins 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.

Regional distribution and habitat

Click on a region below to view detailed distribution, habitat and vegetation information.

- Border Rivers-Gwydir
- Central West
- Lachlan
- Lower Murray-Darling
- Murray
- Murrumbidgee
- Namoi
- Northern Rivers
- Western

Indicative distribution



Key: known predicted

The areas shown in pink and/purple are the sub-regions where the species or community is known or predicted to occur. They may not occur thoughout the sub-region but may be restricted to certain areas. (click here to see geographic restrictions). The information presented in this map is only indicative and may contain errors and omissions.

Threats

- Loss of large old trees from the landscape, a resource that is critical for nesting and hunting.

Recovery strategies

Priority actions are the specific, practical things that must be done to recover a threatened species, population or ecological community. The Office of Environment and Heritage has identified 8 priority actions to help recover the Black Falcon in New South Wales.

Australian Government

Department of the Environment

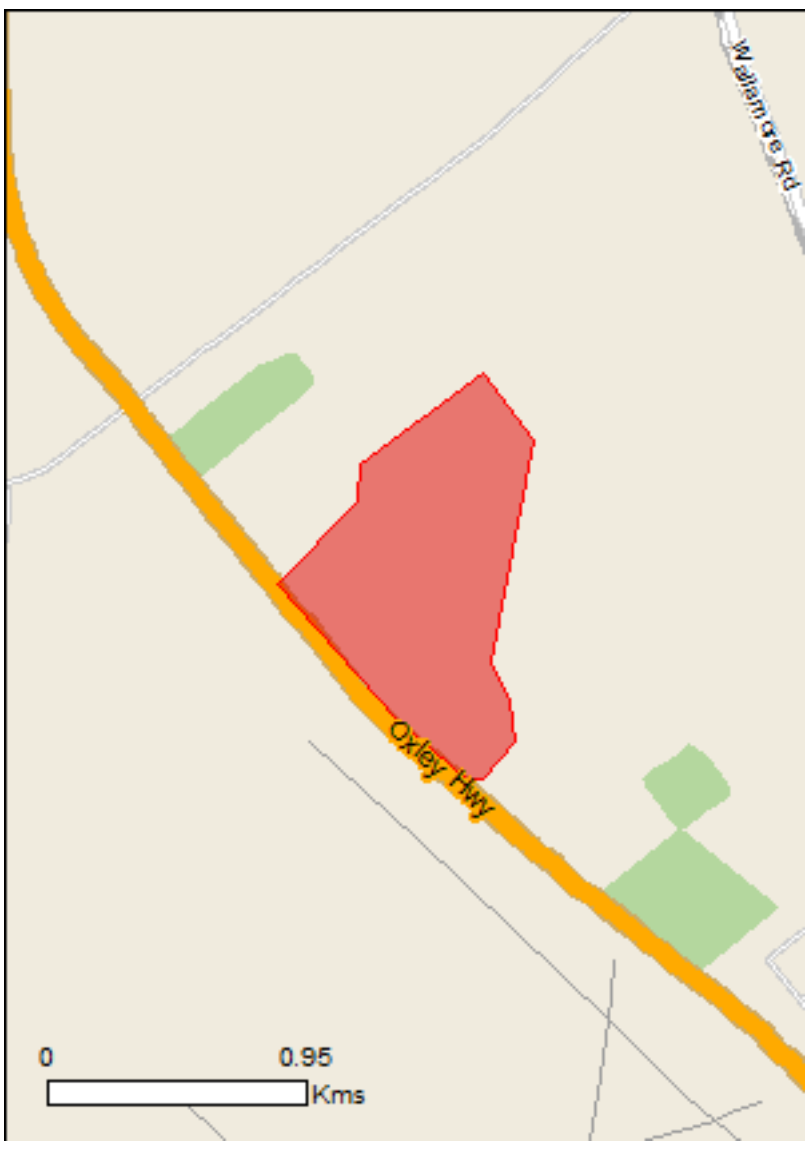
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

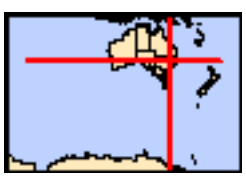
Report created: 28/11/13 17:58:45



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 0.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	17
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	26
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community likely to occur within area
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Frogs		
Litoria booroolongensis		
Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area
Mammals		
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
Nyctophilus corbeni		
South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Plants		
Dichanthium setosum		
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Euphrasia arguta		
[4325]	Critically Endangered	Species or species habitat may occur within area
Philotheca ericifolia		
[64942]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe		
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
Tylophora linearis		
[55231]	Endangered	Species or species habitat may occur within area
Reptiles		
Uvidicolus sphyrurus		
Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat likely to occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
Xanthomyza phrygia		
Regent Honeyeater [430]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat likely to occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor		
Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Pandion haliaetus		
Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis		
Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos		
Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis		
European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia		
Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus		
House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis		
Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris		
Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula		
Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Solanum elaeagnifolium Silver Nightshade, Silver-leaved Nightshade, White Horse Nettle, Silver-leaf Nightshade, Tomato Weed, White Nightshade, Bull-nettle, Prairie-berry, Satansbos, Silver-leaf Bitter-apple, Silverleaf-nettle, Trompillo [12323]		Species or species habitat likely to occur within area

Coordinates

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Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Geoscience Australia
-CSIRO
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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APPENDIX 11: ARCHAEOLOGICAL SURVEY REPORT (G&W AC, 1997)

PRELIMINARY REPORT

THE ARCHAEOLOGICAL SURVEY OF THE PROPOSED RENDERING SITE ON "OAKBURN" OXLEY HIGHWAY TAMWORTH, N.S.W.

PREPARED FOR
EES PTY LTD
TAMWORTH N.S.W.
ON BEHALF OF
BAIADA POULTRY PTY LTD
CORNER OUT AND BRIDGE STREET
WEST TAMWORTH.

BY
GAYNOR AND WILSON
ARCHAEOLOGICAL CONSULTANTS

JULY 1997

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Summary

The archaeological survey of the proposed rendering site on the property "Oakburn", near Tamworth NSW, was undertaken at the request of EES Pty Ltd, acting on behalf of their clients, Baiada Poultry Pty Ltd. The brief was to conduct an archaeological survey of an area of 16 hectares surrounding the site of the former "Oakburn" homestead, located adjacent to the Oxley Highway and opposite the western perimeter of the Tamworth airport. This survey area falls within the area designated as belonging to the *Gamilaroi* tribal or dialectical group and is within the zone supervised by the Tamworth Local Aboriginal Land Council.

The survey was undertaken on the 28th June 1997 by the authors, and Mr. Allan Kelly, representing the Tamworth Local Aboriginal Land Council and Mr. Adam Heaton, a second year Aboriginal student from the Department of Archaeology and Palaeoanthropology UNE, Armidale. During the survey two isolated Aboriginal stone artefacts were located. The first artefact was a broken retouched flake which had residues present on its surface. This artefact had been manufactured from a white, very fine grained siliceous material. Identification of this raw material was difficult due to the weathered nature of the surface of the artefact, however, it is either a very fine grained quartzite or a silcrete. Either raw material is rare in artefact assemblages from the Tamworth region and must have been imported into this area as they are not locally available.

The second stone artefact was manufactured from andesitic greywacke and was identified as being either an axe or an axe blank. The advanced state of weathering and patination of this artefact made it impossible to tell if it had ever been used, and therefore, the distinction between an axe and axe blank could not be made. Andesitic greywacke is locally available, however, raw material of the quality necessary for axe manufacture is limited in the landscape. It is likely, therefore, that the raw material for this artefact was sourced from the nearby Peel River 5 Aboriginal Axe Quarry. Further analysis of both of these artefacts, under laboratory conditions, will help clarify raw material type and thus, to pinpoint more accurately their sources. Sourcing of the raw material will in turn, provide information in relation to the movement of Aboriginal people and/or raw materials across the landscape prior to European settlement of the survey area.

The following recommendations have met with the approval of Mr. Allan Kelly (Tamworth Local Aboriginal Land Council representative), but have not yet been approved at a general meeting of the committee and members of the Tamworth Local Aboriginal Land Council. Written approval of these recommendations will be necessary prior to this preliminary report being finalised and then forwarded to the National Parks and Wildlife Service.

It is the recommendation of the authors that there is no archaeological reason that the development proposed by Baiada Pty Ltd on the property "Oakburn" should not be allowed to proceed, providing the following conditions are met by the developer:

1) that no works proceed on the proposed development area until the two artefacts located during the survey are collected for analysis and temporary storage at the Department of Archaeology and Palaeoanthropology, UNE Armidale. The artefacts collected will be returned to the Tamworth Local Aboriginal Land Council for display within their "Keeping Place" as soon as its construction is complete. In this regard an application for a "Consent to Collect" the artefacts in the sites known as "Oakburn 1" and "Oakburn 2" must be forwarded by Baiada Pty Ltd to the National Parks and Wildlife Service for their approval;

2) that the developer agrees to meeting the cost of:

a) the artefact collection and the writing of the subsequent report required by the National Parks and Wildlife Service;

b) the cost of residue analysis on the broken retouched flake and thin section analysis of the axe/blank, should laboratory inspection under high powered magnification indicate that these forms of analyses would be successful in furthering our knowledge of past Aboriginal life ways in the Tamworth Region (this will need to take into account the nature of the residue and the degree of weathering of the axe/blank).

3) that a representative of the Tamworth Local Aboriginal Land Council be granted permission to investigate any areas disturbed by earthworks undertaken for the development so that if further artefacts are uncovered they may also be collected.

CONTENTS

CONTENTS

1 Introduction

The archaeological survey of a 16 hectare portion of the property "Oakburn", on the Oxley Highway, adjacent to the Tamworth airport, was undertaken at the request of Terry Ellis of EES Pty Ltd, acting on behalf of their clients, Baiada Poultry Pty Ltd of Tamworth. The survey was to record the presence of any sites or relics of Aboriginal, archaeological or historic significance.

1.1 Aboriginal Tribal Area

The survey area falls within the region designated as belonging to the *Gamilaroi* tribal or dialectical group (Tindale 1974), and is within the Land Council Zone of the Tamworth Local Aboriginal Land Council.

1.2 The Archaeological Brief

The archaeological brief was to conduct a survey covering an area of 16 hectares on the property "Oakburn". The survey area included the site of the former homestead (according to local landholders the homestead was demolished around three to five years ago). The area surveyed is located on Portions 42 and 432, Parish of Murroon, County of Parry. The survey was to be undertaken in accordance with National Parks and Wildlife Service guidelines.

1.3 The Location of the Survey Area

The survey area was located approximately 5.25 km west of Tamworth on the right hand side of the Oxley Highway (see Figure 1).

2 The Environmental Context

2.1 Geography

The survey area is situated on a slope which dips gently (<1 degree) to the north. The nearest major watercourse is the Peel River which flows approximately 3 km to the northeast. The major tributary draining the area is Bolton's Creek which runs approximately 500 metres to the west of the survey area (see Figure 1). The property is bounded to the south side by the Oxley Highway.

2.2 Geology and Soils (A glossary of geological terms has been attached as Appendix 1)

The survey area lies at the border of the Upper Devonian Mandowa Mudstone, which contains mudstones (technically it would be more correct to term these siltstones; N. Stephenson pers. comm. 1990, geologist, U.N.E.) and arenites, and the Upper Devonian Keepit Conglomerates, which contain polymictic conglomerates and andesitic greywackes. These geological formations in turn overlie the Upper Devonian Baldwin Formation, which contain argillites and andesitic greywackes. To the north the Baldwin Formation is overlain by Quaternary sediments deposited along the banks and floodplains of the Peel River and its major tributaries (Tamworth 1:250000 Geological Series Sheet SH 56-13, Crook 1960:

189-207, Chappell 1961:63-75, Chappell 1968: 87-102, pers. obs:1993).

Of the stone types which are likely to outcrop in the survey area, only andesitic greywacke is known to have been regularly used for the production of Aboriginal stone implements. Andesitic greywacke is an excellent raw material for the production of stone axes (for more information see Binns and McBryde 1972 and Wilson 1994) and a large percentage of axes produced in the Tamworth Region were manufactured from this raw material. Further to the north-east where the argillites have been contact metamorphosed by heat from the Permian Moonbi Adamellite intrusions these were also used for the production of both axes and for the production of sharp flakes for cutting, scraping, skinning etc (Gaynor and Wilson 1994, 1995b), however, as the argillites present in the area surrounding "Oakburn" have not been subject to contact metamorphism, it is unlikely that they will be suitable for axe or flake manufacture.

The pebble/cobble beds in the Peel River may also have supplied raw materials, such as quartz, chert, cherty argillite and siltstone for flake manufacture, to Aboriginal people using the area of the proposed development prior to European settlement.

During the actual survey of "Oakburn" (see Section 5 below) no rock outcrops were observed, however, loose scree of both andesitic greywacke and argillite were observed both in the paddocks and in piles around trees in the paddocks.

Soils formed from andesitic greywacke and argillite are generally red-brown in colour, not of high fertility have a high clay content and poor permeability. The soils observed during the survey fit this description.

2.3 Vegetation

Species identification for this report was undertaken with the assistance of the following references: **Plants of Western New South Wales** by Cunningham et al:1981, **Weeds** by Auld and Medd 1987, **Eucalypts a Guide** by Brogan 1987, **Field Guide to Eucalypts** by Brooker and Kleinig 1990, **Grasses of Temperate Australia** by Lamp et al 1990 and **What Tree is That?** by Macoboy 1997.

The plant species recorded within the proposed development area are discussed in full within Section 5 (the Survey) of this report. A discussion of how plant species identification has been used to help understand the manner in which the landscape has been modified since European settlement of the area will also follow the discussion of the survey of the "Oakburn" property.

As the survey was broken up into the various paddocks included in the proposed development

area, the plant species present were recorded for each paddock separately. In many cases these were found to be similar but differences did arise due to the introduction of many non-native species in the area surrounding the former homestead site and the associated sheds and yards. As the survey was undertaken at the end of June, after several very heavy frosts, the species recorded will not be representative of the species which may be present in the area during the warmer months of the year. The majority of the weeds and grasses present were dead and retained only their stalks, and those parts of the plants normally used for species identification were no longer present. The living groundcover plants had only just germinated and were too immature to identify to species level on the day of the survey.

A detailed survey of the flora present in the proposed development area will be undertaken at a later date by Mr Paul Broese van Groenou of Arnhem Environmental Impact Assessors.

2.4 Fauna

On the day of the survey absolutely no fauna was recorded within the proposed development area. The day was very cold and windy and not even bird or insect activity was observed. Large amounts of fresh sheep and cattle manure did indicate however, that the area is still being used for the grazing of livestock.

3 Aboriginal Consultation

Mr. Allan Kelly, was the nominated representative of the Tamworth Local Aboriginal Land Council and he accompanied the authors on the survey and was consulted in regard to the recommendations made within this preliminary report. The recommendations within this report will have to be presented to a general meeting of the Tamworth Local Aboriginal Land Council for discussion by its members. This may result in some amendments to the recommendations presented at this time. If this is the case, then the amended recommendations will be those that will appear in the report that will be sent to the National Parks and Wildlife Service.

4 Previous Archaeological Research

4.1 The Aboriginal Axe Quarry on "Daruka" Station Moore Creek

The Aboriginal axe quarry on "Daruka" is listed on the Register of the National Estate and andesitic greywacke axes from this quarry have been recovered from all over the north-west of NSW, reaching as far distant as the Wilcannia Region, 960 kilometres away (Binns and McBryde 1972). During the 1960's and early 1970's research was undertaken at the site by Binns and McBryde (1969 and 1972) and by McBryde (1974). Research pertaining to the quarry site itself was mainly descriptive and no quantitative research was undertaken. Binns' and McBryde's (1974) main interest at that time was in the distribution patterns of axes from this quarry. "Daruka" is located approximately 11 km northeast of "Oakburn".

The most recent Archaeological consultancy in the area of the "Daruka" axe quarry was

by Appleton (1991), who surveyed the lower eastern slopes of Mt. Daruka for a rural subdivision. Appleton recorded "34 artefact locations (1991:17)". These consisted of one scarred tree, ten isolated artefacts, one camp site, nineteen artefact scatters and three knapping floors. Raw material types noted by Appleton (1991:33) were greywacke, mudstone, chert, quartz, chalcedony, jasper, silicified mudstone and silicified greywacke. All of these materials can be sourced locally or from within a few kilometres of "Daruka". The sites containing the artefacts were all located on the lower slopes and along the local creeks.

Wilson (1994) carried out research in the Tamworth Region which concentrated on experimental axe production and use-wear experiments using raw materials sourced from the local area, including that from the "Daruka" axe quarry. Wilson (1994:13-19) found that the andesitic greywacke from the Daruka axe quarry was by far the superior axe raw material available in this area due to its durability (toughness and preservation of a sharp cutting edge).

4.2 The Peel River Sites

All five of these sites were recorded by one of the authors in 1993 (J.W.).

Peel River 1

Situated approximately 6 km north of "Oakburn". Peel River 1 is an open camp site which extends for over 1700 metres along the western side of the Peel River. To date this is the only known site along the Peel River. This site has not been fully investigated as the landowner would not grant permission for research to be undertaken on his property. Preliminary observations by the authors (1992-3) noted that the site contained knapping debris from pebbles derived from the local pebble beaches along the Peel River, as well as andesitic greywacke sourced from a local quarry (Peel River 5) and what appeared to be andesitic greywacke from the "Daruka" quarry. Raw materials present at Peel River 1 included andesitic greywacke, cherty argillite, hornfels, quartz, siltstone and chert.

Peel River 2, 3 and 4

Situated approximately 5.75 km north of "Oakburn". These three sites consist of lithic sandstone boulders with evidence for the grinding of axes. They are located in a ring surrounding a small greywacke axe quarry (Peel River 5).

Peel River 5

Situated approximately 5.75 km north of "Oakburn". Peel River 5 is a small andesitic greywacke quarry. The andesitic greywacke from this quarry has been used for the manufacture of axes as well as the manufacture of cores for the production of flakes. The greywacke is very different to that found at the "Daruka" axe quarry. It is light grey in

colour ("Daruka" is green), coarser in texture and it has much better flaking qualities. This superior flaking quality makes it by comparison an inferior axe material to that from "Daruka".

Peel River 3, 4 and 5 were threatened by destruction by bulldozers in 1994 during the Rural Lands Protection Board rabbit eradication programme. Fortunately one of the landowners objected and the matter was eventually sorted out and the quarry and grinding grooves saved.

4.3 Botanic Gardens (this site was given the *Gamilaroi* name *"Garawul Gurar"*, meaning Long Gully).

This site is approximately 10.25 km east of "Oakburn" and is situated on the northern outskirts of Tamworth. In 1996 the authors located a large artefact scatter between two tributaries of Long Gully, a watercourse which drained the southwestern slope of a hill known locally as Bald Hill. The nature of the assemblage recorded at the site, indicated that cherty argillite and hornfels scree found on the slope, had been used for the manufacture of cores and flakes, that had later been removed from the site. The small cores, retouched and used flakes left at the site, had been sourced from river pebbles (most likely from the Peel River 2000 metres to the south) and it appears that *" Garawul Gurar"* was a stopover place where Aboriginal people replaced exhausted (worn out) artefacts, with those made from material sourced from the present area of the Botanic Gardens. Most of this site will be preserved as part of the Tamworth Botanic Gardens Development which will also include the Tamworth Local Aboriginal Land Council "Keeping Place". Artefacts located at the site had been manufactured from cherty argillite, hornfels, quartz, andesitic greywacke and chalcedony.

4.4 "Marengo"

In 1994, six sites were located during a survey undertaken by the authors, on the property "Marengo" which is situated approximately 10 km ENE of "Oakburn". The sites consisted of one hornfels and one cherty argillite quarry, a large open site (located adjacent and beneath an old European homestead site), two artefact scatters and an isolated artefact. Raw materials observed at "Marengo" included cherty argillite, hornfels, andesitic greywacke, siltstone, quartz, aplite and chert.

4.5 West Tamworth to Carroll Optic Fibre Cable Route

This Telstra line runs both inside (300 metres) and outside the front fence of the "Oakburn" property. The survey of the Optic Fibre Cable Route was carried out by Mr.T. Griffiths and Mr Allan Kelly (Tamworth Local Aboriginal Land Council) in November 1995. In the 54 km length of the route, no Aboriginal relics were sighted (Griffiths 1995)

4.6 Tamworth Sewage Effluent Irrigation Scheme

This survey was carried out by Lovell-Jones and Mr. Allan Kelly (Tamworth Local Aboriginal Land Council) in January 1996. The work was undertaken for the NSW Department of Public Works. Lovell-Jones's survey area overlapped that of the present survey and also included an area adjacent to the Tamworth airport and continued further to the west and south to include a section of Bolton's Creek. It should be noted at this time that the author's were unaware of the previous survey when they undertook their own survey and were still awaiting the results of a National Parks and Wildlife Service search of their "Minark" Aboriginal sites register, which would have indicated the earlier survey.

Lovell-Jones (1996) located five isolated stone artefacts and one site (containing four stone artefacts) during her survey. Lovell-Jones (1996) does not mention the location of the site but Allan Kelly (1997: pers. comm.) from the Tamworth Local Aboriginal Land Council informed the author's that the site was on Bolton's Creek. All four artefacts located in the site on Bolton's Creek were described by Lovell-Jones (1996:29) as "grey silcrete". Captions under photographs of two of the isolated stone artefacts describes them as silcrete and chert flakes respectively (Lovell-Jones 1996:14), however, the report fails to mention what the raw material types were for the other three isolated artefacts.

In her recommendations Lovell-Jones (1996:V) stated that:

> "none of the artefacts or the site we located were uncommon for the Tamworth region. Therefore, none of the artefacts or indeed the site that we found could be described as a significant Aboriginal or archaeological area, place or site."

However, Lovell Jones (1996:V11) did go on to recommend that all the artefacts be collected and deposited with the Tamworth Local Aboriginal Land Council. As this development did not proceed it appears that the artefact collection was not undertaken.

4.7 Discussion--Previous Archaeological Research

From the brief site descriptions given above, it can be ascertained that there are a certain suite of raw materials common to Aboriginal stone artefact assemblages from this area. These include andesitic greywacke, cherty argillite, hornfels, chert, quartz, siltstone and more rarely chalcedony. Silcrete, such as that described by Lovell Jones (1996:29), is not a common raw material located in sites in this area. In fact, to the authors' knowledge the closest site to contain silcrete artefacts was on the property "Sunnyside" at Kootingal (Gaynor and Wilson 1995:42), more than 15 kms to the north-east, and even then, only two artefacts out of more than 600 artefacts were silcrete (the remainder of the artefacts were of those raw materials discussed above). The only areas with suitable geological histories for the formation of silcrete lie to the north in the Armidale area and far to the south in the Hunter Valley. Thus, silcrete in a site in the Tamworth area should be seen to

have archaeological significance, as its presence indicates either the long distance movement of people or of raw material.

4.8 Historical References to the Survey Area.

The earliest parish map of Murroon available from the Department of Land and Water Conservation at Tamworth is dated 26th July 1909. The "Oakburn" area was originally part of the Australian Agricultural Company's "Goonoo Goonoo Station". In 1909, the area was thrown open for settlement purchase by the government of the day. According to the original parish map, Portion 42 was taken up by A.G. Warner on June 11th 1909 (farm 29), and Portion 43, by P.T. Potter on 8th June 1909 (farm 30). The survey area is comprised of part of the most southerly section of these two portions (Portion 43 is now divided into two portions with the Portion adjacent to the highway being Portion 432). The site of the "Oakburn" homestead is in portion 42. It is likely that these portions were cleared for cultivation soon after they were purchased and this indicates a long history of cultivation and thus, of ground disturbance.

5 The Survey

The survey was undertaken on Saturday the 28th June 1997 by the two authors, Mr. Allan Kelly (Tamworth Local Aboriginal Land Council) and Mr. Adam Heaton, a second year Aboriginal student from the Department of Archaeology and Palaeoanthropology, UNE, Armidale. The weather was clear and fine but windy and cold. Light conditions were good.

5.1 The Predictive Model

From the sites known to the authors and discussed above, it could be predicted that the most likely sites to be found would be artefact scatters and/or isolated artefacts. If sites such as these were located, it could be predicted that they would contain artefacts manufactured from andesitic greywacke, cherty argillite, hornfels, quartz and chert. It was also possible that grinding grooves and/or axe quarries may be located within the survey area if suitable outcrops were found to exist. As sites such as scarred or carved trees and art sites were unknown in this general area it was unlikely that they would be found during this survey.

As mentioned above, the survey undertaken by Lovell-Jones (1996), of the same area, was unknown prior to the undertaking of this survey and therefore, her results could not form part of the predictive model. If they had been known, the only change in the predictive model would be that silcrete would have been added to the list of raw materials expected in any assemblages located in the area.

5.2 The Survey Strategy

The entire area of the proposed development was surveyed with the participants walking at five metre intervals. All ant's nests, cattle, sheep and vehicular tracks and eroded and scoured areas were investigated closely as they provided the only areas with excellent visibility. The remainder of the area had poor visibility due to a thick mantle of short,

recently germinated, grass and weeds and in other sections by stands of tall, dead, grasses. The direction in which the participants walked was altered as the day progressed to take advantage of the best light and to avoid shadows. All stone artefacts located were flagged for later artefact analysis, site recording and photographic purposes. All four participants involved in the survey were experienced in stone artefact identification.

5.3 The Paddocks

5.3.1 - Paddock 1 (see Plates 1 and 2)

Paddock 1 was located adjacent to the Oxley Highway on the western side of the development area (see Figure 2). Included within this paddock were a derelict shearing shed, a shed which combined a hay shed, horse stalls and a cow bale; a roundyard and loading ramp, sheep yards and a grain silo. A drainage channel had also been constructed below (north) the yards complex. This channel carried water away from the former homestead. Paddock 1 was flat. (see Plate 1).

The groundcover species in Paddock 1 included wiregrass (most probably *Aristida ramosa*), an occasional barbed-wire grass (*Cymbopogon refractus*) and star thistles (*Centaurea calcitrapa*). Around the sheds and in the sheep yards there were also Bathurst burrs (*Xanthium spinosum*). All of these plants were dead but beneath these many new groundcover species had recently germinated. As most of these were only at the two leaf stage their identification to species level was problematic, but they included dock (*Rumex sp.*) and medics (*Medicago sp.*) and rosettes of variegated thistle (*Silybum marianum*) and saffron thistle (*Carthamus lanatus*).

There were no mid-stratum species observed. The native trees present in the upper stratum consisted of an occasional white box (*Eucalyptus albens*) and wilga (*Geijira parviflora*) and there were also and some very large introduced trees which included peppercorn (*Schinus areira*), locust (*Ceratonia siliqua*) and another very large tree which could not be identified.

The paddock was surveyed in an east/west direction taking advantage of the best light conditions at that time of the morning. Visibility was generally around 5% owing to the fresh green mantle of plants. This green mantle, however, was not sufficient to obscure any stones greater than approximately 2 cm in diameter, so stone artefacts greater than this size would have been sighted owing to the 5 metre grid pattern adopted for the survey. There were only small patches of tall grass in this paddock.

There were a number of bare areas in this paddock that had 100% visibility. These were on tracks or roads, around the sheds and in the sheep and horse yards. The areas around the buildings and yards were very disturbed. Andesitic greywacke scree was visible in this paddock and piled under the trees, suggesting that farmers had removed them from the paddock so that it could be cultivated more effectively. No Aboriginal or historic relics were sighted in this paddock.

5.3.2 Paddock 2 (see Plates 3 and 4)

Paddock 2 was also adjacent to the Oxley Highway and this paddock included the original house yard, two large slabs of cement, the foundations of a house and shed and a well and pump. This area was also flat. According to local farmers (Diane and Devon Drew pers. comm. 1997), the brick homestead was demolished and a large shed removed sometime after 1992. As the antiquity or historic significance of this building was unknown at the time of the survey, the author's spent some time in drawing up a plan of the homestead as reflected by the remains of its foundations, at the completion of the survey (see Figure 3 and Plate 12).

Plant species recorded in the house yard included many introduced garden plants such as jonquils (*Narcissus sp.*) and iris (*Iris sp.*) and ornamental trees such as the Oleander (*Nerium oleander*). A yellow flowering vine (species unknown) grew over the few remnants of the house yard fence and some succulents (possibly aloes) grew nearby. Native trees in around the house yard included wilga, silky oak (*Grevillea robusta*), Casuarina (probably *Casuarina cunninghamiana*) and kurrajong (*Brachychiton populneus*). The kurrajongs were planted in a neat row across the northern side of the house yard. Groundcover species growing in the house yard included couch grass (*Cynodon dactylon*), nettles (*Urtica incisa*) and horehound (*Marrubium vulgare*).

Outside the house yard the groundcover species were the same as those recorded for Paddock 1 with the addition of an occasional soft roly-poly (*Salsola kali*) and an occasional patch of a very tall grass (up to one metre) which had shed all its seed and leaf but appeared to be tall plains grass (*Stipa aristiglumis*). Directly in front of the former house yard a small stand of grey gums (probably *Eucalyptus punctata*) were recorded. These were mainly immature specimens surrounding an occasional mature tree. Isolated kurrajongs, wilgas and white cedars (*Melia azedarach*) were also recorded in this paddock.

The only mid-stratum species noted in Paddock 2 were ornamental trees around the house yard and an African boxthorn (*Lycium ferocissimum*) beneath one of the trees.

This paddock was surveyed in a similar fashion to Paddock 1. The same mantle of new green growth covered much of the ground and there were still many bare patches affording 100% visibility. Soil heaped up along the fencelines in this paddock indicated that the area had been regularly ploughed in the past. This paddock had also been disturbed by the laying of a Telstra cable just inside the boundary fence and running the length the Oxley Highway boundary. It was evident that this line had been laid after cultivation had ceased in this paddock as the soil deposited by prior disc ploughing had been removed from along this fenceline. There was a considerable amount of andesitic greywacke scree present along the southern boundary of this paddock. Visibility in Paddock 2 ranged from 5% in the grass to 100% in eroded and scoured areas (some of which reached a size of 10 metres by 5 metres). Overall visibility averaged around 25%.

5.3.3 Paddock 3 (see Plates 5 and 6)

Paddock 3 ran to the north-east of Paddocks 1 and 2 (see Figure 2). Paddock 3 sloped gently (<1 degree) to the north-east. There were no buildings or remains of buildings observed in this paddock. Paddock 3 contained only one tree. This was a mature white box. There was no mid-stratum present. The groundcover consisted of the same weeds and grasses recorded in Paddock 1 and 2 with the addition of some (dead) chicory plants (*Cichorium intybus*), also an introduced species.

This paddock was traversed in a north-south fashion as light conditions had changed from the first two paddocks. A laneway containing a track with 100% visibility ran along the western boundary of this paddock (see Plate 5). Although trampled hard by stock, it afforded an excellent cross section (with 100% visibility) of the western side of this paddock. A graded track also crossed this paddock from west to east. Visibility was 100% over most of this track, which appears to have been lightly graded for access through both Paddocks 3 and 4.

One stone artefact was discovered in the southwestern corner of this paddock. The artefact was a broken retouched flake, the surface of which was quite patinated making raw material identification difficult. Under magnification (x30) the artefact appears to have been manufactured from a white, extremely fine grained quartzite or silcrete. The artefact also appeared to have some residues on both its ventral and dorsal surfaces (see Plate 9). The area surrounding the artefact was intensively investigated, however, no further artefacts were located.

It is interesting to note that both quartzite and silcrete are very rare raw material types used for stone implement manufacture in this region and therefore, the location of this isolated broken retouched flake is of some archaeological significance.

Visibility in Paddock 3 away from the laneway and grader scrape ranged between 5 to 50% and averaged 25% in the western half of the paddock. Visibility then decreased significantly in the eastern half of the paddock, to range between 2% and 15% and average 5% owing to thick stands of tall grass. As in the earlier paddocks, there were also many areas within the grass totally devoid of vegetation which gave patches of 100% visibility.

5.3.4 Paddock 4 (see Plate 7)

Paddock 4 was the largest paddock surveyed and comprised the south-eastern section of the proposed development area. Paddock 4 sloped gently (<1 degree) to the north-north-east. It showed very definite signs of past cultivation with broadsheet erosion visible in the southwestern corner (see Plate 7). Groundcover varied with patches of bare ground, patches of dense tall grass, and patches with only the green mantle of immature grasses and weeds. Visibility varied throughout this paddock from 0% to 100% and averaged 25%.

An andesitic greywacke stone axe or axe blank was discovered in Paddock 4, approximately 80 metres from the tributary which drains the present site of the airport. This artefact was extremely weathered and highly patinated and it was not possible to discern if it had ever been used as an axe or if it had been lost or discarded prior to being used. It had never been edge-ground. The source of the raw material for this axe was not the "Daruka" quarry at Moore creek, and it is more likely to have been sourced from a smaller quarry such as the Peel River 5 quarry, described earlier. No other Aboriginal artefacts were located in this paddock.

The only trees observed during the survey of this paddock were just outside the survey area proper (to the south-east) and these consisted of one peppercorn tree and two white cedars growing along the tributary. Both of these are introduced species. There were no mid-stratum species present and the groundcover was similar to that in the earlier paddocks with the addition of rat's tail grass (*Sporobolus creber*).

As groundcover had diminished visibility within the survey area to such as degree that it was not really possible to observe the majority of the ground surface, it was decided to increase the area surveyed to include the banks of the tributary which drained the airport. This tributary ran parallel to, and just outside, the northern and eastern margins of the survey area (Paddock 4). Visibility was 100% along the tributary and this degree of visibility often extended more than 20 metres back from the tributary (see Plate 8). It was felt that if sites were to exist in the area that they would most likely be found in association with the tributary system. It was also felt that the proximity of this tributary system to the proposed development area may mean that it could be damaged during the construction of the rendering plant and any water retention dams that may have to be built to retain run-off from the site.

Upon inspection it was found that this tributary system appeared to have been straightened and reformed by earthmoving equipment in the past. The length of the tributary system surveyed was approximately 300 metres. Within this the tributary varied from a single channel approximately 10 metres wide to a braided channel up to 50 metres wide. The O horizon was missing from the majority of the area surveyed. In many places the A horizon was also missing and the B Horizon was visible at the surface. It is probable that this tributary system periodically carries large volumes of water originating from the large expanses of sealed tarmac at the Tamworth airport. These flows it appears have in the past, broken the banks of two dams to the east of the survey area and scoured the banks of the tributary removing the O and A horizon. As could be expected, no artefacts were located along this tributary system and it is suggested that even if they had existed in this area in the past, that they would have been washed away along with the O and A horizons.

5.4 Results of the Survey

Two isolated Aboriginal stone artefacts were located during the survey of "Oakburn". As it is a National Parks and Wildlife Service directive that each isolated stone artefact be

classified as an Aboriginal site if it is at a distance greater than 50 metres from any other Aboriginal artefact, the two artefacts were recorded as separate sites, which were named "Oakburn 1" and "Oakburn 2".

The homestead foundations suggest that the original house was probably reasonably small but had been substantially added to over the years (the original foundation was brick but later additions were concrete footings). As the area was first taken up by settlers in 1909, the homestead could not have been any older than this. The nature of the concrete footings suggest that most of the house was much younger than a 1909 vintage (see Plate 12 and Figure 3). The question of whether or not the house was of historic significance is no longer relevant as it has already been destroyed and the rubble removed from the site.

The sheds and yards are typical of those built post 1920 and are all now in a derelict state. Constructions of a similar nature and in better condition are common on other farms in the district and therefore, these appear not to have any historic significance.

5.4.1 Discussion

It was obvious that most of the native trees had been cleared from the proposed development area. This would appear to indicate that the area was cleared for cultivation. The groundcover species present were those generally associated with disturbed ground and this would also suggest that the area has been subject to cultivation in the past. Other indications of cultivation were the large piles of andesitic greywacke scree around many of the trees, plough damage on rocks left in the paddocks, the soil heaped up along the fencelines, erosion initiated by the method of ploughing the paddock and a cutting point from an old mould board plough. In light of all this evidence it is fairly obvious that the soil has been disturbed at least to the base of the plough zone (approximately 15-30 cms below the surface).

All of the above indicates that any artefacts located during the survey will have been subject to some degree of vertical and horizontal movement from cultivation. This means that both spatial (across the ground surface) and temporal (within the soil profile) patterning has been disrupted. Observations by the authors have shown that during cultivation the horizontal movement of artefacts is limited and though the original pattern of discard will be disturbed, the actual area of discard can still be defined to within a few metres. Unfortunately the vertical movement of the artefacts when subject to cultivation means that it is no longer possible to know if subsurface artefacts have any greater antiquity than surface artefacts and vice-versa. Therefore, it is not possible to know if there are more artefacts below the surface or to suggest any age for those artefacts which were discovered during the survey. The type and degree of weathering of the artefacts does, however, suggest that they have spent some time buried beneath the surface before being returned to the surface by cultivation.

6 Site Recording

6.1 Site Details "Oakburn 1'

Map Reference: Tamworth 1:25000 9035-I-N Second Edition
Grid Reference: E293800 N6560750 Site Type: single artefact
Artefact type : broken retouched flake Raw Material(s): quartzite or silcrete
Landform: gentle slope Resource Zone: Open grassland (old cultivation)
Local Outcrop(s): andesitic greywacke Visibility: 100%
Present Land Use: grazing Geomorphic Processes: erosion
Past Land Use: farming and grazing Nearest permanent water: 625 m Boltons Creek

Comments:

The artefact is the proximal end of a broken retouched flake. The surface of this artefact is quite patinated making identification of the raw material extremely difficult. The raw material is extremely fine grained and creamy white in colour. Under magnification, the raw material appears to be a either a fine grained quartzite or a silcrete. Both of these raw materials are very rare in sites in the Tamworth District. Residues were observed on both the ventral and dorsal surfaces of the artefact.

Technical Details :(a glossary of technical terms has been attached as Appendix 1)
length - 16mm, width - 16 mm, thickness - 6 mm.
Retouched on the left lateral margin. Retouch initiated from the ventral surface. Possible use-wear on the right lateral margin. Platform has three flake scars on its surface indicating the core from which the flake was removed had been rotated. The flake termination is missing due to a transverse snap. There is no cortex remaining on the artefact.

6.2 Site Details "Oakburn 2'

Map Reference: Tamworth 1:25000 9035-I-N Second Edition
Grid Reference:E294200 N6560450 Site Type: isolated artefact
Artefact type(s): axe/axe blank Raw Material(s): andesitic greywacke
Landform: gentle slope Local Outcrop(s): andesitic greywacke
Resource Zone: Open grassland Visibility: 20%
Geomorphic Processes: cultivation Present Land Use: grazing
Past Land Use: farming and grazing Nearest permanent water:1000m Boltons Creek

Comments:

This artefact was highly patinated and extremely weathered with magnesium staining (indicating a lengthy time in contact with the soil). The degree of weathering of the artefact's surface made it impossible to discern if it had ever been used as an axe or if it had been lost or discarded prior to being used. It had never been edge-ground. The axe/blank had been bifacially flaked and was manufactured from a large flake of andesitic greywacke. The poll of the artefact exhibited some evidence of plough damage. The source of the raw material for this axe was not the "Daruka" quarry at Moore creek, and it is more likely to have been

sourced from a smaller quarry such as the "Peel River 5" quarry. Thin section analysis of the artefact will be able to prove if this is the case, providing the artefact is not too weathered. A new method of thin sectioning is now available which removes only a very thin (pencil lead thickness) core from the artefact. The end of the core is then glued back into the artefact so that the thin sectioning is no longer visible.

Technical details of this artefact were :
length - 76 mm, width - 69 mm, thickness - 30 mm.
The width of cutting edge was 61 mms and the width of the poll was also 61 mms. There was no cortex remaining on the artefact.

7 Discussion

7.1 "Oakburn 1"

After consultation with Mr Allan Kelly (Tamworth Local Aboriginal Land Council) it was decided that as the raw material used in the manufacture of the broken retouched flake was rare in the Tamworth region and could be instrumental in helping to trace past movements of Aboriginal people across the landscape, that the artefact should be collected for further analysis (including residue analysis)and then ultimately housed in the Tamworth Local Aboriginal Land Council Keeping Place. As construction of this "Keeping Place" has not yet begun, the artefact would be stored in an area already set aside as a temporary Keeping Place for the Tamworth Local Aboriginal Land Council, at the Department of Archaeology and Palaeoanthropology, UNE, Armidale, until such time as the Tamworth Local Aboriginal Land Council Keeping Place is finished.

7.2 "Oakburn 2"

After consultation with Mr Allan Kelly (Tamworth Local Aboriginal Land Council) it was decided that as this axe/blank could be instrumental in helping to trace past movements of Aboriginal people across the landscape, that the artefact should be collected for further analysis and then ultimately housed in the Tamworth Local Aboriginal Land Council Keeping Place. As construction of this "Keeping Place" has not yet begun, the artefact would be stored in an area already set aside as a temporary Keeping Place for the Tamworth Local Aboriginal Land Council, at the Department of Archaeology and Palaeoanthropology, UNE, Armidale, until such time as the Tamworth Local Aboriginal Land Council Keeping Place is finished.

8 Significance

8.1 Aboriginal Significance

Discussions with Mr. Allan Kelly (to be ratified at the next Tamworth Local Aboriginal Land Council meeting) during the "Oakburn" survey led us to conclude that the two artefacts located during the survey do not have any great Aboriginal significance which could have been derived from their association with any known Aboriginal sites in the area, nor do they constitute sites which could be used for teaching purposes within the Aboriginal community

and therefore, gain Aboriginal significance in this regard. However, both artefacts could be used as teaching tools within the context of the regional perspective which will be a feature of the displays in the Tamworth Aboriginal Land Council Keeping Place and as such, do have sufficient Aboriginal significance to warrant their collection prior to any development going ahead on the property "Oakburn".

8.2 Archaeological Significance

Both of the Aboriginal stone artefacts located during the survey have archaeological significance which is derived from a number of factors. To begin with, the archaeological resource of the area surrounding "Oakburn" is so poorly known, due to an almost total lack of research in the area, that it is not possible to state with any confidence what proportion of the archaeological record that these artefacts may represent. We suspect that they are just a minute sample of what exists on other private properties in the area, but at present these artefacts constitute 18%, or two from a total of 11 artefacts known from the area (nine from the survey of Lovell-Jones 1996). Secondly, both the andesitic greywacke axe and the quartzite/silcrete broken retouched flake may add valuable information to the archaeological record in regard to the movement of people and/or raw materials across the landscape. The flake also has some residues on its surface which may be able to provide information in relation to what the flake was used for and by extrapolation what Aboriginal people were doing when they were in the area now known as the "Oakburn" property. By collecting and analysing these artefacts it may be possible to add significantly to the present archaeological knowledge of the Tamworth Region.

8.3 Educational Significance

When eventually added to the collection displayed at the "Tamworth Local Aboriginal Land Council Keeping Place", the artefacts will add to the store of knowledge on the Aboriginal prehistory of the whole of the Tamworth Region. This kind of information will not only provide a means of teaching future generations of Aboriginal children, it is also of great interest to the general public and helps nurture a greater understanding between the Aboriginal and non-Aboriginal community.

8.4. Historic Significance

The sheds and yards recorded during the survey are in a state of disrepair and typical of many old constructions found on farms around the region. As such they are seen to have low historic significance.

9 Recommendations

It is the recommendation of the authors that there is no archaeological reason that the development proposed by Baiada Pty Ltd on the property "Oakburn" should not be allowed to proceed, providing the following conditions are met by the developer:

1) that no works proceed on the proposed development area until the two artefacts located during the survey are collected for analysis and temporary storage at the Department of Archaeology and Palaeoanthropology, UNE Armidale. The artefacts collected will be returned

to the Tamworth Local Aboriginal Land Council for display within their "Keeping Place" as soon as its construction is complete. In this regard an application for a "Consent to Collect" the artefacts in the sites known as "Oakburn 1" and "Oakburn 2" must be forwarded by Baiada Pty Ltd to the National Parks and Wildlife Service for their approval;

2) that the developer agrees to meeting the cost of:

a) the artefact collection and the writing of the subsequent report required by the National Parks and Wildlife Service;

b) the cost of residue analysis on the broken retouched flake and thin section analysis of the axe/blank, should laboratory inspection under high powered magnification indicate that these forms of analyses would be successful in furthering our knowledge of past Aboriginal life ways in the Tamworth Region (this will need to take into account the nature of the residue and the degree of weathering of the axe/blank).

3) that a representative of the Tamworth Local Aboriginal Land Council be granted permission to investigate any areas disturbed by earthworks undertaken for the development so that if further artefacts are uncovered they may also be collected.

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Appendix 1

A1.1 Glossary of Geological and Technical Terms

Geological terms were adapted from The Penguin Dictionary of Geology (Whitten and Brooks 1988) and those related to artefact analyses and description from Gaynor 1987 and Wilson 1994).

adamellite: a medium to coarse grained igneous rock, occurring like granite, mainly in batholiths.

andesitic greywacke: a greywacke containing fragments of andesite derived from the erosion of an earlier volcanic sequence (see greywacke below).

aplite: a fine-grained, equigranular felsic plutonic rock occurring as dykes and sills in adamellite.

arenite: detrital sedimentary rocks in which particle size ranges from 1/16 mm to 2 mm. more commonly known as sandstone.

argillite: a sedimentary rock, commonly a siltstone or a mudstone, which has lost its ability to cleave along its bedding due to metamorphism. Argillites can have a conchoidal fracture.

axe: an artefact will be classed as an axe if it has been edge-ground to produce a cutting edge and is of a shape suitable for use as a hand held or hafted axe. An artefact will also be classed as an axe if it fulfils the above criteria except for the edge-grinding but displays identifiable use-wear.

axe blank: a piece of stone of a raw material, shape and size suitable for the manufacture of an axe that has undergone some modification other than grinding (flaking, pecking).

bifacial: bifacial flaking refers to the removal of flakes from a single edge but from two opposite directions. Axes often have bifacially flaked cutting edges.

chert: a cryptocrystalline rock which sometimes displays conchoidal fracture and may have either an organic or inorganic origin.

cherty argillite: a very fine grained sedimentary rock which has undergone silicification due to the infilling of its pore spaces by silica. Cherty argillites vary in colour but are generally grey through to a pale green.

contact metamorphism: changes brought about in rocks within the crust of the earth by heat from contact with igneous rocks.

core: a piece of isotropic material from which flakes or pieces have been struck. It may have negative bulbs of percussion or straight shear edges according to the method of reduction. It will always display at least one flake scar.

cortex: the weathered surface of the rock.

distal: in reference to a flake the distal margin is the bottom of the flake or that margin which contains the termination of the flake.

dorsal surface: the dorsal surface of a flake is the surface which once constituted the outside surface of the core (see ventral surface). It may or may not exhibit flake

scars.

equigranular: containing grains of equal size.

flake: A piece of stone detached from a larger mass by the application of force and having a feather, hinge or step termination, plus a bulb of percussion. A platform may be present if the proximal end is unbroken or uncrushed.

flake scar: a concave surface which has resulted from the removal of a flake

greywacke: a very poorly sorted sandstone which has often undergone metamorphism producing a very tough, dark coloured rock.

hornfels: a medium or fine grained equi-granular rock produced by high grade contact metamorphism of a sedimentary or igneous rock. Hornfelses are generally hard, compact, black to grey in colour and may exhibit a range of conchoidal fracture from good to poor. Fresh flakes have a dull lustre and a somewhat porous appearance. The more intractable hornfelses make excellent axe materials.

igneous: a solid crystalline or glassy rock formed by crystallisation from a magma.

intrusion: a body of magma which has forced its way up through the existing rocks.

lateral margin: the lateral margins of a flake are the two edges (right and left) of the flake which join the platform (top) of the flake and the termination (bottom) of the flake.

patinated: the term patinated or patination refers to the weathering skin which forms on the outside of the sttone artefact.

platform: the area on the proximal end of a flake where the force was applied to remove it from the core.

polymictic conglomerate: a conglomerate containing fragments of many rock types.

proximal: the proximal end of a flake is the top part of the flake or that part which contains the platform (where the flake was struck by the hammerstone to remove it from the core).

relic: Aboriginal or historic artefact.

residue: the term residue refers to the remnants of plant or animal material which remain encrusted on the surface of an artefact. Residue analysis can provide information in relation to the use of the artefact.

retouch: retouch refers to the resharpening or blunting of an artefact by the removal of small flakes.

rotation: when the angle on the edge of a core becomes greater than 90 degrees the core may be rotated and a new platform initiated or the core may be discarded and another core utilised. If that particular raw material is in short supply for any reason (distance to quarry, socio-cultural reason for restriction of access) then core rotation will be utilised to increase the use-life of the core. Core rotation can be recognised on flakes by the orientation of the various flake scars on the dorsal surface and/or platform of the flake. Core rotation is a method for the conservation of raw material.

scree: loose rock rubble.

siltstone: very fine-grained sedimentary rock formed by the deposition of silt.

termination: the termination of a flake is that part of the flake which was the last to be

detached from the core. The termination of a flake make take several forms dependant on the amount of force with which it is struck from the core, the direction of that force and the distance from the edge of the core that the hammerstone impacts. The three main termination types are the feather, step and hinge. A feather termination is one in which the flake detaches from the core with a thin sharp end or termination. A stepped termination occurs when the flake detaches from the core with a fracture plane at right angles to the core face. A hinge termination occurs when the flake detaches from the core with a rounded blunt termination.

use-wear: use-wear on an artefact refers to some indication such as, edge chattering, polish or striations which indicate that the artefact has been used to cut, grind, slice or scrape.

ventral surface: the ventral surface of the flake is the surface which was inside the core before it was detached. The ventral surface will not display flake scars unless it has been retouched after being removed from the core. The ventral surface will often, but not always (depending on raw material type), display a rounded protruberance below the platform commonly known as a bulb of percussion or bulb of force.

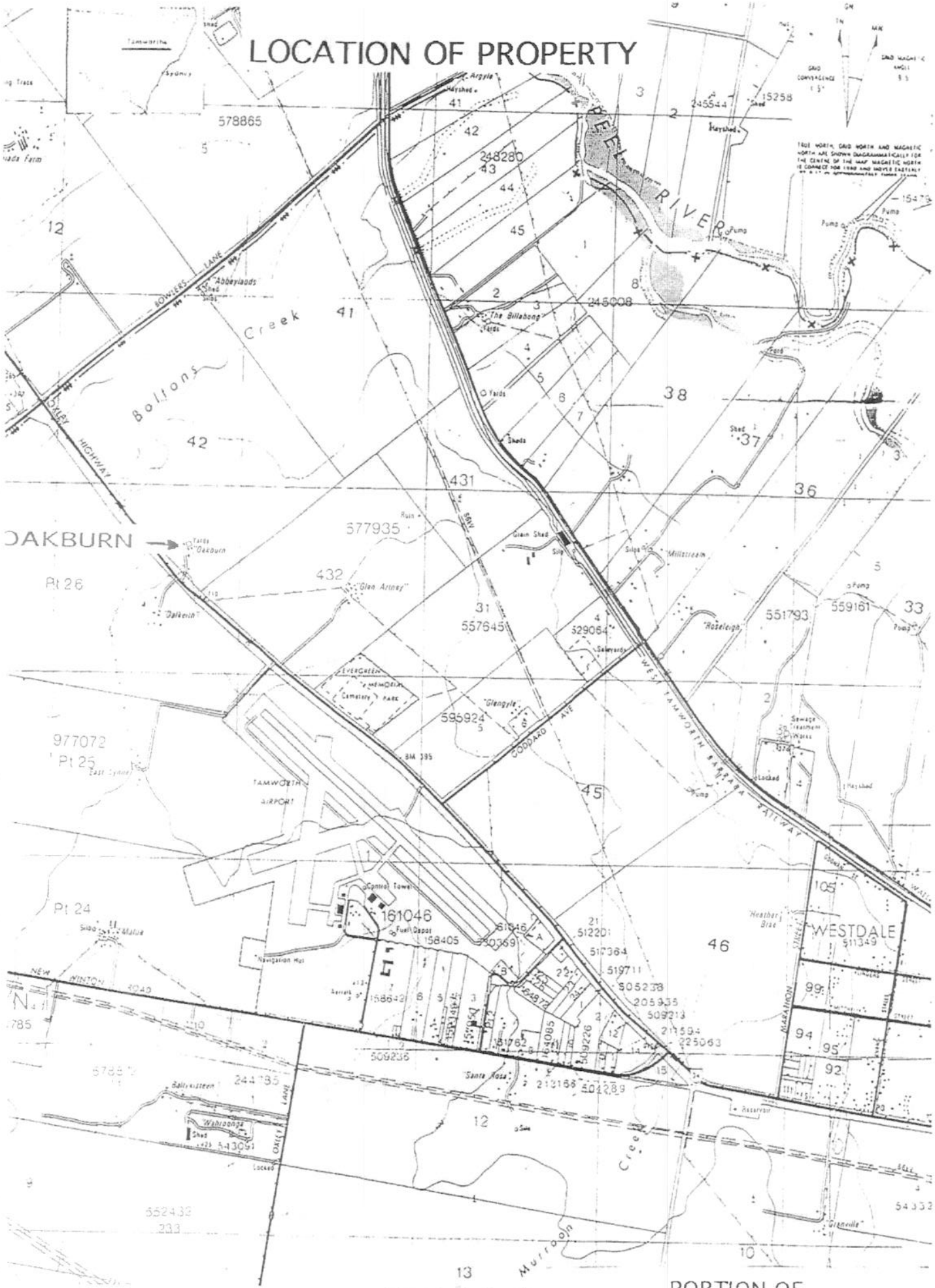

FIGURE 2

PORTION OF
TAMWORTH 1:25000
TOPOGRAPHICAL MAP

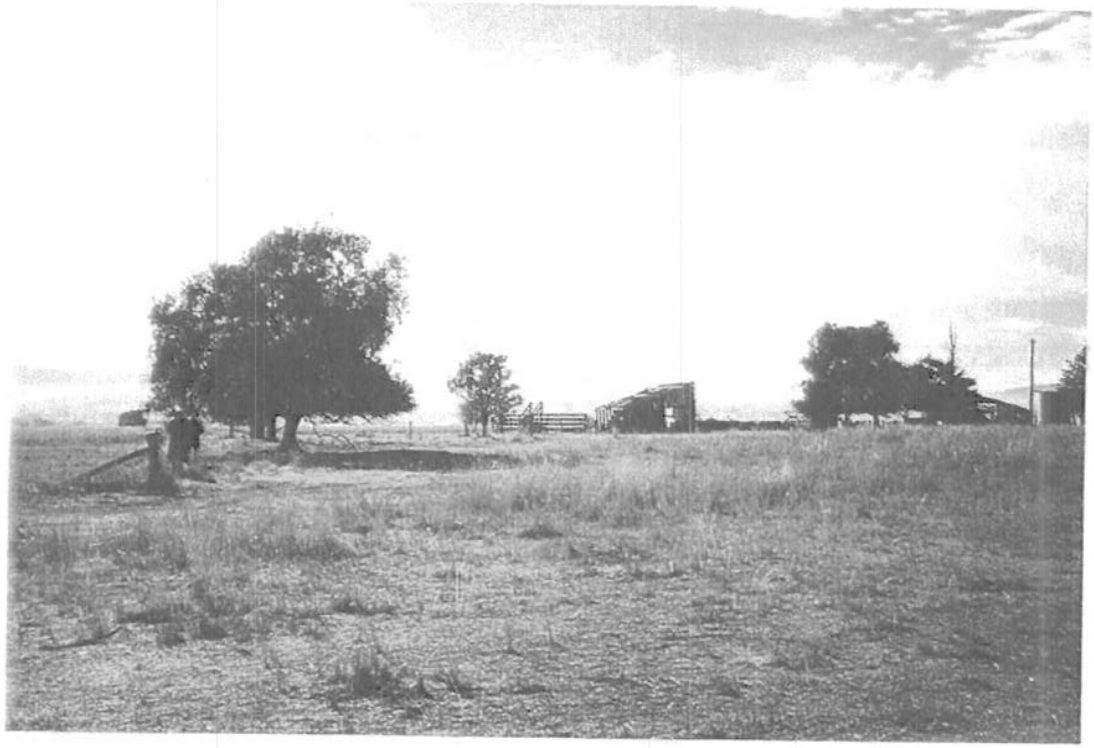

Plate 1 Paddock 1 from southwest corner with sheds and yards
hills in the background are the Baldwin Formation above Tamworth

Plate 2 Paddock 1 near sheds showing green mantle of immature plants

Plate 3 Paddock 2 from southwest corner looking towards old homestead site near tank

Plate 4 Paddock 2 from southeast corner showing visibility on open grassland

Plate 5 Paddock 3 from northwest corner showing laneway on western boundary with 100% visibility

Plate 6 Paddock 3 from southeast corner showing visibility in open grassland

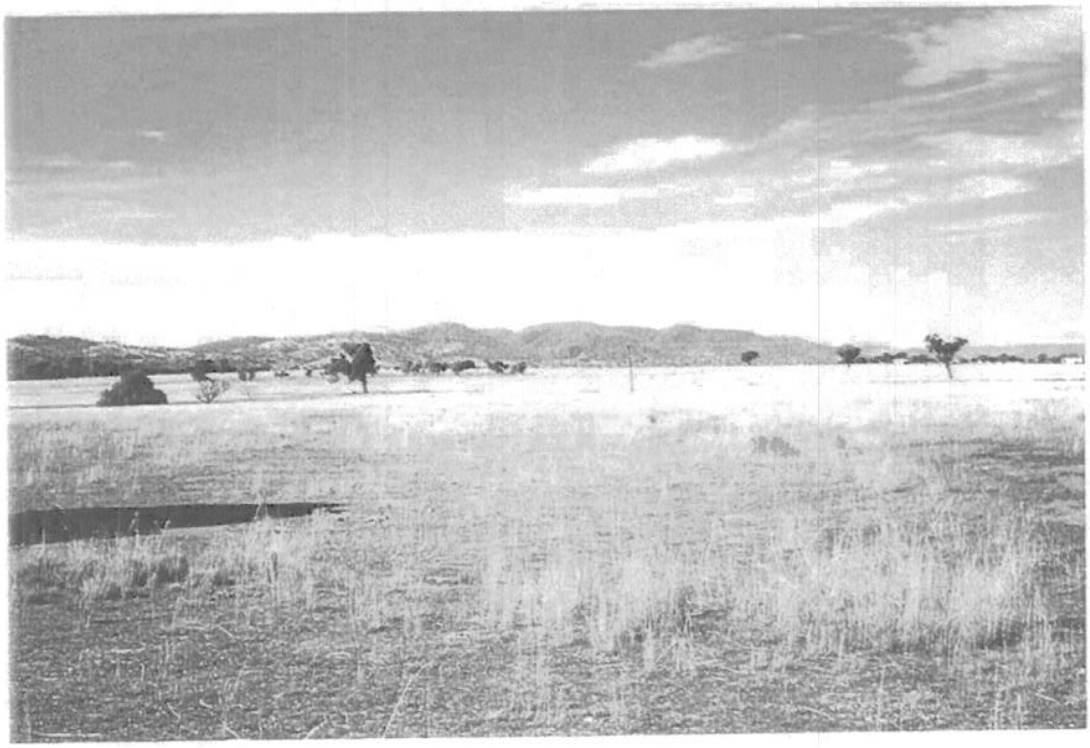

Plate 7 Paddock 4 from southwest corner showing depression down corner from past erosion of cultivation. Visibility here is typical of this paddock with bare patches (on right), mantle of green immature plants and patches of dead grasses

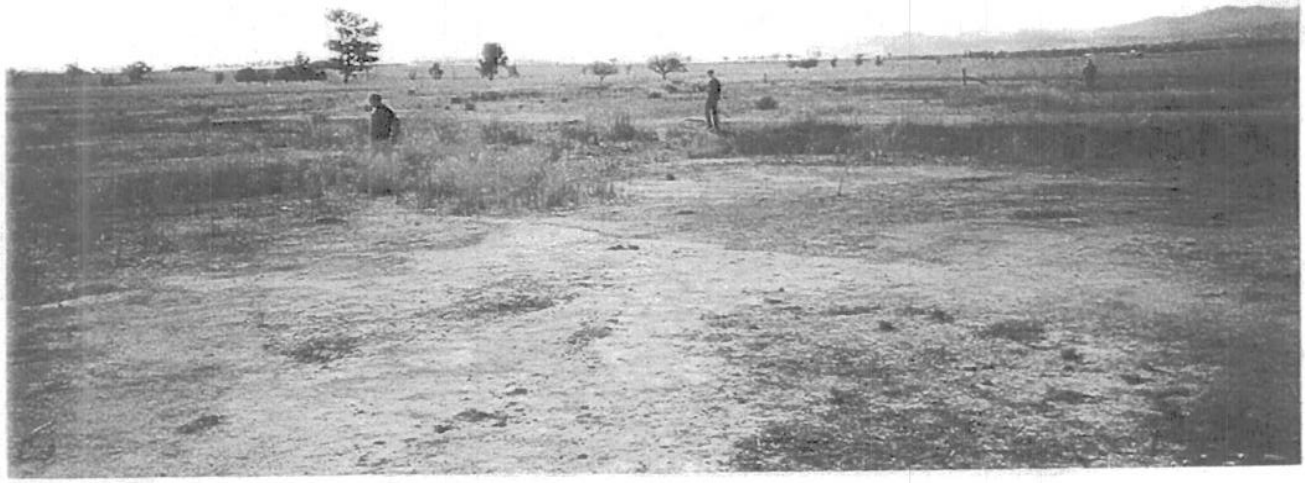

Plate 8 Scoured banks of the tributary of Boltons creek running across paddock 4 but to the north of the survey area

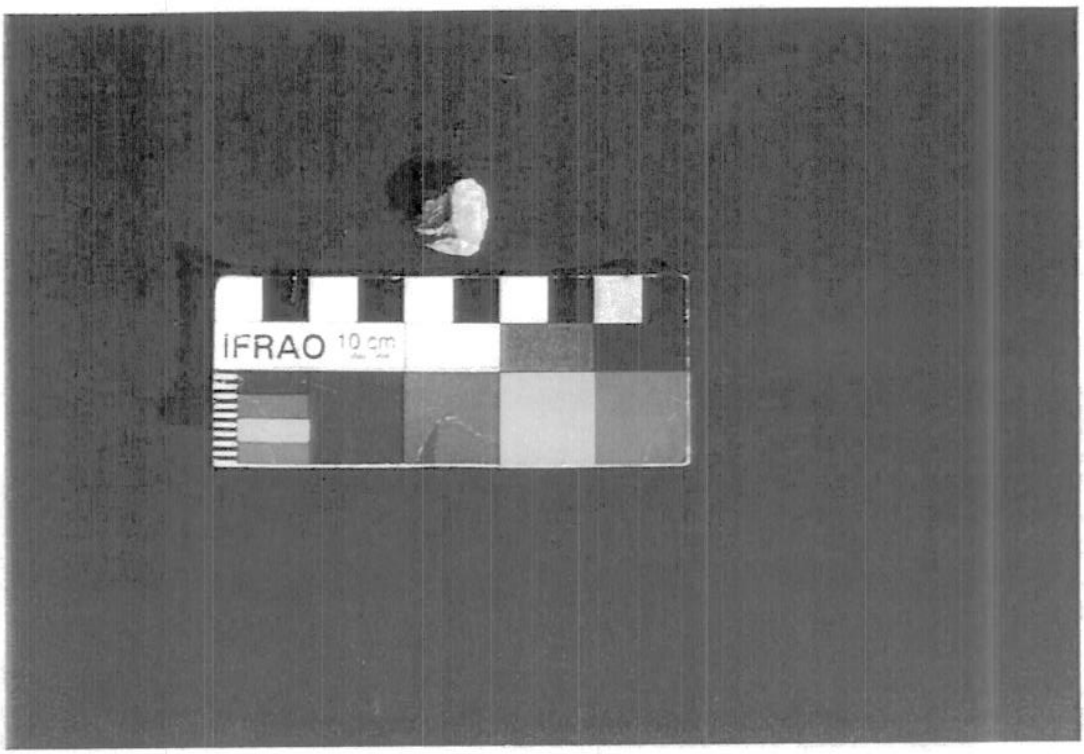

Plate 9 Broken quartzite flake found in paddock 3

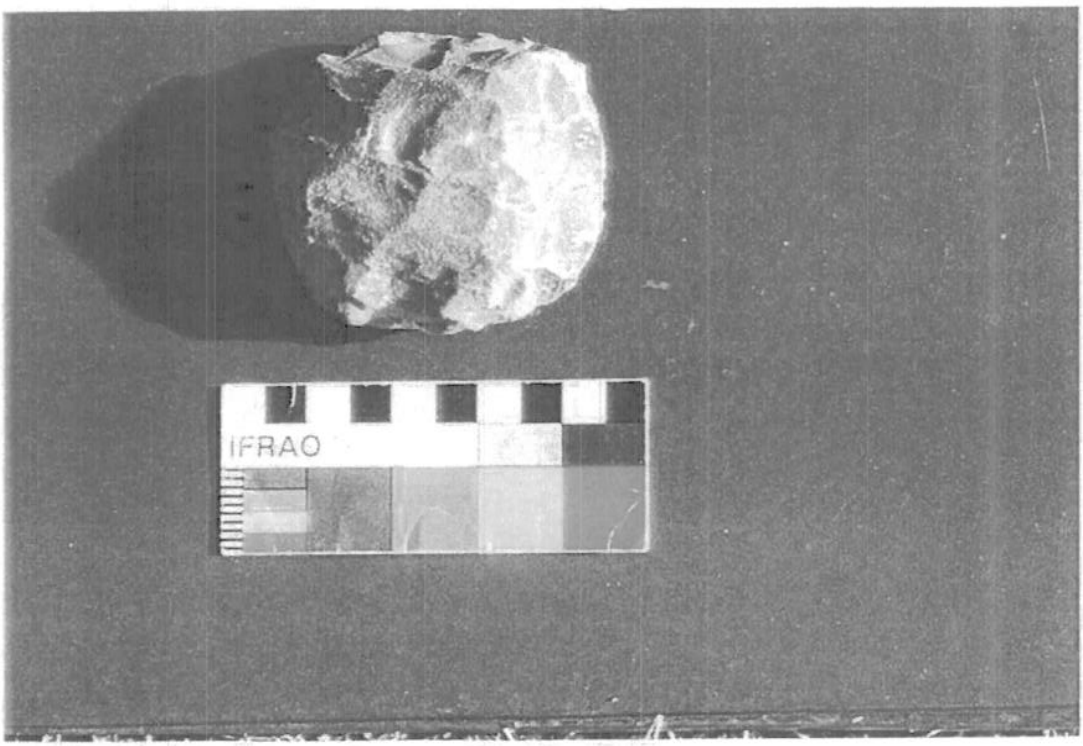

Plate 10 Greywacke axe found in paddock 4

Plate 11 Derelict sheds

Plate 12 Homestead foundations