

I hereby certify that the Minutes of the Ordinary Council Meeting held are a true and accurate record of the proceedings contained therein.

Shire President

Date



SHIRE OF WYNDHAM | EAST KIMBERLEY

MINUTES ORDINARY COUNCIL MEETING

31 May 2016

C O N T E N T S

01. DECLARATION OF OPENING / ANNOUNCEMENT OF VISITORS.....	5
02. RECORD OF ATTENDANCE / APOLOGIES / LEAVE OF ABSENCE (PREVIOUSLY APPROVED).....	5
03. DECLARATION OF INTEREST	6
04. REPOSE TO PREVIOUS PUBLIC QUESTIONS TAKEN ON NOTICE	8
05. PUBLIC QUESTION TIME	8
06. APPLICATIONS FOR LEAVE OF ABSENCE	10
07. PETITIONS	10
08. CONFIRMATION OF MINUTES.....	10
09. ANNOUNCEMENTS BY THE PERSON PRESIDING WITHOUT DISCUSSION	12
10. MATTERS FOR WHICH THE MEETING MAY BE CLOSED	12
11. DEPUTATIONS / PRESENTATIONS / SUBMISSIONS.....	12
12. REPORTS.....	13
12.01. MATTERS ARISING FROM COMMITTEES OF COUNCIL.....	13
12.01.1. Consideration of Recommendations Contained Within the Minutes of the Audit (Finance and Risk) Committee Meeting of 10 May 2016	13
12.02. CHIEF EXECUTIVE OFFICER	20
12.02.1. Show Cause Notice to Council	20
12.02.2. Standing Item - Outstanding Actions from Council Resolutions	28
12.02.3. Our Town Television Program	37
12.02.4. Delegation 7 Expressions of Interest and Tenders - Review	47
12.03. COMMUNITY DEVELOPMENT.....	52
12.03.01. Application for Temporary Licence - Kununurra Agricultural Showgrounds	52
12.03.02. Application for Temporary Licence- Kununurra Race Club.....	56
12.03.03. Mosquito Management Plan.....	60
12.03.04. Policy Review - CP/PMG 3780 Leasing of Council Managed Reserve - Community	208
12.03.05. Request for Lease - Ord River Sports Club	219
12.03.06. Request for Approval to Sublease - Ord River Sports Club	307
12.03.07. Wild West Entertainment Fun Fair Temporary Caravan park Licence	336
12.03.08. Community Service Policy Reviews.....	340
12.03.09. Unify Gathering -Temporary Caravan Park Licence	360
12.03.10. Proposed North Kimberley Marine Park - written submission to public comment period	365
12.03.11. Reduction/waiver of regulated charges for approval of long-life battery smoke detectors in communities	422
12.03.12. Request to Sublease Wyndham Childcare Centre.....	430
12.04. CORPORATE SERVICES.....	438
12.04.1. Draft Council Policy CP/FIN-3217 Regional Price Preference for Community Engagement.....	438
12.04.2. List of Accounts Paid from Municipal Fund and Trust Fund	463
12.04.3. Monthly Statement of Financial Activity for the Period Ended 30 April 2016	475
12.04.4. Revised Council Policy CP/FIN-3204 Purchasing	487
12.04.5. Rates Exemptions and Concessions for 2016/17 and 2017/18	533

12.04.6. Endorsement of the Draft Corporate Business Plan 2016/17 to 2019/20 and the Proposed 2016/17 Annual Budget Including Rates in the Dollar and Minimum Payments for Community Engagement	563
12.05. INFASTRUCTURE.....	773
12.05.1. Weero Road Speed Limit Review	773
12.05.2. Budget Amendment - Vehicle Replacement.....	778
12.05.3. Extension of Waste Services	782
13. MOTIONS OF WHICH PREVIOUS NOTICE HAS BEEN GIVEN	788
14. QUESTIONS BY MEMBERS OF WHICH DUE NOTICE HAS BEEN GIVEN	788
15. URGENT BUSINESS APPROVED BY THE PERSON PRESIDING OR BY DECISION	788
16. MATTERS BEHIND CLOSED DOORS.....	788
17. CLOSURE	788

**SHIRE OF WYNDHAM EAST KIMBERLEY
MINUTES ORDINARY COUNCIL MEETING
WYNDHAM COUNCIL CHAMBERS
HELD ON 31 MAY 2016 AT 5:00PM**

01. DECLARATION OF OPENING / ANNOUNCEMENT OF VISITORS

The Shire President declared the meeting open at 5.10pm.

**02. RECORD OF ATTENDANCE / APOLOGIES / LEAVE OF ABSENCE
(PREVIOUSLY APPROVED)**

ATTENDANCE

Cr J Parker	Shire President
Cr K Wright	Deputy Shire President
Cr B Robinson	Councillor
Cr D Spackman	Councillor
Cr S Rushby	Councillor
Cr E Bolto	Councillor
Cr N Perry	Councillor
Cr S Cooke	Councillor
C Askew	Chief Executive Officer
N Octoman	Director Corporate Services
D Klye	Director Infrastructure
L Gee	Director Community Development
L Hannagan	Senior Governance and Risk Officer (Minute Taker)

GALLERY

Wayne Richards	SWEK
Rob Storey	Rate Payer
Peter Aladin	Community Member
Donna Aladin	Community Member
Jenny Spragg	Rate Payer
Jill Williams	EKCCI
Michelle Pucci	EKCCI
Mark Northover	Ratepayer
Paul O'Neill	Ratepayer
Jayca Cavanagh	J Cav Elec
Paul Cavanagh	Wyndham Excavating
Rhonda Guerinoni	Rate Payers Association
Catherine Atkins	Rate Payer
Emma Venables	-
Annie Iruine	Resident
Ebony Daniell	SWEK
Chiquita dos Reis	SWEK
Lorre Daniel	Kimberley Motors/Resident
Rhonda McDonald	Rate Payer

Chris McLachlan
Marten Ynema

Resident
Resident/Rate Payer

APOLOGIES

Cr A Petherick

Councillor

LEAVE OF ABSENCE PREVIOUSLY APPROVED

Nil

03. DECLARATION OF INTEREST

- Financial Interest

Councillor/Officer	Item	Title	Description of Interest
Cr K Wright	12.05.3	Extension of Waste Services	May be recipient of benefit
Cr S Rushby	12.05.3	Extension of Waste Services	I reside on Weaber Plains/Mills Road
Cr S Cooke	12.04.1	Draft Council Policy CP/FIN 3217 Regional Price Preference for Community engagement	My husband's business does work for the Shire and as such if this policy were to be adopted we could potentially benefit from the Regional Price Preference
Cr B Robinson	12.05.3	Extension of Waste Services	Financial Interest

- Impartiality Interest

Councillor/Officer	Item	Title	Description of Interest
Cr J Parker	12.02.1	Show Cause Notice	I am a Councillor at the SWEK
Cr S Rushby	12.02.1	Show Cause Notice	I am a Councillor at the Shire of Wyndham East Kimberley – referenced in the Show Cause Notice
Cr B Robinson	12.05.1	Weero Road Speed Limit Review	My home is on the effected road in this item
Cr E Bolto	12.02.1	Show Cause Notice	I am a current Councillor of SWEK
Cr E Bolto	12.04.5	Rates Exemptions and Concession	Member of Kununurra Agricultural Society
Cr K Wright	12.02.1	Show Cause Notice	Member of Council

Cr K Wright	12.03.1	Application for Temporary License – Kununurra Agricultural Show Grounds	Member of KAS
Cr K Wright	12.04.5	Rates Exemptions and Concession	Member of KAS
Cr N Perry	12.02.1	Show Cause Notice	It effects me in my role as a Councillor but not financially
Cr N Perry	12.03.5	Request for Lease – Ord River Sports Club	My relatives are lawyers who have assisted to negotiate terms of the lease
Cr N Perry	12.03.6	Request for approval to sublease – Ord River Sports Club	My relatives are lawyers who have assisted to negotiate terms of the lease
Cr N Perry	12.04.1	Draft Council Policy CP/FIN 3217 Regional Price Preference for Community engagement	This policy may effect people I know in the community – family & friends
Cr S Cooke	12.02.1	Show Cause Notice	I am a member of Council that will be undergoing the mediation
Cr S Cooke	12.03.5	Request for Lease – Ord River Sports Club	I am a member of the Ord River Sports Club
Cr S Cooke	12.03.6	Request for approval to sublease – Ord River Sports Club	I am a member of the Ord River Sports Club
Cr S Cooke	12.04.5	Rates Exemptions and Concession	I am a member of the Ord River Sports Club
L Gee	12.02.1	Show Cause Notice	I am a member of the Executive management team referenced in the Show Cause Notice
D Klye	12.02.1	Show Cause Notice	I am a member of the Executive management team referenced in the Show Cause Notice
C Askew	12.02.1	Show Cause Notice	I am a member of the Executive management team referenced in the Show Cause Notice
C Askew	12.02.4	Delegation 7 – Expressions of Interest and Tenders	I am required to action delegations
C Askew	12.04.5	Rates Exemptions and Concession	I am a member of the Kununurra Golf Club

N Octoman	12.02.1	Show Cause Notice	I am a member of the Executive management team referenced in the Show Cause Notice
N Octoman	12.03.5	Request for Lease – Ord River Sports Club	I am a member of the Ord River Sports Club
N Octoman	12.03.6	Request for approval to sublease – Ord River Sports Club	I am a member of the Ord River Sports Club
N Octoman	12.04.5	Rates Exemptions and Concession	I am a member of the Ord River Sports Club

- Proximity Interest

Nil

04. REPONSE TO PREVIOUS PUBLIC QUESTIONS TAKEN ON NOTICE

Nil

05. PUBLIC QUESTION TIME

Chris McLachlan, Wyndham

In March you advised that seven streets were due for re-sealing in Wyndham – Denham, Delemere, Koolama, Coverley, Bonaparte, Cato and a service road off the Great Northern Highway (houses 4, 6, 7 and 8).

This morning a Martell Pavline truck spread tar and sand over Koolama Street. Is this what is planned for the other streets?

How much of the \$400,000 budget allocated will you be outlaying for this job?

CEO response – Yes, the tar and sand form part of the preparation work which has now commenced. Preparation works for each street may vary depending upon need. Majority of \$400,000 budget allocation will be expended on the seven streets that were noted in the question.

Rhonda Guerinoni, 15 Eucalyptus Close, Kununurra

Councillor Rushby, Councillor Petherick, Councillor Spackman – why did you call a Special Meeting last Friday knowing only too well, in advance, you did not have a quorum? You wasted not only my time but also the people in the gallery who managed to come along. Are you prepared to pay the Shire staff wages that are now due because of your actions.

Cr Rushby response – The meeting was only one Councillor short and as no formal advice had been received the quorum could have been reached.

Rhonda Guerinoni, 15 Eucalyptus Close, Kununurra

Is the Council aware that following my comments on Facebook, congratulating the Shire on its hard work concerning the Draft Budget, that I am now being accused by a Certain Councillor's partner of being corrupt?

These corruption allegations have arisen, due to my relationship with the Shire President and the Chamber of Commerce President. For those who don't know, it is common knowledge that we meet on a regular basis swapping ideas on how we can kick start Kununurra's slow economy. By having these meetings, the line of communication is opening up between the Shire and community groups.

My Company also works closely with the Shire. The Contracts awarded to my Company via WALGA have gone through a long and lengthy legal process. To quote on Shire Contracts your company must first pass the WALGA qualifications and then be requested to Tender on projects. I have won my Contracts fair and square as this person is well aware and I refuse to be called corrupt by anyone.

I will be continuing my relationship with both Presidents and no small, narrow minded malicious person is going to prevent this little black sheep from doing just that.

Shire President response – Not aware of any comments, but will investigate.

Rhonda McDonald, Ratepayer, Wyndham

My questions concern the proposed Local Planning Scheme No. 9

- 1. Given that Wyndham's commercial precinct in Koolinda Street has been partially vacant for at least the last 20 years, and more land could not possibly be required, why is this Council proposing to effectively expand this zone, and incorporate the residential area to the west of the precinct?*

Director Gee responded - we are currently out for Public exhibition of the Draft Local Planning Strategy and Draft Local Planning Scheme No.9. You are welcome to provide a submission so that these issues can be considered along with all others.

- 2. The area in question (between Cambridge and Timor Streets) is currently zoned Residential R15. If this proposal goes ahead, housing will become an "Additional Use" under the plan. Therefore what will be the effective Residential Design Code for new housing developments – R15, R20, R26 or R30?*

Director Gee responded: this is all part of the current review, we will get Planning Department to contact Rhonda so that she can make a submission to the review.

- 3. As there are only five single dwellings affected by the proposal, what impact will it have on your decision if the majority of these householders object?*

Director Gee responded – Once the community consultation is complete a report will be prepared for Council to consider and the above issues considered.

Mark Northover, Ratepayer

Who provided the advice to and has undertaken the works of filling local road potholes with cement?

Director Klye responded – I am not aware of pot holes being filled with cement. Please provide additional detail (locations) and the matter will be investigated.

Mark Northover, Ratepayer

Why have you been using Pindan sand to patch the road running surface and shoulders, and where did this sand come from?

Director Klye responded - I am not aware that Pindan sand had been used on road shoulders but that some Pindan sand was delivered to Pruinosa Street in error recently and this has now been rectified.

Mark Northover, Ratepayer

Is the council committee concerned that at the 10/05/2016 audit meeting, the tabled SWEK rates including the defaults, when compared to the actual rates applied for 2015/16 is indicating a default rate of \$696,000, which is well in excess of the reported 3.34%.

CEO responded: This question will be taken on notice

Shire President refused further questions as the time for Public Question had been exceeded and advised Mr Northover that further questions can be submitted in writing

06. APPLICATIONS FOR LEAVE OF ABSENCE

Nil

07. PETITIONS

Nil

08. CONFIRMATION OF MINUTES

OFFICER'S RECOMMENDATION 1

That Council confirms the Minutes of the Ordinary Council Meeting held on 26 April 2016

COUNCIL DECISION

Minute No: 11346

Moved: Cr B Robinson

Seconded: Cr S Cooke

That Council confirms the Minutes of the Ordinary Council Meeting held on 26 April 2016.

Carried 8/0

Note: The Minutes of the Ordinary Council Meeting held on 26 April 2016 are provided under separate cover via www.swek.wa.gov.au

OFFICER'S RECOMMENDATION 2

That Council confirms the Minutes of the Special Council Meeting held on 5 April 2016

COUNCIL DECISION

Minute No: 11347

**Moved: Cr D Spackman
Seconded: Cr K Wright**

That Council defer the confirmation of the Minutes of the Special Council Meeting held on 5 April 2016 until clarification has been sought from the Department of Local Government and Communities.

Carried 8/0

REASON FOR VARYING OFFICER'S RECOMMENDATION

Clarification requested from the Department of Local Government and Communities.

Note: The Minutes of the Special Council Meeting held on 5 April 2016 are provided under separate cover via www.swek.wa.gov.au

OFFICER'S RECOMMENDATION 3

That Council confirms the Minutes of the Special Council Meeting held on 4 May 2016

COUNCIL DECISION

Minute No: 11348

**Moved: Cr B Robinson
Seconded: Cr E Bolto**

That Council confirms the Minutes of the Special Council Meeting held on 4 May 2016.

Carried 8/0

Note: The Minutes of the Special Council Meeting held on 4 May 2016 are provided under separate cover via www.swek.wa.gov.au

OFFICER'S RECOMMENDATION 4

That Council confirms the Minutes of the Special Council Meeting held on 27 May 2016

COUNCIL DECISION

Minute No: 11349

Moved: Cr K Wright

Seconded: Cr S Rushby

That Council confirms the Minutes of the Special Council Meeting held on 27 May 2016.

Carried 8/0

Note: The Minutes of the Special Council Meeting held on 27 May 2016 are provided under separate cover via www.swek.wa.gov.au

09. ANNOUNCEMENTS BY THE PERSON PRESIDING WITHOUT DISCUSSION

Nil

10. MATTERS FOR WHICH THE MEETING MAY BE CLOSED

Nil

11. DEPUTATIONS / PRESENTATIONS / SUBMISSIONS

Nil

12. REPORTS

12.01. MATTERS ARISING FROM COMMITTEES OF COUNCIL

12.01.1. Consideration of Recommendations Contained Within the Minutes of the Audit (Finance and Risk) Committee Meeting of 10 May 2016

DATE:	31 May 2016
AUTHOR:	Natalie Octoman, Director Corporate Services
RESPONSIBLE OFFICER:	Natalie Octoman, Director Corporate Services
FILE NO:	Various
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

COMMITTEE'S RECOMMENDATION 1

In relation to Item ***"7.1 - Standing Item - Rates Debtors"*** that the Audit (Finance and Risk) Committee recommends to the Council that the actions being undertaken by the administration in regard to rates debtors, including rates debts in legal process are sufficient and appropriate.

COUNCIL DECISION

Minute No: 11350

Moved: Cr K Wright

Seconded: Cr B Robinson

In relation to Item ***"7.1 - Standing Item - Rates Debtors"*** that the Audit (Finance and Risk) Committee recommends to the Council that the actions being undertaken by the administration in regard to rates debtors, including rates debts in legal process are sufficient and appropriate.

Carried 8/0

VOTING REQUIREMENT

Simple Majority

COMMITTEE'S RECOMMENDATION 2

In relation to Item "7.2 - Review of Council Policy CP/FIN-3210 Notice of Discontinuance (Rates and Charges)" that the Audit (Finance and Risk) Committee recommends to the Council that it adopts the amended Policy CP/FIN-3210 Notice of Discontinuance (Rates and Debtors).

COUNCIL DECISION

Minute No: 11351

**Moved: Cr B Robinson
Seconded: Cr K Wright**

In relation to Item "7.2 - Review of Council Policy CP/FIN-3210 Notice of Discontinuance (Rates and Charges)" that the Audit (Finance and Risk) Committee recommends to the Council that it adopts the amended Policy CP/FIN-3210 Notice of Discontinuance (Rates and Debtors).

Carried 8/0

VOTING REQUIREMENT

Simple Majority

COMMITTEE'S RECOMMENDATION 3

In relation to Item "7.3 - Standing Item - Insurance Claim Report" that the Audit (Finance and Risk) Committee recommends to the Council that it notes the Confidential Insurance Claims Register attached to the minutes of the Audit (Finance and Risk) Committee meeting of 10 May 2016.

COUNCIL DECISION

Minute No: 11352

Moved: Cr K Wright

Seconded: Cr B Robinson

In relation to Item *“7.3 - Standing Item - Insurance Claim Report”* that the Audit (Finance and Risk) Committee recommends to the Council that it notes the Confidential Insurance Claims Register attached to the minutes of the Audit (Finance and Risk) Committee meeting of 10 May 2016.

Carried 8/0

VOTING REQUIREMENT

Simple Majority

COMMITTEE’S RECOMMENDATION 4

In relation to Item *“7.4 - Standing Item - Leases”* that the Audit (Finance and Risk) Committee recommends to the Council that it notes the Confidential Lease Schedule and New and Renewal Lease Schedule attached to the minutes of the Audit (Finance and Risk) Committee meeting of 10 May 2016.

COUNCIL DECISION

Minute No: 11353

Moved: Cr K Wright

Seconded: Cr N Perry

In relation to Item *“7.4 - Standing Item - Leases”* that the Audit (Finance and Risk) Committee recommends to the Council that it notes the Confidential Lease Schedule and New and Renewal Lease Schedule attached to the minutes of the Audit (Finance and Risk) Committee meeting of 10 May 2016.

Carried 8/0

VOTING REQUIREMENT

Simple Majority

COMMITTEE'S RECOMMENDATION 5

In relation to Item "7.5 - Standing Item - Sundry Debtors Report May 2016":

- 1. That the Audit (Finance and Risk) Committee reports to the Council that the actions being undertaken in regard to sundry debtors, including sundry debts in legal process are sufficient and appropriate.**

COUNCIL DECISION

Minute No: 11354

Moved: Cr B Robinson

Seconded: Cr K Wright

In relation to Item "7.5 - Standing Item - Sundry Debtors Report May 2016":

- 1. That the Audit (Finance and Risk) Committee reports to the Council that the actions being undertaken in regard to sundry debtors, including sundry debts in legal process are sufficient and appropriate.**

Carried 8/0

VOTING REQUIREMENT

Absolute Majority

COMMITTEE'S RECOMMENDATION 6

In relation to Item "7.6 - Audit (Finance and Risk) Committee Terms of Reference Review" that the Audit (Finance and Risk) Committee recommends to the Council that:

- 1. It adopt the revised Terms of Reference; and**
- 2. Calls for Councillor nominations to appoint one (1) additional person to the Audit (Finance and Risk) Committee in accordance with section 5.10 and 7.1A of the *Local Government Act 1995* noting that this will require an absolute majority decision.**
- 3. Appoints Cr _____ to the Audit (Finance and Risk) Committee.**

Cr B Robinson nominated Cr J Parker, seconded by Cr N Perry. Cr J Parker accepted the nomination.

Cr S Rushby nominated Cr K Wright, seconded by Cr D Spackman. Cr K Wright accepted the nomination.

Local Government Act 1995

Section 5.10. Committee members, appointment of

- (4) If at a meeting of the council a local government is to make an appointment to a committee that has or could have a council member as a member and the mayor or president informs the local government of his or her wish to be a member of the committee, the local government is to appoint the mayor or president to be a member of the committee.*

Show of hands ballot on two candidates

IN favour of Cr Wright – Cr Wright, Cr Spackman, Cr Rushby

IN favour of Cr Parker – Cr Parker Cr Cooke, Cr Perry, Cr Bolto, Cr Robinson

COUNCIL DECISION

Minute No: 11355

Moved: Cr B Robinson

Seconded: Cr N Perry

In relation to Item “7.6 - Audit (Finance and Risk) Committee Terms of Reference Review” that the Audit (Finance and Risk) Committee recommends to the Council that:

- 1. It adopt the revised Terms of Reference; and**
- 2. Calls for Councillor nominations to appoint one (1) additional person to the Audit (Finance and Risk) Committee in accordance with section 5.10 and 7.1A of the *Local Government Act 1995* noting that this will require an absolute majority decision.**
- 3. Appoints Cr J Parker to the Audit (Finance and Risk) Committee.**

Carried 6/2

For: Cr J Parker, Cr K Wright, Cr E Bolto, Cr N Perry, Cr S Cooke, Cr B Robinson

Against: Cr S Rushby, Cr D Spackman

VOTING REQUIREMENT

Simple Majority

COMMITTEE’S RECOMMENDATION 7

In relation to Item “8.1 - Confidential Item - Potential Acquisition of Property for the Recovery of Outstanding Rates” that the Audit (Finance and Risk) Committee reports to the Council:

- 1. The investigations undertaken to date regarding options for the recovery of outstanding rates for Assessments A2574, A2569 and A411 in accordance with relevant legislation; and**
- 2. That a further updated report will be included in the next Audit (Finance and Risk) Committee Agenda.**

COUNCIL DECISION

Minute No: 11356

Moved: Cr B Robinson

Seconded: Cr K Wright

In relation to Item “8.1 - Confidential Item - Potential Acquisition of Property for the Recovery of Outstanding Rates” that the Audit (Finance and Risk) Committee reports to the Council:

- 1. The investigations undertaken to date regarding options for the recovery of outstanding rates for Assessments A2574, A2569 and A411 in accordance with relevant legislation; and**
- 2. That a further updated report will be included in the next Audit (Finance and Risk) Committee Agenda.**

Carried 8/0

PURPOSE

That the Council consider the recommendations from the Audit (Finance and Risk) Committee at its meeting of 10 May 2016.

NATURE OF COUNCIL’S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices

Regulator - enforce state legislation and local laws

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

The background and details supporting the recommendations are contained in the Audit (Finance and Risk) Committee meeting minutes.

STATUTORY IMPLICATIONS

Various - detailed within the Minutes of the 10 May 2016 Audit (Finance and Risk) Committee meeting.

POLICY IMPLICATIONS

Various - detailed within the Minutes of the 10 May 2016 Audit (Finance and Risk) Committee meeting.

FINANCIAL IMPLICATIONS

Various - detailed within the Minutes of the 10 May 2016 Audit (Finance and Risk) Committee meeting.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved services

Strategy 1.4.1 : Ensure legislative compliance and follow best practice principles in planning and service delivery

RISK IMPLICATIONS

Various - detailed within the Minutes of the 10 May 2016 Audit (Finance and Risk) Committee meeting.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

Various - detailed within the Minutes of the 10 May 2016 Audit (Finance and Risk) Committee meeting.

ATTACHMENTS

Nil

12.02. CHIEF EXECUTIVE OFFICER

12.02.1. Show Cause Notice to Council

C Askew, N Octoman, L Gee, D Klye declare Impartiality Interests as they are members of the Executive Management Team mentioned in the Show Cause Notice.

Councillors Parker, Perry, Wright, Cooke, Bolto and Rushby declared Impartiality Interests as they are current Councillors referenced in the Show Cause Notice.

DATE:	25 May 2016
AUTHOR:	Lisa Hannagan, Senior Risk and Governance Officer
RESPONSIBLE OFFICER:	Carl Askew, Chief Executive Officer
FILE NO:	CM.05.3
DISCLOSURE OF INTERESTS:	The CEO declares an impartiality interest in this item as he is a member of the Executive Management Team referenced in the Show Cause Notice.

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council instruct the CEO to respond to the Minister for Local Government acknowledging the issues raised in the Show Cause Notice and accepting the proposed intervention (mandatory mediation) to address the issues and assist the Shire of Wyndham East Kimberley.

COUNCIL DECISION

Minute No: 11357

Moved: Cr E Bolto

Seconded: Cr B Robinson

That Council instruct the CEO to respond to the Minister for Local Government acknowledging the issues raised in the Show Cause Notice and accepting the proposed intervention (mandatory mediation) to address the issues and assist the Shire of Wyndham East Kimberley.

Carried 8/0

PURPOSE

The purpose of this Agenda Item is for Councillors to consider correspondence addressed to the Shire President from the Hon. Tony Simpson MLA Minister for Local Government, which was received on Wednesday 25 May 2016 and included a Show Cause Notice in accordance with Section 8.15B of the *Local Government Act 1995*.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

The Shire President and CEO have had ongoing discussions and meetings with Minister Simpson and senior staff of the Department of Local Government since early in 2016 raising concerns in relation to behavioural and interpersonal issues within Council that have now been noted in the Show Cause Notice.

Rather than suspend the Council, the Minister has stated his intention in the Show Cause Notice is to "require all members of the Council and the Executive Management Team to participate in a mediation program ...".

As Councillors are expected to be able to successfully interact with the Shire administration, members of the Executive Management team have been included in the mediation program, which is mandatory.

The Council is required to prepare and submit a response to the Show Cause Notice by 20 June 2016.

STATUTORY IMPLICATIONS

8.15. Minister can take action to ensure that recommendations are put into effect

(1) *The Minister may, if he or she thinks fit —*

(a) *after receiving the local government's advice; or*

(b) *after the time allowed by or under section 8.14(3) runs out, if no*

advice has been received by then, order the local government, or any of its council members or employees, to give effect to any one or more of the recommendations in the report in a manner and within a time ordered by the Minister.

(2) *If the Minister's order under subsection (1) is not complied with according to its terms the Minister may, by order, suspend the council of the local government.*

8.15A. Local government may have to meet inquiry costs

If —

(a) *an authorised person makes findings adverse to a local government, or to its council or any member, or to any of its employees; or*

(b) *an inquiry by an authorised person was instituted at the request of a local government, the Minister may order the local government to pay all or part of the costs of the inquiry and the local government is to comply with that order.*

[Section 8.15A inserted by No. 64 of 1998 s. 43.]

Division 2A — Council may be peremptorily suspended or required to undertake remedial action

[Heading inserted by No. 2 of 2012 s. 22.]

8.15B. Notice that council may be peremptorily suspended or required to undertake remedial action

(1) Before the Minister makes an order under section 8.15C(2), the Minister is to give a notice (a show cause notice) in writing to the local government of the intention to do one or both of the following —

(a) suspend the council of the local government;
(b) require the council, or one or more of the members of the council, to undertake such remedial action as is specified in the notice.

(2) Within 21 days of receiving a show cause notice, or such longer period as the Minister allows, the local government is to give the Minister a written response to the notice.

[Section 8.15B inserted by No. 2 of 2012 s. 22.]

8.15C. Minister may order that council be peremptorily suspended or required to undertake remedial action

(1) This section applies if the Minister thinks that —
(a) the seriousness or duration of a suspected failure of the council of a local government to ensure that the local government performs its functions properly; or
(b) such other factors as the Minister considers relevant, make it inappropriate for the council to act, or to continue to act, without intervention under this section, as the governing body of the local government, whether or not there has been an inquiry under Division 1.

(2) The Minister may —
(a) after receiving the local government's response under section 8.15B(2); or
(b) after the time allowed by or under section 8.15B(2) runs out, if no response has been received by then, by order, do one or more of the following —
(c) suspend the council;
(d) require the council, or one or more of the members of the council, to undertake such remedial action as is specified in the order.

(3) An order under this section suspending a council ceases to have effect when —
(a) an Inquiry Panel is appointed to conduct an inquiry and make a report about the local government; or
(b) the council is reinstated by the Minister under section 8.28(3); or
(c) the period of 6 months from when the order was made ends, whichever happens soonest.

[Section 8.15C inserted by No. 2 of 2012 s. 22.]

POLICY IMPLICATIONS

New policies or amendments to current policies may be required by the mediation process.

FINANCIAL IMPLICATIONS

Nil

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved services

Strategy 1.4.1 : Ensure legislative compliance and follow best practice principles in planning and service delivery

RISK IMPLICATIONS

Failure to comply with legislative requirements leading to damage of reputation and/or financial loss.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

As noted above, the Shire President and CEO have had ongoing discussions and meetings with Minister Simpson and various senior staff at the DLGC since early in 2016 raising concerns in relation to the serious issues that have now been noted (at 2.) in the Show Cause Notice. The most recent meeting with Minister Simpson was in Broome for the launch of the Regional Youth Strategy.

While it is disappointing that the Minister considers that behaviour demonstrated by Councillors is bringing the Shire into disrepute (3.), Council are being provided the opportunity to resolve issues (via mediation) and move forward to be able to *“properly perform the functions set out in the Local Government Act 1995 in relation to providing for the good governance of persons in the district.”*

The proposed mediation program, which will be approved by the Director General of Local Government, will be developed to address the identified issues at 2. In the Show Cause Notice.

As the Minister has not determined, at this point, that suspension of the Council is necessary, Councillors will be expected to perform all other duties as normal.

In the interests of achieving the best possible outcome for the mediation process, Councillors are reminded of their responsibilities under the following policies:

- Code of Conduct for Council Members, Committee Members and Employees
- Media and Communications Policy

It is suggested that Councillors refrain from making any public comments in relation to this matter which essentially relate to failings in Councillor behaviour and interactions with each other and the Shire administration.

ATTACHMENTS - Item 12.02.1

Attachment 1 - Correspondence from Minister Simpson, dated 25 May 2016 and including Show Cause Notice to Council.



**The Hon Tony Simpson MLA
Minister for Local Government; Community Services;
Seniors and Volunteering; Youth**

Our Ref: 49-11347

PRIVATE AND CONFIDENTIAL

Cr Jane Parker
President
Shire of Wyndham-East Kimberley
PO Box 614
KUNUNURRA WA 6743

Dear Cr Parker *Jane*

SHOW CAUSE NOTICE

Please find attached, for Council's urgent attention, a Show Cause Notice in accordance with Section 8.15B of the *Local Government Act 1995*.

The Council has until close of business on Monday, 20 June 2016 to provide me with a written response to the notice, as set out in section 8.15B(2) of the Act.

If further clarification in relation to this matter is required, please contact Ms Jenni Law, Director, Local Government Regulation and Support, Department of Local Government and Communities, on 1800 620 511.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Tony Simpson'.

HON TONY SIMPSON MLA
**MINISTER FOR LOCAL GOVERNMENT; COMMUNITY SERVICES;
SENIORS AND VOLUNTEERING; YOUTH**

att

24 MAY 2016

SHOW CAUSE NOTICE
Local Government Act 1995

[Section 8.15B]

To: The Shire of Wyndham-East Kimberley

Attention: Cr Jane Parker, Shire President

This Show Cause Notice is given pursuant to Section 8.15B of the *Local Government Act 1995*.

1. Based on the high level of increasing complaints and concerns relating to the Shire, I have formed the view that the local government of the Shire is unable to properly perform the functions set out in the *Local Government Act 1995* in relation to providing for the good governance of persons in the district.
2. I am satisfied that an analysis of the complaints and concerns identifies *inter alia*:
 - A. Credible evidence both of significant ongoing conflicts between senior administration staff and members of the Council, as well as evidence of conflict within the Council, to an extent that the levels of communication necessary for good decision processes have been compromised;
 - B. Ongoing complaints alleging bullying and harassment of staff and councillors;
 - C. Allegations of denigrating comments by councillors;
 - D. Continuing allegations of failing to declare interests and/or failing to vote;
 - E. Interference by councillors and, in some instances, acquaintances of councillors, in the administration and Chief Executive Officer functions; and
 - F. Ongoing and systemic compliance and governance issues.
3. I am also satisfied that the behaviour demonstrated by the councillors is bringing the Shire into disrepute.
4. I am further satisfied that the Council lacks the capacity to properly address these matters, based on the ongoing and escalating complaints.
5. Accordingly, I am satisfied that the matters referred to in this notice provide significant evidence of a serious and ongoing failure of the Council to ensure that the Shire properly acquits its functions, rendering it inappropriate, without intervention, for the Council to act as the local government's governing body.
6. I therefore give notice of my intention to require all members of the Council and the Executive Management Team to participate in a mediation program, of a kind approved by the Director General of the Department of Local Government and Communities, to address the identified issues.

7. The Council has until Monday, 20 June 2016 to provide a written response to my office.
8. This notice should be presented to Council at the first opportunity to enable the preparation and submission of a response by the Shire by Monday, 20 June 2016.



HON TONY SIMPSON MLA
**MINISTER FOR LOCAL GOVERNMENT; COMMUNITY SERVICES;
SENIORS AND VOLUNTEERING; YOUTH**

24 MAY 2016

12.02.2. Standing Item - Outstanding Actions from Council Resolutions

DATE:	31 May 2016
AUTHOR:	Meagan Le Riche, Executive Assistant
RESPONSIBLE OFFICER:	Carl Askew, Chief Executive Officer
DISCLOSURE OF INTERESTS:	NIL

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council Notes the report - Outstanding actions from Council Resolutions.

COUNCIL DECISION

Minute No: 11358

Moved: Cr B Robinson

Seconded: Cr N Perry

That Council Notes the report - Outstanding actions from Council Resolutions.

Carried 8/0

PURPOSE

To report to Council on progress of implementing Council resolutions and provide comment on outstanding actions from Council resolutions

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

At each meeting of Council, resolutions are made which require actions to be taken by officers to implement those resolutions. This monthly update advises the Council as to the status of the implementation of resolutions.

STATUTORY IMPLICATIONS

NIL

POLICY IMPLICATIONS

NIL

FINANCIAL IMPLICATIONS

NIL

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved services

Strategy 1.4.1 : Ensure legislative compliance and follow best practice principles in planning and service delivery

RISK IMPLICATIONS

NIL

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

This report includes actions from April resolutions (Attachment 1). Attachment 2 summarises all actions that are outstanding from previous Council resolutions (before May 2016)

ATTACHMENTS - Item 12.02.2

Attachment 1 - Actions from April Resolutions

Attachment 2 - Outstanding Actions from Previous Council Resolutions

Attachment 1 - Actions from April Resolutions

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 26/04/16	Carl Askew	Intent to Review Local Laws	That Council undertake a review of all of its Local Laws in accordance with the <i>Local Government Act 1995</i> s.3.16 and give statewide and local public notice of its intent to undertake a review.	Advertising has taken place and review is under way	26-May-16	In progress
OCM 26/04/16	Carl Askew	Meeting Procedures Local Law 2016	That Council, pursuant to Section 3.12 of the Local Government Act 1995, give statewide public notice that it intends to make the Shire of Wyndham East Kimberley Meeting Procedures Local Law 2016 as contained in the attachment to this item, with the amendment to section 17.1 (3) (b) replacing the words "Absolute Majority" to "Simple Majority", the purpose of which is to provide procedures which apply to the conduct of meetings of Council, its committees and to meetings of electors. The effect of the Local Law is to control the operation of Council, committee and electors meetings.	Advertising has taken place and review is under way	26-May-16	In progress
OCM 26/04/16	Louise Gee	Draft Alcohol Management Policy	That Council adopt the Alcohol Management Policy as detailed in Attachment 1.		27-Apr-16	Completed
OCM 26/04/16	Louise Gee	Council Policy Review - Trading in Public Places - Mobile Food Vehicle	That Council endorse the draft Trading in Public Places - Mobile Food Vehicle Policy for public advertising for a period of 28 days.	Notice placed in Kimberley Echo, and letters sent to Chamber of Commerce and current permit holders - until 2 June 2016.	27-Apr-16	In progress
OCM 26/04/16	Natalie Octoman	Rates Exemptions and Concessions	That Council defers item 13.04.1 to a Budget Briefing session	A briefing was held with elected members on 10 May 2016. The item is to be re-presented for consideration at the May OCM.	10-May-16	Complete
OCM 26/04/16	David Klye	Road Development Policy	That Council rescind policy E5 Road Construction Specifications and adopt policy CP-OPS 3655 - Road Development as attached.	Policy rescinded and new policy available	02-May-16	Complete
OCM 26/04/16	David Klye	Sale of Coldmix Asphalt to Water Corporation	That in accordance with the spirit of inter-agency cooperation, Council approve the disposal by the Shire of approximately 4 tonnes of cold mix asphalt to the Water Corporation for \$475 per tonne (pro rata) ex GST which is the current replacement cost to the Shire of the cold mix asphalt. That the cold mix is to be weighed and the cost to do so be borne the Water Corporation.	Delivery of asphalt complete. Invoice has been provided to Water Corporation	02-May-16	Complete
OCM 26/04/16	Carl Askew	Review of Delegation 7	That Council: 1. Request the CEO to review Delegation 7 Expressions of Interest and Tenders and ensure that it includes a delegation to the CEO to accept tenders when the consideration involved does not exceed \$500,000 excluding GST provided that appropriate provision is made in the Council's Budget; and 2. Ensure that the revised Delegation is presented to the Council at the May Briefing Session and May Ordinary Council Meeting.	Report has gone to May Briefing Session. Report going to Council at May OCM	26-May-16	In progress

Attachment 2 - Outstanding Actions from Previous Council Resolutions

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
Aug-12	Louise Gee	Matters arising from committees of council	That the Audit (Finance and Risk) Committee recommends to Council to require A501 to: 1. Either a. meet their outstanding rates debt on assessment A501 within 60 days; or b. enter into a suitable payment plan approved by the Chief Executive Officer; and 2. Formalise the lease of Lot 472 Great Northern Highway, Wyndham with the Shire within 90 Days	Correspondence provided to A501 and a suitable payment plan has been entered into, with payments commenced. Lease discussions may now commence as the payment plan is in place.	Ongoing	In progress
OCM 24/02/15	Louise Gee	Management of Proposed Reserve - Packsaddle Creek	That item 13.4.7 Management of Proposed Reserve – Packsaddle Creek be deferred to a briefing session.	Matter was discussed at March Briefing Session. Subsequent information has been sought from Department of Lands and Department of Parks and Wildlife (DPaW). Further information to be presented to Council at a future 2016 briefing session.	20-Nov-15	In progress
OCM 24/03/15	Louise Gee	Unnamed Creek Crossing - Victoria Highway	That Council: 1. Directs the Acting Chief Executive Officer to write to the MG Corporation to seek advice from the relevant Traditional Owners on the proposed formal naming of 'Philchowski Crossing', and potential indigenous naming of the creek. 2. Directs the Acting Chief Executive Officer to undertake research and compile supporting documentation to demonstrate Philchowski's contribution to the community or historical significance. 3. Endorses the proposed formal naming of 'Philchowski Crossing', and advises the Geographic Names Committee of its endorsement, subject to adequate supporting documentation being compiled and no objection being received from Traditional Owners.	Letter sent to MG Corporation dated 20 April to seek advice from relevant Traditional Owners. MG Corporation have acknowledged receipt of this letter and advised that the matter will be referred to the relevant MG Entity and Traditional Owner for comment, and a response will be provided in due course. Correspondence received from MG Corporation dated 1 March 2016 advising that the board does not support the formal naming of "Philchowski Crossing", and have nominated an alternative name. Officers are undertaking further research, prior to the matter being considered at a future OCM.	19-Apr-16	In progress
OCM 28/04/15	David Klye	Confidential - Legal Claim	That Council; 1. Notes the officer's confidential report and the progress of the General Procedure Claim, 2. Directs the CEO, or their delegate, to legally defend the matter on behalf of the Shire in the abovementioned General Procedure Claim, 3. Approves sufficient provision in the budget to allow for associated legal fees, and 4. Directs the CEO, or their delegate, to provide a report to Council on the status of the matter at the earliest opportunity.	Point 2 is still in progress. Issue listed for mention on 18th May 2016. Issue was adjourned to 8 June 2016.	26-Jun-15	In Progress
OCM 23/06/15	David Klye	East Kimberley Regional Airport Proposed Runway Extension Business Case	That Council notes the Chief Executive Officer's intention to appoint GHD Consulting Engineers for the Lump Sum price of \$140,740.00 ex GST in accordance with the current budget to: 1. Prepare a Business Case to support grant opportunities including an application to a future round of the National Stronger Regions Fund; 2. Investigate the ground soil conditions for the proposed runway extension and associated taxiways and passenger terminal apron at East Kimberley Regional Airport to determine their structural adequacy to accommodate B737 and A320 aircraft.	Latest revised report was received 13 May 2016. Item to go to Council Briefing Session in June.	25-Jun-15	In progress

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 28/07/15	Louise Gee	Draft East Lily Creek and Kununurra Civic Centre and Structure Plans	That Council: 1. Supports in principle the draft East Lily Creek and draft Kununurra Civic Centre Structure Plans. 2. Requests the Chief Executive Officer to facilitate meetings with major stakeholders to discuss the draft Structure Plans and provide a report back to Council on the outcomes of these meetings.	Meeting has been held with Department of Lands, Department of Regional Development, Kimberley Development Commission, Landcorp and Kununurra Chamber of Commerce. Separate discussion with MG Corporation also held. Aquatic and Leisure Facility Preliminary Business Plan discussed at 22 March briefing. Draft Kununurra Civic and East Lily Creek Precinct Structure Plans discussed at 10 May	27-Jan-16	In progress
OCM 28/07/15	Louise Gee	Request for Lease – Kimberley Action Sports Inc.	That Council request the Chief Executive Officer to commence negotiations with Kimberley Action Sports Inc. for a 10 year lease over a portion of Reserve 30290, Lot 707 Drovers Road Kununurra, subject to the approval of the Minister of Lands.	Letter has been forwarded to Kimberley Action Sports Inc. advising of Council resolution. Draft Lease sent to Kimberley Action Sports 10/2/16	17-Aug-15	In progress
OCM 28/07/15	Louise Gee	Request for Lease – Kununurra Dragon Boat Club Inc.	That Council request the Chief Executive Officer to enter into negotiations with the Kununurra Dragon Boat Club Inc. for a 10 year lease over a portion of Reserve 41812, Lot 2371 Old Darwin Road Kununurra, subject to the approval of the Minister of Lands.	Letter has been forwarded to Kununurra Dragon Boat Club Inc. advising of Council resolution. Draft Lease sent to Dragon Boat Club 10/2/16	17-Aug-15	In progress
OCM 28/07/15	Carl Askew	Mediterranean Fruit Fly Eradication Program	That Council consider entering into a Memorandum of Understanding with DAFWA and industry on the following basis: 1. DAFWA continues to fund and maintain the current medfly surveillance program. 2. SWEK will fund medfly eradication programs from its biosecurity reserve, with a maximum exposure being those funds available in the reserve in excess of \$200,000 i.e. currently approximately \$67,000. 3. If an eradication program reduces the reserve balance to below \$200,000, industry will make good the difference to restore the reserve to a balance of \$200,000 (mechanism yet to be determined). 4. The biosecurity reserve be maintained with a balance for now of a minimum \$200,000, to serve as a form of insurance against future pest or disease incursions. 5. A reference group to be established with members from SWEK, DAFWA and industry. The role of the group would be to recommend expenditure from the reserve and to formulate policy in the event of future pest crises. SWEK Council approval would still be required before the reserve could be accessed for response to threats other than medfly.	Letter sent to DAFWA advising of the decision and requesting advice on how to proceed with the eradication program, including indicative cost, and an invoice. Advice also given that SWEK will be in contact shortly to commence the consideration of entering into a MOU. The baiting program is complete and area freedom was reinstated for the area on 5th October. Industry has been notified. Invoice has been paid. In relation to the MOU, DAFWA have requested for an interim group to be formed to progress this - feedback from industry has been minimal. ORDCO are interested in assisting where possible and have volunteered to talk with growers to get some industry participation. This will also be discussed at the incident debrief. There is no date for the debrief yet.	12-Oct-15	In progress

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 25/08/15	Louise Gee	Proposed Gravel Reserves	That Council: 1. Requests the Chief Executive Officer to consult with the Darwulah Aboriginal Corporation to obtain written consent for the surrender of the proposed 'King River' gravel area from Lease I837493, and support the realignment of the dedicated road reserve to correspond with the physical location of the constructed King River Road. 2. Requests the Chief Executive Officer to advise the Department of Lands that the Shire of Wyndham East Kimberley: a. agrees to proceed with a future act process to facilitate the creation of reserves for the purpose of gravel supply for road building purposes over the sites identified as 'Afghan Cemetery', 'Mount Albany and 'Parry Creek', and proposed easement to provide legal access to the 'Afghan Cemetery'. b. indemnifies the Minister for Lands against any costs arising from the future act process. 3. Requests the Chief Executive Officer to advise the Department of Lands that the Shire of Wyndham East Kimberley agrees to pay survey costs associated with: a. the creation of 'Gravel' reserves over the four areas referred to as 'King River', 'Afghan Cemetery', Mt Albany and 'Parry Creek', b. the creation of an easement to provide access to the area referred to as 'Afghan Cemetery'; and c. the realignment of the dedicated road reserve to correspond with the physical location of the constructed King River Road. d. that the estimated total survey costs be acknowledged as \$19,600.	Correspondence sent to DoL advising of Council resolution. Correspondence also sent to Darwulah Aboriginal Corporation in relation to the gravel source along King River Road and the proposed realignment of the dedicated road reserve. The Senior Planning Officer met with Darwulah representatives on 6 October 2015 to discuss the matter. The Senior Planning Officer and Director Infrastructure met again with representatives of the Darwulah Aboriginal Corporation on 18 March 2016. Darwulah Aboriginal Corporation have requested another meeting with the Senior Planning Officer and Shire President.	18-Mar-16	In progress
OCM 25/08/15	Louise Gee	Transient Accommodation - Lot 411 Minijirrga Lane, Kununurra	That Council request the Chief Executive Officer to undertake further investigation as part of the Local Planning Scheme review, to consider the introduction of a new or amended use class to appropriately provide for rural workers accommodation and preparation of a subsequent Local Planning Policy	Officers have commenced desktop audit of accommodation on rural properties.	15-Jan-16	In progress
OCM 22/09/15	Louise Gee	Request for Community Lease – Kununurra Bushmen's Rodeo Association	That Council request the Chief Executive Officer to enter into negotiations with the Kununurra Bushmen's Rodeo Association for a lease over a portion of Reserve 30290, Lot 707 Drovers Road Kununurra, subject to the approval of the Minister of Lands.	KBRA have been notified of the intent to commence negotiations. Draft Lease sent to KBRA 10/2/16	01-Oct-15	In progress
OCM 22/09/15	Louise Gee	Request for Community Lease – Ord Pistol Club	That Council request the Chief Executive Officer to enter into negotiations with the Ord Pistol Club for a lease over a portion of Reserve 31780, Lot 375 Drovers Road Kununurra, subject to the approval of the Minister of Lands	OPC have been notified of the intent to commence negotiations. Draft Lease has been sent to the Pistol Club (18/1/16).	01-Oct-15	In progress

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 15/12/15	Carl Askew	Notice of Motion from Cr D Spackman: That every Shire vehicle display a standard design, Shire Council approved decal of approximate size 400mm x 300mm (or other council approved size) of which clearly illustrates the Shire logo. Decals are to be on both left and right hand doors or panels where it is appropriate for that type of machinery. Decals are not to be magnetic or removable.	That Council defers the motion from Cr D Spackman to 2016, to be considered prior to budget considerations.	Deferred until budget considerations		Not Complete
OCM 27/01/16	Louise Gee	Western Australian Housing Authority Utilisation of Wyndham Administration Centre	That Council:- 1. Requests the Chief Executive Officer to advise the Western Australia Housing Authority that it accepts its offer of \$5,000.00 per annum to utilise the Wyndham Administration Centre as outlined in Attachment 1. 2. Requests the Chief Executive Officer to advise the Western Australia Housing Authority that the Shire will not contribute any direct costs towards the placement of the Authority's officer and service within the Wyndham Administration Centre i.e. additional furniture, technology and communication equipment, display stands, signage.	Draft MoU forwarded to WA Housing Authority. Letter and MoU forwarded to WA Housing for execution.	12-Feb-16	In progress
OCM 23/02/16	Louise Gee	Wyndham CRC	That Council: 1. Continue to provide Community Resource Network services in accordance with its agreement with the Department of Regional Development. This agreement is for the provision of Community Resource Network services for a period of three years from 1 July 2014 to 30 June 2017. 2. Request the CEO to call for Expressions Of Interest from the Wyndham community for the production of the Community Newsletter - The Bastion Bulletin.	Expression of Interest being drafted.	21-Apr-16	In progress
OCM 23/02/16	David Klye	Directional Signage Policy	That Council 1. Repeal Council Policy E9 - Traffic Signs - Directional Signage 2. Adopt draft Policy CP/OPS-3655 - Directional Signage 3. Request the CEO to investigate options for the Shire to charge an annual fee for the provision of Business Directional signage.	Policy updated. Investigation/research underway.	24-Feb-16	In progress
OCM 23/02/16	Louise Gee	Dual Naming - Barnett River Gorge	That Council resolve to undertake community consultation in relation to the proposal for dual naming or renaming of the Barnett River Gorge.	Community Consultation commenced 22 April 2016. Comment from relevant organisations also being sought.	19-Apr-16	In progress
OCM 23/02/16	David Klye	Ivanhoe Crossing - Safety audit	That a desktop safety audit be requested of Ivanhoe Crossing and any findings be included in the community information	Desk top review commenced	04-Mar-16	In progress
OCM 23/02/16	David Klye	Ivanhoe Crossing Community Consultation	That Council: 1. Immediately initiates community consultation in the form of both public survey (published on Facebook and in the Kimberley Echo), and a community forum, to ascertain the primary use of Ivanhoe Crossing from a community perspective. The results of both to be brought back to Council for consideration at a near future Briefing Session,	1. Public Meeting held on 24 May 2016 2. Survey to be coordinated following the meeting	26-May-16	In progress
OCM 23/02/16	Carl Askew	Kununurra Visitor Centre - repairs	That Council, subject to receiving three acceptable quotes, funds security fittings to the front doors and windows of the Kununurra Visitors Centre from the East Kimberley Tourism Reserve and that the Shire President and CEO be authorised to accept the most suitable quote in order to allow fitting of security measures as soon as possible.	2. Survey to be coordinated following the meeting	24-Mar-16	In progress

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 23/02/16	David Klye	Wyndham Reticulation	That Council request the Chief Executive Officer to provide a report to Council on the Wyndham reticulation system for inclusion in the 2016/17 budget considerations. The report shall include details on the cost to replace the aging public open space reticulation system with an integrated, automatic system. The report should provide budget estimates for the project to be undertaken in stages of between approximately \$100,000 and \$150,000 per annum for consideration in the forthcoming budget deliberations.	Report in progress for future consideration	24-Feb-16	In progress
OCM 29/03/16	David Klye	Airport Sculpture	That Council; 1. That the sculpture be placed airside at a site determined by the CEO in accordance with the discussion at Council on 29 March 2016. 2. Note that on completion of the associated signage the sculpture be installed and a formal unveiling organised that includes representatives from Waringarri Aboriginal Arts and local Aboriginal groups.	The sculpture has been installed airside. The artist has been contacted with a request to supply the sign.	26-May-16	In progress
OCM 29/03/16	David Klye	Fees and Charges 5	That Council request the CEO to commence negotiations with the Shire's waste contractor, ToxFree, to expand the current waste receptacle pick-up areas to include Packsaddle Road, Weaber Plain Road, Valentines Falls, Crossing Falls, River Farm Road, Bull Run Road and Egret Close / Curlew Court, to commence from 1 July 2016.	Initial verbal notification has been provided. This will be followed up with written correspondence advising accordingly.	30-Mar-16	In progress
OCM 29/03/16	Louise Gee	Request for Lease - Ord River Magpies	That Council request the Chief Executive Officer to enter into negotiations with the Ord River Magpies for a lease over a portion of Lot 504 on Reserve 29799, Kununurra, subject to approval of the Minister of Lands	Letter drafted 20/04/16	21-Apr-16	In progress
OCM 29/03/16	Louise Gee	Request for extension of Development Approval - Lot 507 Chestnut Ave - 1	That Council: 1. Extend the Kununurra Neighbourhood House Development Approval (DA) 6/14 at Lot 507, Chestnut Drive Kununurra for a further two years. 2. Request the Chief Executive Officer to enter into lease negotiations with Kununurra Neighbourhood House; the lease to include agreed development milestones and timeframes.	1) DA06/14 extension sent. 2) Letter drafted 20/04/16. Draft Lease developed and forwarded to Neighbourhood House.	21-Apr-16	In progress
OCM 29/03/16	Louise Gee	Request for extension of Development Approval - Lot 507 Chestnut Ave - 2	That Council: 3. Request the Chief Executive Officer to investigate alternate options for expansion of the Child Care facility on lot 506, Chestnut Drive; and 4. Request the Chief Executive Officer to investigate alternate options for the construction of a new Kununurra Neighbourhood House facility. 5. Request the Chief Executive Officer to bring the report on future expansion of child care facilities to Council at a future Briefing Session.		21-Apr-16	In progress
OCM 29/03/16	Louise Gee	Review of CP/COM - 3580 Community Services Policy	That Council endorse the draft reviewed CP/COM - 3580 Community Development Policy for public advertising for a period of 28 days.	Comments on draft Policy closed Friday 20 May 2016. To be presented to May OCM for adoption.	21-Apr-16	In progress
OCM 29/03/16	Carl Askew	Annual General Electors Motions 1	That Council: 1. Notes that the WA Department of Health will be scheduling a public information session for Kununurra prior to the proposed implementation of fluoridation of the town's water supply. 2. Request that Chief Executive Officer write to the Minister for Health requesting that public consultation sessions be conducted in Kununurra to determine community support for the fluoridation of the water supply. These sessions must be conducted prior to a determined implementation date to ensure there is sufficient time for the community to make an informed decision about the fluoridation or otherwise of their drinking water supply.	letter Drafted. To be sent	20-Apr-16	in progress
OCM 29/03/16	Carl Askew	Annual General Electors Motions 2	That Council note that a Regional Price Preference Policy is currently being prepared for consideration by Council.	Policy currently under draft. Report to Council at May Ordinary Council Meeting	21-Apr-16	In progress
OCM 29/03/16	Carl Askew	Annual General Electors Motions 3	That Council request the development of a Community Facilities Strategy to assess the use of existing community facilities and the opportunities for collocated facilities to meet the needs of existing and future community groups, and this be included in the Shire's 2016/17 Corporate Business Plan.	Development of a Community Facilities Strategy has been included in draft Corporate Business Plan.	19-Apr-16	In progress
OCM 29/03/16	Carl Askew	Annual General Electors Motions 4	That Council note that an Indigenous Employment Organisational Directive will be drafted.	Organisational Directive under draft	21-Apr-16	In progress
OCM 29/03/16	Carl Askew	Notice of Motion from Cr S Rushby: Request Review of Shire of Wyndham East Kimberley Membership to WA Local Government Association (WALGA)	That Council requests the Chief Executive Officer to provide a report to Council by June 2016 reviewing the costs, benefits, advantages and disadvantages of the Shire continuing to be a member of the Western Australian Local Government Association (WALGA).	Report is currently being drafted	21-Apr-16	In progress

Meeting	Responsible Officer	Item	Resolution	Progress Comment	Date Actioned	Completed
OCM 26/04/16	Carl Askew	Intent to Review Local Laws	That Council undertake a review of all of its Local Laws in accordance with the <i>Local Government Act 1995</i> s.3.16 and give statewide and local public notice of its intent to undertake a review.	Advertising has taken place and review is under way	26-May-16	In progress
OCM 26/04/16	Carl Askew	Meeting Procedures Local Law 2016	That Council, pursuant to Section 3.12 of the Local Government Act 1995, give statewide public notice that it intends to make the Shire of Wyndham East Kimberley Meeting Procedures Local Law 2016 as contained in the attachment to this item, with the amendment to section 17.1 (3) (b) replacing the words "Absolute Majority" to "Simple Majority", the purpose of which is to provide procedures which apply to the conduct of meetings of Council, its committees and to meetings of electors. The effect of the Local Law is to control the operation of Council, committee and electors meetings.	Advertising has taken place and review is under way	26-May-16	In progress
OCM 26/04/16	Louise Gee	Council Policy Review - Trading in Public Places - Mobile Food Vehicle	That Council endorse the draft Trading in Public Places - Mobile Food Vehicle Policy for public advertising for a period of 28 days.	Notice placed in Kimberley Echo, and letters sent to Chamber of Commerce and current permit holders - until 2 June 2016.	27-Apr-16	In progress
OCM 26/04/16	Carl Askew	Review of Delegation 7	That Council: 1. Request the CEO to review Delegation 7 Expressions of Interest and Tenders and ensure that it includes a delegation to the CEO to accept tenders when the consideration involved does not exceed \$500,000 excluding GST provided that appropriate provision is made in the Council's Budget; and 2. Ensure that the revised Delegation is presented to the Council at the May Briefing Session and May Ordinary Council Meeting.	Report has gone to May Briefing Session. Report going to Council at May OCM	26-May-16	In progress

12.02.3. Our Town Television Program

DATE:	31 May 2016
AUTHOR:	Meagan Le Riche, Executive Assistant
RESPONSIBLE OFFICER:	Carl Askew, Chief Executive Officer
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council refer for consideration in the 2016/17 Budget an allocation of \$_____ as a contribution towards the production of an episode of Our Town, subject to support from other organisations within the Shire of Wyndham East Kimberley.

Cr S Cooke requested an additional comment to be added that Council seek financial support from other people.

The amendment was supported by the mover and seconder.

COUNCIL DECISION

Minute No: 11359

Moved: Cr N Perry

Seconded: Cr K Wright

That Council refer for consideration in the 2016/17 Budget an allocation of \$20,000 as a contribution towards the production of an episode of Our Town, subject to financial support from other organisations within the Shire of Wyndham East Kimberley.

Carried 8/0

REASON FOR VARYING OFFICER'S RECOMMENDATION

To clarify that the support sought from other organisations was financial in nature.

PURPOSE

For Council to consider the proposal from Visage Productions for production of an episode of Our Town.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Advocator - advocate and support initiatives on behalf of the community and the Kimberley

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

In 2011 the Our Town television second series featured an episode in Kununurra to which the Shire contributed \$11,000 including purchasing 1,650 copies of the DVD. A second episode in the following series was created but never went to air due to that series being fully subscribed. The budget for the original episode came from Economic Development Grants - Other Economic Services.

Visage Productions, who produced the television series, have written to the Shire about the opportunity to feature Kununurra in the fifth series which they have the "green light" to produce.

The cost of production is estimated by them at \$40,000 ex GST per episode, however this is not necessarily to come entirely from the Shire, but could be funded from other organisations and agencies such as the Kununurra Visitor Centre, East Kimberley Chamber of Commerce and Industry, East Kimberley Marketing Group and Kimberley Development Commission.

STATUTORY IMPLICATIONS

Nil

POLICY IMPLICATIONS

Nil

FINANCIAL IMPLICATIONS

The financial implications can be considered as part of the 2016/2017 Budget process.

The costs to the Shire involvement in the production could be reduced by contributions from other organisations including (but not limited to) the Kununurra Visitor Centre, East Kimberley Chamber of Commerce and Industry, East Kimberley Marketing Group and Kimberley Development Commission also contributing to the production costs.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 2: Greater returns from regional investment to ensure sustainable provision of appropriate physical and social infrastructure

Objective 2.2: Maintenance of economic diversity and greater community returns from investment in the region

Strategy 2.2.4: Enhance and expand tourism opportunities in the East Kimberley and improve access to significant tourism destinations

RISK IMPLICATIONS

Risk: Inability to deliver levels of service expected by the community.

Control(s): Current budget and service levels.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

The Our Town program represents an excellent opportunity to showcase Kununurra and the East Kimberley, which can increase tourism levels, and thereby provide further economic development opportunities for the Shire and broader community.

ATTACHMENTS - Item 12.02.3

Attachment 1 - Email from Lee Loraine, Visage Productions

Attachment 2 - OTWA Proposal

Attachment 3 - CE_Endorsement

Meagan LeRiche

From: Lee Loraine <visage1@iinet.net.au>
Sent: Wednesday, 11 May 2016 6:00 AM
To: ceo
Cc: Meagan LeRiche
Subject: New OUR TOWN Television Series
Attachments: otwa_proposal.pdf; CE_endorsement.pdf

Good morning Carl

I spoke with Meagan yesterday who suggested I touch base via email in relation to the new OUR TOWN television series, and the potential to have Kununurra involved in the series. This is the fourth instalment of OUR TOWN in WA and Kununurra has been featured twice before so it would be great if we can have the town involved once gain.

FYI, in series two, the Shire contributed to the overall storyline, which can be viewed at <https://vimeo.com/28733733>, and in series three the episode was fully subscribed, hence the Shire's commitment to be involved was just too late. This episode can be viewed at <https://vimeo.com/114865598>.

The OUR TOWN WA series in summary:

- To be broadcast throughout the state via Channel 7 (metro) and GWN Prime (regional) from November this year.
- Series' major aim is to promote why people should visit, live, play, work and invest in the towns/cities of Western Australia.
- The project will be produced by VISAGE Productions – we are a WA based production company who will be utilizing the skills of a WA based production team for this series.
- The program is built from a successful model that has been in production in Western Australia over three series' and more recently via a Queensland focussed series, which has just completed airing.
- The 10 episode, 30 minute program will be packaged as an entertaining and informative look at some of the regional towns and cities (and near Perth metro towns) that have made their mark in WA, towns that have gathered plenty of history over the years, as well as looking at what the towns have planned for the future.
- Each of the 10 weekly episodes will focus on a particular town, and the surrounding region. Feature stories will cover subjects relating to tourism, regional and economic development and industry and commercial growth, stories built around 'positive' community relationships and partnerships. The content is endless, as long as it's a positive story.
- The program will feature the many companies and organisations that are helping the area move forward, for the betterment of themselves and for the community, and provides an ideal opportunity for the town and business operators in the region to feature their product to an extensive audience.
- Each participant will also have unlimited access to the final edited story, as well as the raw footage, which can be further promoted through other promotional mediums such as television commercials, websites and social media (conditions apply).

To give you an idea of what we've just produced for Queensland, please view the below links:

Fraser Coast <https://vimeo.com/155661997> - visit and liveability theme

Capricorn <https://vimeo.com/157111967> - visit and liveability

Samford <https://vimeo.com/151890315> - local community focus

Bundaberg <https://vimeo.com/149281241> - a look at how the City has recovered from devastating floods

Gladstone <https://vimeo.com/151760850> - more resource focussed theme

Some other examples of the previous WA series:

Geraldton <https://vimeo.com/115507806> - visit and liveability theme

Lancelin <https://vimeo.com/119831946> - visit and liveability

Busselton <https://vimeo.com/117021832> - visit and liveability

Broome <https://vimeo.com/107360354> - visit and liveability

Over recent series', from a Kununurra POV, there's been a strong focus on tourism, as the industry plays an integral role in the growth of the region. Last series we had KAI involved, and I see this series as a mix between the visit, live, work, play and invest theme, which the Shire plays a key role in promoting.

With both the WA and Queensland series', it was found that by being involved in the OUR TOWN program, it really brought the communities together. OUR TOWN WA will look at how it all started, we'll chat with the locals, the people who have lived in the region for a lifetime, people who have seen the changes, who have experienced the good and bad times. This is a project where we'll work closely with each location throughout the entire process, ensuring a smooth transition throughout all stages of production, and you'll be liaising with just the one person, myself.

To make it all come together we need to raise funding for each episode and this can be done in various ways, which I'm happy to discuss. The magic number we're aiming for is \$40,000, ex GST, per episode. In previous WA and Queensland series' this was made up of funding from LGA's, RTO's, Chamber of Commerce members, State Government Agencies, mining and resources companies, national and state-based organisations and corporations, property and land developers, and local business. With previous series', the first point-of-contact were the LGA's who contributed various funding dollars, some contributing the whole amount in return for total control of the episode. To produce a 30 minute program (22 minutes with commercials) we spend five days on location producing storylines. As with the Shire we have a budget we need to work with to make each episode happen, and with a crew of four the budget soon gets chewed up, plus we take advantage of the full days light so it's long days on the road for the crew. FYI, for the first series the Shire's commitment was \$10,000. In an ideal world I'd like to build the Kununurra story around the Shire, what it is doing to grow the region, and if we can get that interest I'll talk to other operators and attempt to bring it all together. So, yes there is some urgency if we want to make a Kununurra episode come to fruition, and I'm happy to work with you to have the Shire and the region as part of the new series. Local business operators are more receptive to being involved if their LGA is also involved.

I'm keen to make a Kununurra and surrounding region episode one of the priority locations for the series Carl – I think the program needs such an episode as it has a great story to tell, so feel free to ask 'any' questions along the way, and we'll do our best to make it all come together. It will be a first in – best dressed scenario for the 10 episodes with filming planned to start from July (we can schedule filming for your preferred time of year). In the meantime, if you'd like to keep up to date with everything OUR TOWN feel free to follow the program on our Facebook page, which has regular updates on the upcoming and previous series', and is also utilised as a tool to further promote included destinations - you can view this at <https://www.facebook.com/ourtownoz>. FYI, I have attached a program proposal for your perusal as well as a letter of endorsement from the recent Queensland series.

Thanks Carl, I look forward to hearing from you and possibly having the Shire involved. I'm happy to answer any questions and discuss further on the phone, if that suits.

Best regards

Lee Loraine
PRODUCER DIRECTOR
VISAGE PRODUCTIONS



Contact: 0419 967 806
112 Elliot Road HOCKING WA 6065
www.visageproductions.com.au





TELEVISION PROGRAM PROPOSAL 2016

 PRESENTED BY VISAGE PRODUCTIONS COPYRIGHT 2016 



TELEVISION SERIES



Due to the resounding ratings success of the first three series' of OUR TOWN Western Australia, VISAGE Productions, in partnership with Channel 7 and GWN Prime, are pleased to announce a new OUR TOWN WA series, on the back of the recently produced and successful OUR TOWN Queensland series. The program will be broadcast from November this year in a weekend afternoon timeslot as we now head into production for the series.



OUR TOWN will focus on the towns of WA, focusing on the 'visit, live, play, work and invest' theme, with a strong profile on regional and economic development and specific stories based on positive community relationships and partnerships.



The 10 episode, 30 minute program is packaged as an entertaining and informative look at some of the regional towns that have made their mark in WA, and have gathered plenty of history over the years, as well as looking at what the towns have planned for the future.

We'll look at how it all started, we'll have a chat with the locals, the people who have lived in the town for a lifetime, people who have seen the changes, who have experienced the good and bad times - we'll be telling the whole story.

We'd like to feature the many companies and organisations that are helping the area, in which they operate, move forward, for the betterment of themselves and for the community.





THE OUR TOWN TEAM



BRETT NOVAK

Brett is an Australian born TV and radio presenter based in Fremantle, Western Australia. Having graduated from ECU/WAAPA Broadcasting he has assisted in production and presented in programs for both television and radio. While he aspires to become James Bond, in his spare time he enjoys participating in comedic endeavors, 'breaking the internet' and searching for the perfect doughnut - which consequently may in fact be hindering his chances of becoming the next Bond.



PIP O'CONNELL

While best known for her role on the award winning Western Australian television travel show Postcards WA, Pip has also worked in a broad range of other media spheres.

She has worked on Just Add Water, co-hosted live coverage of horse racing at Ascot, hosted a live football panel show, co-hosted breakfast radio and worked in film. In addition, Pip played state netball for 12 years, was an inaugural WAIS scholarship holder, has attended the World Championships for Ironman triathlon, and has completed a Rottnest channel swim crossing.





PRESENTED BY LEE LORAINÉ - VISAGE PRODUCTIONS COPYRIGHT 2016



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Ground Floor Foyer, 34 East Street, Rockhampton
PO Box 1313, Rockhampton Q 4700

Capricorn Coast Office:

Ross Creek Roundabout, Scenic Hwy, Yeppoon
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Web: www.capricornenterprise.com.au

Ph: 07 4927 2055 Fax: 07 4922 2605

ABN: 72 142 612 280

Capricorn Tourism & Economic Development Ltd
Trading as Capricorn Enterprise

22nd March 2016

Lee Loraine
Producer
VISAGE PRODUCTIONS
112 Elliot Road
Hocking WA 6065

Dear Lee,

I wish to extend my sincere thanks to you and the team for producing a fantastic half hour 'Our Town' production on our region, which stretches along the Tropic of Capricorn from the Southern Great Barrier Reef in the east to the Sapphire Gemfields in the west (including Great Keppel Island, Yeppoon, Emu Park, Rockhampton and Rubyvale).

As one of the thirteen (13) official Regional Tourism Organisations (RTO's) in Queensland as recognised by the state government, your pilot 'Our Town' production was recommended to us by Tourism and Events Queensland (TEQ). Whilst not having allocated budget for this opportunity, we found a way with our local government partners to proceed with one of your five shows in the first series of 'Our Town' and the result could not have been better!

From the get go, you were so great to work with; from the pitch to the script, from the on-site filming to post production. We've worked with many film crews over the years, from travel shows to lifestyle shows, but the production style from VISAGE Productions was so incredibly inclusive from start to finish. Whilst in other paid segments we have had input into content and location, we have never experienced the approval of script to the detail that you provided!

As is 'Murphy's Law' with film crews, the weather played havoc during your time in our destination, yet you filmed from dawn to dusk and worked around the summer storm clouds to capture AMAZING footage and your aerials were just beautiful. Presenter Miranda was such a professional and her warm and friendly style really came through the camera lens.

Lee, you and your team have been a pleasure with whom to work and I do look forward to working with you again. I am sure that 'Our Town' will become a regular feature on Channel 9 and in fact I would encourage it to be so!

Thanks again for producing an amazing half hour on our destination and for your permission for us to re-purpose in our social media channels. The feedback from our participants and viewers locally was ten out of ten!

Kind regards,

Mary Carroll
Chief Executive Officer

12.02.4. Delegation 7 Expressions of Interest and Tenders - Review

DATE:	31 May 2016
AUTHOR:	Lisa Hannagan, Senior Governance and Risk Officer
RESPONSIBLE OFFICER:	Carl Askew, Chief Executive Officer
DISCLOSURE OF INTERESTS:	The CEO declares an Impartiality Interest as he is required to action delegations

VOTING REQUIREMENT

Absolute Majority

OFFICER'S RECOMMENDATION

That Council amend Delegation 7 "Expressions of Interest and Tenders" to reflect changes at part 2 and 6 and new parts 7 and 8 in accordance with Regulation 18 and 20 of the *Local Government Act (Functions and General) Regulations 1996*

COUNCIL DECISION

Minute No: 11360

Moved: Cr N Perry

Seconded: Cr E Bolto

That Council amend Delegation 7 "Expressions of Interest and Tenders" to reflect changes at part 2 and 6 and new parts 7 and 8 in accordance with Regulation 18 and 20 of the *Local Government Act (Functions and General) Regulations 1996*

Carried 5/3

**For: Cr E Bolto, Cr N Perry, Cr S Cooke, Cr B Robinson, Cr J Parker
Against: Cr K Wright, Cr D Spackman, Cr S Rushby**

PURPOSE

To review Delegation 7 - Expressions of Interest and Tenders, in relation to the value of the Authority that Council delegates to the CEO.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

At the April 2016 Ordinary Meeting of Council, Cr Robinson moved a Notice of Motion:

Minute No: 11338

That Council:

1. Request the CEO to review Delegation 7 Expressions of Interest and Tenders and ensure that it includes a delegation to the CEO to accept tenders when the consideration involved does not exceed \$500,000 excluding GST provided that appropriate provision is made in the Council's Budget; and

2. Ensure that the revised Delegation is presented to the Council at the May Briefing Session and May Ordinary Council Meeting.

Carried 5/3

The "Reason for Motion" provided by Cr Robinson is included below;

REASON FOR MOTION

In accordance with the *Local Government Act 1995* the role of Council is to oversee the allocation of the Shire's finances and to determine policies that strategically direct the Shire. The legislation prevents the Council and Councillors from being involved in operational matters.

On the basis that the Council has adopted the budget and provided the strategic direction, there is no requirement for the Council to be involved in the awarding of Tenders as this is operational in nature. The delegation to the CEO will ensure that the Shire can operate more efficiently by reducing the number of Council agenda items that are required to be drafted by staff members; reduce the amount of time taken to award and therefore commence works; and minimise any potential financial liability for the Shire when the Council does not make a decision in a timely manner.

STATUTORY IMPLICATIONS

There are no Statutory Implications. It is for Council to determine the level of authority they will delegate to the CEO.

POLICY IMPLICATIONS

The Delegations Register will require amendment if Council supports the suggested change.

FINANCIAL IMPLICATIONS

There are no financial implications.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved services

Strategy 1.4.2 : Improve the efficiency and productivity of Shire services

RISK IMPLICATIONS

Risk: Wrong advice provided by CEO leading to political damage or financial loss

Control: Seek specialist technical and legislative/legal advice from relevant agencies and organisations.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

The Local Government Act 1995 allows Council to delegate to the Chief Executive Officer exercise of certain powers or the discharge of any of its duties under the Act. The Local Government Act 1995 also allows for the Chief Executive Officer to delegate any of their powers to another employee (carried out once the delegations to the CEO are adopted).

The aim of delegated authority is to assist with improving the time taken to make decisions within the constraints allowed by the relevant legislation. If Council has already endorsed, through its annual budget process, funds for specific projects or programs which, as part of the procurement process requires a tender, there is no operational reason why the above proposal should not be supported by Council and as such it has the support of the Administration.

A brief desktop review of the level of delegation other Western Australian Local Governments issue in relation to Tenders has been conducted and a wide variation in values was discovered. It is worth noting that many Local Governments do not make public their Delegations Register, so the information below is not suggested to be a representative sample, simply what could be found readily available and in a short timeframe via internet searches.

Local Government	Value of Delegation to CEO for Tenders
City of Bunbury	\$250k to \$500k (larger value for a WALGA contract)
City of Albany	\$250k
Shire of Margaret River	\$200k
City of Geraldton	\$500k
Town of Port Hedland	\$450K
Shire of Ashburton	\$ 1 million
City of Busselton	\$350k
Shire of Derby West Kimberley	\$150k
Shire of GinGin	\$250k
City of Bayswater	\$250k

ATTACHMENTS – Item 12.02.4

Attachment 1 - Amended Delegation 7 showing amendments is provided.

7. EXPRESSIONS OF INTEREST AND TENDERS

LEGISLATIVE POWER *Local Government Act 1995* Sections 5.42 and 5.43 (b), 3.57(1), *Local Government Functions and General Regulations 1996*, Regulations 11, 14(2a), 18(4) & (5), 20, 20(1), 20(2), 21(1),

23(3) DELEGATE Chief Executive Officer

FUNCTION TO BE PERFORMED

The Council delegates its authority and power to the Chief Executive Officer to:

1. Publicly invite tenders before the local government enters into a contract for the supply of goods and services.
2. ~~Where considered beneficial, P~~publicly invite tenders, where considered beneficial, in lieu of seeking quotations for purchases ~~sd~~ under the \$1500,000 threshold (excluding GST).
3. ~~Before tenders are publicly invited, D~~determine in writing, before tenders are publicly invited, the criteria for deciding which tender should be accepted.
4. Make minor variations to a specification for goods or services before it enters into the contract with the successful tenderer.
5. Seek expressions of interest before entering into the tender process.
6. Consider any expressions of interest and tenders that have not been rejected and decide which, if any, of those expressions of interest are from persons who it thinks could satisfactorily supply the goods or services and execute the associated contract up to a value of \$500,000 (excluding GST) provided that appropriate provision has been made in the Council's budget.
7. Decline any tender; and
8. Select the next most appropriate tender if the successful tenderer does not want to accept the contract with the variation or the CEO and the tenderer cannot reach agreement.

Provided that appropriate provision is made with reference to Council Policy CP/FIN-

3204 Purchasing. Condition-

The CEO must ensure safe custody of tender documents submitted.

NOTE: Minor variations to a specification for goods or services shall be deemed to be variations the value of the supply or to the scope of a specification that is expected to be less than approximately 10% of the value of the contract or specification.

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12.03. COMMUNITY DEVELOPMENT

Cr K Wright declares an Impartiality Interest as he is a member of the Kununurra Agricultural Society.

12.03.01. Application for Temporary Licence - Kununurra Agricultural Showgrounds

DATE:	31/5/16
AUTHOR:	Ebony Daniell, Environmental Health Officer
RESPONSIBLE OFFICER:	Louise Gee, Director Community Development
ASSESSMENT NO:	A2153
FILE NO:	PH.12.5
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council grant a temporary caravan park licence to the Kununurra Agricultural Society Incorporated for 14 short stay sites from 13 June - 20 June 2016 subject to the following conditions:

- 1. Only event staff associated with the Loritz Circus are to be accommodated in the park.**
- 2. The following minimum ablution facilities are to be available for the duration of the licence: 2 toilets, 1 hand basin and 1 shower.**
- 3. All wastewater (including sullage water) is to be collected and disposed of at an approved wastewater dump point.**
- 4. Rubbish bins are to be sealed and provided within 90 metres of every site. All rubbish is to be removed from site.**
- 5. Fire extinguisher/s are to be located within 90 metres of every site.**

COUNCIL DECISION

Minute No: 11361

Moved: Cr D Spackman

Seconded: Cr B Robinson

That Council grant a temporary caravan park licence to the Kununurra Agricultural Society Incorporated for 14 short stay sites from 13 June - 20 June 2016 subject to the following conditions:

- 1. Only event staff associated with the Loritz Circus are to be accommodated in the park.**
- 2. The following minimum ablution facilities are to be available for the duration of the licence: 2 toilets, 1 hand basin and 1 shower.**
- 3. All wastewater (including sullage water) is to be collected and disposed of at an approved wastewater dump point.**
- 4. Rubbish bins are to be sealed and provided within 90 metres of every site. All rubbish is to be removed from site.**
- 5. Fire extinguisher/s are to be located within 90 metres of every site.**

Carried 8/0

PURPOSE

For Council to consider an application made by Kununurra Agricultural Society Incorporated (KAS) for a Temporary Caravan Park and Camping Ground Licence at Lot 504, portion of Reserve 29799, Coolibah Drive, Kununurra for the period 13 June to 20 June 2016 for the Loritz Circus.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Regulator - enforce state legislation and local laws

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

The Shire has received an application for a public event for the Loritz Circus to be held at the Kununurra Agricultural Showgrounds (Polocrosse Grounds). Loritz Circus travel to Kununurra to perform and have a large amount of equipment and some animals on site which they need to stay with. The Kununurra Agricultural Society have applied for a temporary caravan park licence for the Polocrosse grounds to accommodate staff associated with the circus. A similar temporary camping licence was granted to accommodate the event in July 2015.

STATUTORY IMPLICATIONS

Caravan Parks and Camping Grounds Act 1995 (the Act)

- s. 7(5) Before granting a licence a local government must ensure that —
- (a) the applicant has complied with the requirements of this Act;
 - (b) the applicant is the owner of the land on which the facility is situated, or is to be situated, or has the written approval of the owner of that land to apply for a licence.

Caravan Parks and Camping Grounds Regulations 1997 (the Regulations)

r. 47. Applications not dealt with within time are taken to be refused

(1) If within —

- (a) 63 days of receiving an application for a licence; or
- (b) 35 days of receiving an application for a renewal of a licence, the local government to which the application was made has not informed the applicant whether or not the application has been granted, the applicant may give the chief executive officer of the local government a notice requiring the local government to inform the applicant, within 14 days, whether or not the application is granted.

(2) If within 14 days after receiving a notice referred to in subregulation (1), the local government has not informed the applicant whether or not the application is granted, the local government is to be taken to have refused the application and the applicant may make an application for review to the State Administrative Tribunal under section 27 of the Act.

r. 54 Temporary licence

(1) A local government may, on payment of the fee set out in item 3 of Schedule 3, grant a temporary licence for a facility which is to remain in force for such period of less than one year, as is provided in the licence.

(2) A local government is to endorse on a temporary licence for a facility as conditions of the licence —

- (a) the maximum number of sites that may be used at the facility;
- (b) the maximum number of sites of particular types that may be used at the facility; and
- (c) the services and facilities that are to be provided.

POLICY IMPLICATIONS

Council Policy CP/HTH-3762 Licensing of Temporary Caravan Parks and Camping Grounds provides guidelines for the approval of temporary licences. The policy provides for reduction in amenity and requirements of the Regulations which is considered appropriate as temporary licences are usually issued only for a short time.

FINANCIAL IMPLICATIONS

If Kununurra Agricultural Society is granted a temporary licence they will be invoiced for a licence fee to be calculated in accordance with Schedule 3 of the Regulations. For the proposed temporary licence the minimum fee of \$100 will be applicable.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 2: Greater returns from regional investment to ensure sustainable provision of appropriate physical and social infrastructure

Objective 2.4: Access to appropriate health, family and community services

Strategy 2.4.2 : Ensure community compliance with Environmental Health regulations

RISK IMPLICATIONS

Risk: Failure to comply with minimum health and safety standards resulting in illness or injury to members of the public.

Control: Inspection by Shire officer and compliance with minimum requirements based on legislative requirements for Nature Based Parks.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

The proposed licence meets the requirements and intentions of Council Policy CP/HTH-3762 Licensing of temporary caravan parks and camping grounds. The licenced area will be occupied only by event staff who stay on site with equipment and animals. The amenities provided will be in excess of the requirements for nature based parks as required by the Policy.

ATTACHMENTS

No attachments.

12.03.02. Application for Temporary Licence- Kununurra Race Club

DATE:	31/05/2016
AUTHOR:	Ebony Daniell, Environmental Health Officer
RESPONSIBLE OFFICER:	Louise Gee, Director Community Development
ASSESSMENT NO:	A2859
FILE NO:	PH.12.5
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council grant a temporary caravan park licence to the Kununurra Race Club for 10 short stay sites and 11 campsites from 3 August to 30 August 2016 subject to the following conditions:

- 1. Only event participants and staff associated with the Kununurra Race Club events are to be accommodated in the park.**
- 2. The following minimum ablution facilities are to be available for the duration of the licence: 2 toilets, 1 hand basin and 1 shower.**
- 3. All wastewater (including sullage water) is to be collected and disposed of at an approved wastewater dump point.**
- 4. Rubbish bins are to be sealed and provided within 90 metres of every site. All rubbish to be removed from site.**
- 5. Fire extinguisher/s are to be located within 90 metres of every site.**

COUNCIL DECISION

Minute No: 11361

Moved: Cr S Cooke

Seconded: Cr D Spackman

That Council grant a temporary caravan park licence to the Kununurra Race Club for 10 short stay sites and 11 campsites from 3 August to 30 August 2016 subject to the following conditions:

1. Only event participants and staff associated with the Kununurra Race Club events are to be accommodated in the park.
2. The following minimum ablution facilities are to be available for the duration of the licence: 2 toilets, 1 hand basin and 1 shower.
3. All wastewater (including sullage water) is to be collected and disposed of at an approved wastewater dump point.
4. Rubbish bins are to be sealed and provided within 90 metres of every site. All rubbish to be removed from site.
5. Fire extinguisher/s are to be located within 90 metres of every site.

Carried 8/0

PURPOSE

For Council to consider an application made by Kununurra Race Club for a Temporary Caravan Park and Camping Ground Licence at Lot 707 Drovers Road, Kununurra.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Regulator - enforce state legislation and local laws

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

The Kununurra Cup and Ladies Day Race Rounds are annual events held at the Kununurra Race Club. Owners, trainers, jockeys and other industry personnel travel with their animals to Kununurra to participate in the events. The Kununurra Race Club have applied for a temporary caravan park and camping ground licence to accommodate these travellers and allow them to stay near their animals for the duration of their time in the East Kimberley. In 2015 Council granted a licence for 3 short stay sites and 11 campsites from Wednesday 5 August to Monday 31 August 2015 for the same purpose.

STATUTORY IMPLICATIONS

Caravan Parks and Camping Grounds Act 1995 (the Act)

- s. 7(5) *Before granting a licence a local government must ensure that —*
- (a) *the applicant has complied with the requirements of this Act;*

(b) the applicant is the owner of the land on which the facility is situated, or is to be situated, or has the written approval of the owner of that land to apply for a licence.

Caravan Parks and Camping Grounds Regulations 1997 (the Regulations)

r. 47. Applications not dealt with within time are taken to be refused

(1) If within —

(a) 63 days of receiving an application for a licence; or

(b) 35 days of receiving an application for a renewal of a licence, the local government to which the application was made has not informed the applicant whether or not the application has been granted, the applicant may give the chief executive officer of the local government a notice requiring the local government to inform the applicant, within 14 days, whether or not the application is granted.

(2) If within 14 days after receiving a notice referred to in subregulation (1), the local government has not informed the applicant whether or not the application is granted, the local government is to be taken to have refused the application and the applicant may make an application for review to the State Administrative Tribunal under section 27 of the Act.

r. 54 Temporary licence

(1) A local government may, on payment of the fee set out in item 3 of Schedule 3, grant a temporary licence for a facility which is to remain in force for such period of less than one year, as is provided in the licence.

(2) A local government is to endorse on a temporary licence for a facility as conditions of the licence —

(a) the maximum number of sites that may be used at the facility;

(b) the maximum number of sites of particular types that may be used at the facility; and

(c) the services and facilities that are to be provided.

POLICY IMPLICATIONS

Council Policy CP/HTH-3762 Licensing of Temporary Caravan Parks and Camping Grounds provides guidance for the approval of temporary licences. The policy provides for reduction in amenity and requirements of the Regulations which is considered appropriate as temporary licences are usually issued only for a short time.

FINANCIAL IMPLICATIONS

If Kununurra Race Club is granted a temporary licence they will be invoiced for a licence fee to be calculated in accordance with Schedule 3 of the Regulations. For the proposed licence the minimum fee of \$100 will be applicable.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 2: Greater returns from regional investment to ensure sustainable provision of appropriate physical and social infrastructure

Objective 2.4: Access to appropriate health, family and community services

Strategy 2.4.2 : Ensure community compliance with Environmental Health regulations

RISK IMPLICATIONS

Risk: Failure to comply with minimum health and safety standards resulting in illness or injury to members of the public.

Control: Inspection by Shire officer and compliance with minimum requirements based on legislative requirements for Nature Based Parks.

COMMUNITY ENGAGEMENT

No community engagement is required.

COMMENTS

The proposed licence meets the requirements and intentions of Council Policy CP/HTH-3762 Licensing of Temporary Caravan Parks and Camping Grounds. The licensed area will be occupied only by event staff who stay on site with equipment and animals. The amenities provided will be in excess of the requirements for nature based parks as required by the Policy.

ATTACHMENTS

No attachments

12.03.03. Mosquito Management Plan

DATE:	31 May 2016
AUTHOR:	Ebony Daniell, Environmental Health Officer
RESPONSIBLE OFFICER:	Louise Gee, Director Community Development
FILE NO:	PH.18.2 Mosquito Program
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council endorse the draft Mosquito Management Plan provided in Attachment 2 for public comment for a period of 28 days.

COUNCIL DECISION

Minute No: 11362

Moved: Cr S Cooke

Seconded: Cr N Perry

That Council endorse the draft Mosquito Management Plan provided in Attachment 2 for public comment for a period of 28 days.

Carried 8/0

PURPOSE

For Council to consider the draft Shire of Wyndham East Kimberley Mosquito Management Plan.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

The East Kimberley provides a perfect environment for mosquitoes to breed, particularly with the increased temperatures and high rainfall experienced during the wet season. As a result high populations of adult mosquitoes in the Shire can cause issues with both nuisance and mosquito borne disease.

In 2015 the Shire became a Contiguous Local Authority Group (CLAG) in partnership with the WA Department of Health. As a CLAG the Shire receives funding and assistance from the Department of Health medical entomology team to enhance mosquito management practices.

In recent years the Shire has made changes to the mosquito management activities in accordance with advice from the Department of Health. Some of these changes include increasing monitoring activities, increasing use of larvicides and decreasing the amount of adulticides used. This has led to some enquiries from the public regarding the application of adulticides (fogging) to manage mosquitoes. The draft Mosquito Management Plan (MMP) outlines the Shire's mosquito management activities and includes guidance to staff and information to the public on when and why control activities, including mosquito fogging, are conducted.

In September 2015 a consultant medical entomologist from Biting Insect Technical and Extension Services (BITES) conducted a review of the Shire's mosquito management practices. Please refer to Attachment 1 for a copy of that report. The results and recommendations of this report have been incorporated into the Shire's draft Mosquito Management Plan.

STATUTORY IMPLICATIONS

Department of Health

Health Act 1911

Part VII of the Health Act 1911 provides modes of dealing with nuisance and preventing spread of infectious disease, which can be applied to mosquito breeding sites.

Shire of Wyndham East Kimberley

Health Act 1911 – Shire of Wyndham East Kimberley Health Local Laws 2003

Part 6, Division 2 of the Health Local Laws 2003 details measures to be taken to prevent mosquito breeding.

Department of Environment Regulation

Environmental Protection Act 1986 The Convention on Wetlands of International Importance (the Ramsar Convention)

The Shire contains two Ramsar listed wetlands: the Lakes Argyle and Kununurra Ramsar site and the Ord River Floodplain Ramsar site.

POLICY IMPLICATIONS

No policy implications.

FINANCIAL IMPLICATIONS

As a CLAG the Shire is eligible for funding from the Department of Health to enhance mosquito management in the area. The Shire can apply for funding for up to 50% of the cost of chemicals each year, funding for earthworks to reduce mosquito breeding, and the purchase of mosquito treatment equipment.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 2: Greater returns from regional investment to ensure sustainable provision of appropriate physical and social infrastructure

Objective 2.4: Access to appropriate health, family and community services

Strategy 2.1.2 : Ensure community compliance with Environmental Health regulations

RISK IMPLICATIONS

Failure to comply with legislative requirements leading to damage of reputation and/or financial loss.

COMMUNITY ENGAGEMENT

Engagement will take place in accordance with the Shire's Community Engagement Guidelines and will include:

Once endorsed by Council the draft Mosquito Management Plan will be advertised for public comment for a period of 28 days.

COMMENTS

The goal of the draft Mosquito Management Plan is to reduce nuisance and disease risk associated with mosquito populations by committing to environmentally and financially sustainable mosquito management practices.

The objectives of the Plan are to:

1. Identify existing and potential breeding areas;
2. Detail the preferred mosquito management options;
3. Ensure public education and awareness campaigns are ongoing;
4. Inform landowners, residents, Shire staff and the general public of the Shire's mosquito management actions;
5. Ensure information retention by documenting mosquito management actions;

6. Strategically guide the financial direction of mosquito management.

The draft Plan incorporates an integrated approach to mosquito management with four control methods considered: cultural control, physical control, biological control and chemical control.

As noted in the draft Plan it is important to understand that it is not possible, nor desirable to completely eradicate mosquitoes from the environment and there will always be some risk of mosquito borne disease within the Shire. Therefore, education programs (cultural control) are a particularly important part of the Shire's mosquito management activities.

Included in the draft Plan are some triggers for when fogging will be considered which are based on recommendations of the review conducted by BITES. The application of adulticides will only occur during times of high disease risk when the risk to public health outweighs the risk to the environment.

The Draft Mosquito Management Plan is provided at Attachment 2 for Council's consideration.

ATTACHMENTS - Item 12.03.3

Attachment 1 - Review of Mosquito Management - Final Consultant Report

Attachment 2 - Final Draft Mosquito Management Plan

Review of mosquito control program Wyndham/East Kimberley Shire.

PETER WHELAN AM.
CONSULTANT MEDICAL ENTOMOLOGIST
BITES
MARCH 2016.

1.0. INTRODUCTION.....	5
2.0. MOSQUITO SURVEY.....	7
2.1. KUNUNURRA TOWN AREA.....	7
2.1.1. Kununurra Town and Lily Creek Lagoon.....	8
2.1.2. Lakeside Resort and Caravan Park.....	9
2.1.3. Edge of Lily Creek Lagoon below Messmate Way.....	10
2.1.4. Drain from Messmate Way.....	11
2.1.5. Lilly Creek Lagoon Boat landing area.....	13
2.1.6. Observation platform area.....	13
2.1.7. Lily Creek.....	14
2.1.8. Lily Creek at the start of Lily Creek Lagoon.....	15
2.1.9. Gardenia Drive drain, Lakeside.....	15
2.1.10. Argentea St. drain.....	17
2.1.11. "Wetland area" off Ivanhoe Road.....	18
2.1.12. Button Drive area.....	19
2.1.13. Drains off Ivanhoe Rd., industrial area.....	20
2.1.14. Drain beside Ironwood Drive.....	20
2.1.15. Barringtonia Ave area.....	22
2.1.16. Drain on Coolibah Drive.....	23
2.2. NEAR TO KUNUNURRA LOCALITIES.....	23
2.2.1. Southern edge of Lily Creek Lagoon.....	23
2.2.2. Quarantine cattle yard area.....	25
2.2.3. Race course, rodeo, camping grounds, pistol club, and Drovers Road area.....	26
2.2.4. Discovery Holiday Park, Lake Kununurra.....	28
2.2.5. Old Quarry area.....	30
2.2.6. End of Old Quarry Road at edge of Lake Kununurra.....	31
2.3. IRRIGATION AREAS.....	32
2.3.1. Main and minor water channels.....	32
2.3.2. Irrigation plantations Ivanhoe Road.....	32
2.3.3. Irrigation areas along Weaber Plains Road.....	33
2.4. KUNUNURRA FACILITIES.....	37
2.4.1. Waste facility, landfill.....	37
2.4.2. Vicinity of Land fill locality.....	37
2.4.3. Kununurra sewage ponds.....	38
2.4.4. Shire arbovirus surveillance and vector control facilities.....	39

2.5. WYNDHAM AREA.	42
2.5.1. The 6 Mile Creek area.....	42
2.5.2. Wyndham Town, (3 Mile area).....	44
2.5.3. Wyndham residence, mosquito complaint location.	44
2.5.4. Wyndham oval.....	46
2.5.5. Sentinel chicken site.	46
2.5.6. Wyndham Caravan Park and 3 Mile Creek area.	47
2.5.7. Wyndham sewage ponds.	49
2.5.8. Wyndham sewage effluent disposal area.	51
2.6. WYNDHAM PORT AREA.....	54
2.6.1. Tidal flats and culverts.....	55
2.6.2. Mud dump areas.	56
2.6.3. Port facilities areas.	57
2.6.4. Old crocodile farm area.....	57
2.6.5. Wyndham Hotel Area.	59
3.0. MEETINGS AND DISCUSSIONS	61
3.1. Meeting 1. - Meeting with Wayne Richards (A/Director Shire of Wyndham /East Kimberley), Louis Franks (EHO Shire of Wyndham /East Kimberley) and Peter Whelan (Mosquito Consultant) Monday 28 September 2015.....	61
3.2. Meeting 2. Discussions between Louis Franks and Peter Whelan.....	62
3.3. Meeting 3. John Piercy (Shire of Wyndham /East Kimberley Asset Management Officer), Nav Rajeha (Shire of Wyndham /East Kimberley Senior Technical Officer), Louis Franks (Shire of Wyndham /East Kimberley EHO), and Peter Whelan (Entomology Consultant), 2 October 2015.....	63
4.0 CONCLUSIONS AND RECCOMENDATIONS	64
4.1. Mosquito breeding, and larval surveillance and control.	64
4.1.1 Drains.....	65
4.1.2. Freshwater depressions and poorly draining areas.	66
4.1.3. Lake and Lagoon margins.	66
4.1.4. Creeks entering Lily Creek Lagoon.	67
4.1.5. Sewage and waste water ponds and effluent.	67
4.1.6. Irrigation plots around Kununurra.	68
4.1.7. Waste water from irrigation areas.	68
4.1.8. Roadside culverts.....	69
4.1.9. Tidal flats and Tidal creeks.	69
4.1.10. Urban septic systems.....	70
4.2. Exotic vector surveillance.....	70

4.3. Adult Vector monitoring.	70
4.4. Sentinel chickens.....	71
4.5. Adult Mosquito Control.	71
4.6. Mosquito Publicity.	72
5.0 REFERENCES.....	74
6.0. ACKNOWLEDGMENTS.....	75
6.1 Field survey.....	75
6.2 Discussions	75
6.3 Comment and Review	75
6.4 Report Preparation.....	75
7.0 APPENDICES	76
Appendix 1 Results of mosquito surveys.	76
Appendix 2 - Common mosquito species in the Top End of the NT.	77
Appendix 3 Fogging program Wyndham area.	84
Appendix 4 Media and Advertising	89
Appendix. 5 Selected Extracts from draft of 2015 Shire of Wyndham East Kimberley Mosquito Management Plan (Draft). Strategic Community Plan 2012-2022.	91
Appendix 6. Mosquito surveillance and monitoring techniques.	96

1.0. INTRODUCTION.

The first part of a review of a mosquito control program should be a mosquito survey to determine the extent and type of mosquito problems in an area. This can be sometimes done from an aerial examination of an area, but with a complex and extensive area such as the Shire of Wyndham East Kimberley, and particularly the population centres of Kununurra and Wyndham, a ground mosquito survey was deemed vital to determine those problems that will need to be addressed.

The mosquito survey deals with the mosquito sampling and inspections carried out from 27 September to 3 October 2015. The survey involved visiting selected areas of interest in and in close proximity to both Kununurra and Wyndham for likely mosquito breeding sites as assessed from Google earth, problem areas mentioned in previous reports and publications, and inspecting recent problem areas as outlined by Louis Franks, the Shire of Wyndham /East Kimberley Environmental Health Officer (EHO). Representative potential mosquito breeding sites were inspected for the presence of water, and assessed for their potential for mosquito breeding.

This survey was not meant to be exhaustive to locate all mosquito breeding sites. It was rather a survey to determine the type of situations that will both need to be examined in more detail, and to consider a relevant surveillance and control program in order to afford some practical control of potential pest and mosquito borne disease problems in the Shire of Wyndham /East Kimberley.

Photos of potential sites were taken and notes made on potential problems sites in relation to mosquito breeding and possible control options. Most potential breeding sites inspected were sampled for larvae using a standard soup ladle, with samples placed in 70% alcohol that evening for later examination and identification. The results of the larval collection are mentioned in sections dealing with those locations and are presented in Appendix 1.

Adult mosquito traps were set at a small number of locations in each town that were considered to represent the major sources of potential mosquito problems close to the towns at this time of the year. The inspection of the breeding sites also considered the placement of future adult mosquito traps for an ongoing mosquito monitoring program. The results of the adult mosquito collections are mentioned in sections that deal with those locations and are presented in full in Appendix 1.

The potential breeding sites inspected were mainly representative of breeding sites in the Shire, and are by no means an exhaustive list of all the actual or potential sites around these towns. They do however represent the types of major mosquito breeding sites that can be expected to result in pest and potential vector mosquito problems. Other similar sites would have similar breeding potentials and control options. The photos of the potential mosquito breeding sites are presented below, together with a brief outline of their potential for breeding and possible control options.

The potential breeding sites, pest problems and disease potential posed by various species for the NT is attached as Appendix 2. Similar pest and disease potentials will be relevant for North West WA.

The second part of this review deals with an examination of the present mosquito and arbovirus surveillance and mosquito control program in each town. An outline of the present surveillance and control program was primarily gained by having meetings and discussions with local Shire officers who have carriage of the present programs, as well as officers of other local organisations whose area of responsibility or operations can impact on mosquito breeding or vector control.

The findings from these meetings and discussions were backed up by various reports and investigations dealing with the mosquito breeding sites or disease data. Not the least was a detailed draft mosquito management plan (MMP) being prepared by the Shire which has already addressed many aspects of a mosquito surveillance and control program. These documents are listed in the references or Appendices where appropriate.

The third part of the review outlines the findings and conclusions from the survey, the discussions, and an examination of various source documents, as well as the result of various comments or advice from principal players in the Shire or the Western Australia Health Department who play a vital role in planning and delivery of the programs. These conclusions incorporate various recommendations for the future mosquito surveillance and control program.

2.0. MOSQUITO SURVEY.

2.1. KUNUNURRA TOWN AREA.



Figure 1. Kununurra overview.

The town of Kununurra is closely associated with Lily Creek, Lily Creek Lagoon and Lake Kununurra.

A large area of the residential section is situated east of Lily Creek Lagoon in the Lakeside area. The other main residential area is north of Lily Creek Lagoon and extends to the north side of the town. The nearest irrigation area is on the north-west side of the town and extends from Ivanhoe Road northwards. The main irrigation channel starts at the old Pump House on Lake Kununurra and extends north to cross Ivanhoe Road just north of the town.

The main section of the town is separated from the Lakeside area by the large Lily Creek Lagoon, which has a narrow opening to Lake Kununurra at the southern end of the Lagoon.

2.1.1. Kununurra Town and Lily Creek Lagoon.



Figure 2. Kununurra town area.

The commercial and industrial section of the town is adjacent to Lily Creek Lagoon in the middle of the image above. Messmate Way leads from the Victoria Highway near the Lagoon to the commercial centre of the town. Ivanhoe Road leads to the nearest irrigation areas to the west and north of the town.

Many of the hotels and two of the caravan parks are sited around Lily Creek Lagoon on the RHS of the image. The Lagoon has margins of Typha reeds (olive green) in many sections, with some sections (RHS of the arm of the Lagoon above) with wide margins of reeds, while others (LHS of arm above) have relatively narrow margins of reeds, and in some places (at the head of the Lagoon) there are relatively bare margins, where there has been Typha removal. The presence of Typha reeds is an indication of a relatively high potential for mosquito breeding for species such as **Culex annulirostris**, **Culex palpalis**, **Anopheles annulipes**, **Anopheles bancroftii**, **Mansonia uniformis** and **Coquillettidia xanthogaster** (Appendix 2).

2.1.3. Edge of Lily Creek Lagoon below Messmate Way.



Figure 6. Edge of Lily Creek Lagoon near Messmate Way.



Figure 7. Thick Typha margins in the background.

Some margins in this area are free of *Typha* after a weed removal program. This is a model for how the lake margin could be in order to reduce potential mosquito problems arising from the margins of the lake. The best method for *Typha* reduction would be to access the lakeside margin with a boat, and spray the emergent plants with a weedicide using a spray rig. This would gradually reduce the width of the reed margin and could still leave a residual narrow reed margin for aesthetic reasons and to reduce wave action erosion of the sides, yet be narrow enough for fish and other aquatic mosquito predator access into the upright stems.



Figure 8. Section near pump shed and Messmate Way.



Figure 9. Wide Typha margin; note house boats on Lagoon.

Some of these margins are very wide and shallow with extensive *Typha* growth, making any reed reduction program very difficult. However a long term program could still reduce these wide *Typha* margins by weedciding where the margins are closest to the town, and hence any mosquito breeding is likely to impact on the residential areas.

2.1.4. Drain from Messmate Way.



Figure 10. The drain from Messmate Way, upper section.



Figure 11. Messmate Way drain, lower section.

The drain from Messmate Way is an unformed earth drain, which receives long term dry season water flow from overspray of grassed areas on Messmate Way, and drains the commercial area of the town.

During the recent inspection, 4th instar **Cx. annulirostris** were sampled from the drain in the upper section of the drain from an isolated pool, in association with green filamentous algae and grass. The green filamentous algae is an indication of high nutrient levels in this water, probably derived from fertiliser in run off from the grass areas in the median strip on Messmate Way.

The point where the drain enters the lake had thick Typha growth, but appeared to have little mosquito breeding, which is a result of fish predation and other biological control agents. There was however a 4th instar **Culex hilli** larvae recovered from a section of particularly thick Typha which was dead and lodged over. This species is not a human pest but its presence indicates that areas of thick lodged and dead Typha are potential breeding sites for other species.

This drain has the capacity to breed **Cx. annulirostris** and **Cx. quinquefasciatus**. These species can breed in relatively high numbers in the drain, as it is not subject to fish predation and has higher level of nutrients and isolated pools, which are ideal for these species. This site is amenable to a medium term engineering solution by piping the drain water via a subsoil pipe or installing concrete inverts direct to the lake margin.



Figure 12. Messmate Way; over watering.



Figure 13. Messmate Way; over watering.



Figure 14. Lakeside area overwatering.

A short term solution to the excess water discharging to drains involves examining the watering regime and the pattern of watering to reduce the frequency of watering and correct over-spray areas where water discharges to the roadside gutter and hence to open earth drains.

The long term and frequent presence of water from over watering and waste water discharge to open drains encourages reed growth in the open drains, and is hence creating mosquito breeding and adding to maintenance needs, which will require regular silt and weed removal.

2.1.5. Lilly Creek Lagoon Boat landing area.



Figure 15. Boat landing, and thick reed margin (RHS).

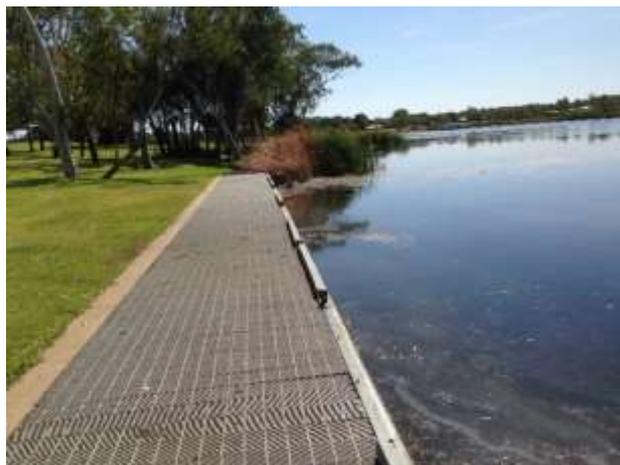


Figure 16. Observation platform (East of boat ramp).

There is an extensive Typha reed area on the other side of the Lagoon opposite the boat landing. Also note the thick reed growth on RHS of the boat landing area. This thick reed growth extends around the Lagoon adjacent to the **Kimberleyland Holiday Park**.

Note the dead reeds in the background of the observation platform. These dead reeds are the result of the recent weed maintenance program.

2.1.6. Observation platform area.



Figure 17. Observation platform.



Figure 18. Dead reeds at end of observation platform.

The reeds appear to have been weedicided by application from the land ward margin. There are calm water areas landward of the dead and lodged reed areas, with green living reeds on the Lagoon side. This type of weediciding pattern can encourage mosquito breeding by keeping fish separate from the shore-side wave protected and nutrient rich water areas. The suggested weediciding program discussed above is also recommended for this area. Land side weedicide application makes it difficult to apply the spray to the outer edge of the Typha, with the result that it will regrow from the untreated outer edges into the treated areas relatively quickly. The presence of these thick reed areas so close to the various camping areas such

as the Kimberleyland Holiday Park camping area, where people are more likely to be exposed to mosquito attack, heightens the potential pest problems and increases the disease potential for diseases such as Ross River virus disease and Murray Valley encephalitis.

2.1.7. Lily Creek.

Lily Creek, upstream of the Victoria Highway, is poor draining, with paperbarks and thick grass growth in Lily Creek. This section will need assessment to determine if wet and post wet season ponding occurs and larval sampling to determine if this area is a productive area of mosquitoes.



Figure 19. Lily Creek downstream of Victoria Highway.

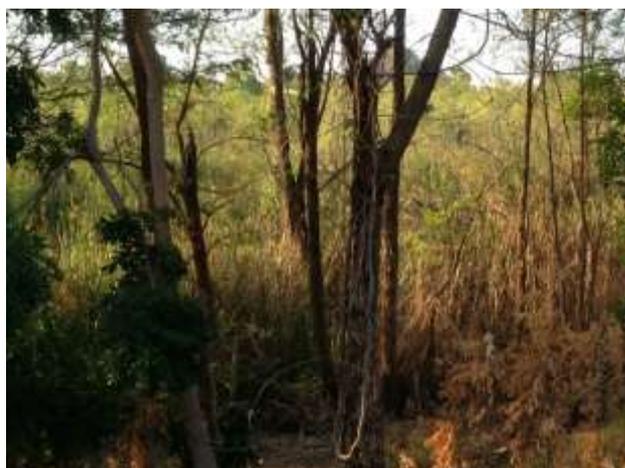


Figure 20. Lily Creek further downstream from Victoria Highway.

Downstream of the Victoria Highway culvert, the creek goes into a sandy area and then a fern area. The creek here has a sandy bed and Pandanus vegetation, with a narrow invert in the upper reaches that is likely to only have short term ponding after the wet season. This creek may add to the silt loads into the Lagoon. This site appears ideal for the installation of a silt trap to prevent silt deposition and further reed expansion into Lily Creek Lagoon. Lower downstream in Figure 19 shows more invert vegetation and probable longer term ponding. This site needs to be investigated during and after the wet season for ponding and mosquito breeding. Likely species breeding here are **Cx. annulirostris** and **Anopheles annulipes**.

The creek widens further downstream nearer to the Lakeside Resort and Caravan Park. The steep bank here has a lot of marginal trees and thick extensive areas of Typha in the wide section of creek. The thick Typha indicates this area may be a productive mosquito breeding site for **Cx. annulirostris**.

2.1.8. Lily Creek at the start of Lily Creek Lagoon.



Figure 21. Lily Creek at edge of Lakeside Resort.



Figure 22. Lily Creek meets Lily Creek Lagoon in a wide extensive area of Typha.

This extensive area of thick Typha is possibly the most important source of **Cx. annulirostris** and **Anopheles species** mosquitoes for the east section of the main town area and the Lakeside suburb area, due to its close proximity to these main residential areas. There is a sparse edge of Typha on the bank adjacent to the Lakeside Resort and Caravan Park (LHS above), indicating purposeful Typha control at the edges, or the effect of depth of water or shading by the adjacent trees. It would be helpful to determine the reed control history of this area. If the sparse reeds are an effect of shading, it indicates a possible environmental and cheap alternative for reed control at the margins. This Typha area needs intensive survey to determine its capacity to breed mosquitoes. If possible, this margin should have reed reduction treatments by weedicide to reduce the reeds margin width.

2.1.9. Gardenia Drive drain, Lakeside.

The drain is between Setosa St. and Gardenia Drive. This open drain starts downstream from the Corkwood Street area. The source of the water discharging into the Gardenia St. drain is in the catchment of the Corkwood drain, and includes areas of lawn watered by the Shire, as well as private verge areas watered by sprinklers.



Figure 23. Discharge into the Gardenia St. drain from the culvert on Hibiscus Drive.

The Gardenia Street drain has an extended length of water and Typha reed regrowth. The water near the headwall at the end of the subsoil drain and for some distance downstream had green algal growth, indicating relatively high nutrient levels. There were 4th instar and younger instars of **Cx. annulirostris** larvae recovered in relatively high numbers in the upper section of the open drain where dead lodged Typha was present. This was in spite of the relatively clear water and the presence of a lot of biological control agents such as mayfly and dragonfly nymphs.



Figure 24. Typha and surface water in Gardenia St. drain well downstream from Hibiscus Drive culvert.

The water areas in this drain were in the process of drying up and leaving isolated pooling, probably as a result of natural water seepage into the drain system being reduced as the dry season progresses. There was no mosquito breeding in this lower section, with more open pools, less nutrients, and less lodged dead Typha. This whole drain has recently been excavated to remove reed growth and silt. The drain needs weedicide application as soon as possible, as the Typha is regrowing and will soon be thick and more difficult to weedicide. This Typha regrowth and the persistence of water in this drain well into the dry season is maintained by the continuing dry season water discharge into this drain. Weediciding as soon as possible will reduce future weedicide needs and silt removal requirements. Insecticide control by repeated methoprene pellets in the short term for 30 day control is warranted while larvae are present, as these locations as so close to residential areas.



Figure 25. Gardenia Drive drain, upper section



Figure 26. Gardenia Drive drain, lower section.

Gardenia Drive drain upper section (LHS above). Typha regrowth is evident in the still moist drain. Lower down (RHS) it becomes more sandy and there is no surface water in the lower section towards the distant creek line, but there is still Typha regrowth in the drain. The entire drain requires weedicide action to reduce Typha reed regrowth. This drain eventually discharges to the now dry north arm of Little Lily Creek.

2.1.10. Argentea St. drain.



Figure 27. Drain head wall with silt blockage and Typha growth.



Figure 28. Lower down Argentea St. drain.

The Argentea St. drain receives less dry season water flow compared with the Gardenia St. drain. However the Typha presence indicates there is still dry season discharge into this drain, and the ponding inside the subsoil drain (LHS above) is likely to breed mosquitoes, particularly **Cx. quinquefasciatus**. The Typha growth should be weeded as soon as possible, and the silt at the subsoil drain end wall, and downstream where necessary, should be removed in preparation for the coming wet season. The Melaleuca regrowth lower down the drain indicates that this growth will eventually catch silt and require added maintenance costs. It is recommended that this drain is weeded or slashed as soon as possible so that the regrowth can be handled relatively easily now rather than later, when removal will prove more costly and difficult.



Figure 29. Lower reaches of Argentea St. drain.

This section of the drain is sandy but there is evidence of wet season pooling in the drain. This drain should be slashed and weedicided where necessary before each wet season. At the end of this drain, at the corner of Livistona St. and Argentea St., is a nearby culvert that has some minor Typha growth. This Typha should be removed and the silt removed before the wet season to facilitate flow in the drain. The wet season water flow from the culvert enters the now dry north arm of Little Lily Creek. Little Lily Creek is a source of silt that facilitates the extensive Typha growth in the shallow edges of Lily Creek Lagoon. It would be useful to install a sediment/silt trap catchment facility in this locality, as well as other major drains, to prevent additional silt entering the Lagoon. These silt structures would need annual removal of silt and sand.

2.1.11. “Wetland area” off Ivanhoe Road.



Figure 30. Dirt track and vehicle ruts, road without culverts.



Figure 31. Depressions and poorly formed drainage lines.



Figure 32. Poorly formed drainage line with depressions.



Figure 33. Land crab burrows indicating water at depth.

An area east of Ivanhoe Rd. and west of Button Drive is called the “Wet Land”. The “Wet Land” area is a severely disturbed area of land with previous excavations and disrupted drainage. There are numerous vehicle ruts, and the whole area will be waterlogged in the wet. The severely disturbed areas have been caused by road or track construction and past land clearing. There are numerous crab holes, and various potential ponding areas are evident that do not drain into nearby drains. The whole area needs to be surveyed to guide levelling, filling, and draining to recreate good drainage, with levels taken of the whole area to see the drainage possibilities. It will probably need a drain through the embankment of the main irrigation drain nearby to effectively drain this area.

The insecticide alternative or interim solution is to apply methoprene pellets to established areas of mosquito breeding prior to the onset of the wet season and reassess this application every 4 weeks by larval sampling and reapplication if the larvae are present and are not methoprene affected.

The depressions are probable breeding sites for various ground breeding *Aedes* species such as ***Aedes normanensis***, as well as ***Cx. annulirostris***. The crab holes could breed some other specialised *Aedes* species but these are not likely to be any significance as pest species.

2.1.12. Button Drive area.



Figure 34. Drain into Aboriginal housing area.



Figure 35. Drain off Speargrass Road, rear of Button Drive.

There are considerable drainage problems in this area, with potential ponding in these drains and adjacent non draining areas in the wet season. These small drains needing silt cleaning and reforming work to improve drainage to a main drain and then to the main irrigation channel. Minor lateral drains from depressions to these drains may be necessary if these pooling sites areas cannot be simply filled.

2.1.13. Drains off Ivanhoe Rd., industrial area.



Figure 36. Main drain to east and at 90 degrees to Ivanhoe Rd.



Figure 37. Junction of smaller drain, parallel with Ivanhoe Rd.

These drains off Ivanhoe Rd. have a good mown invert and are well maintained open earth drains with minor depressions.

2.1.14. Drain beside Ironwood Drive.



Figure 38. Ironwood Drive roadside drain is reasonably well formed.



Figure 39. The branch drain to the fence in the back ground.



Figure 40. Branch of Ironwood Drive drain through fence.

The Ironwood Drive roadside drain and the drains off Ivanhoe Road are reasonably well formed, although there could be some minor pooling in the wet season that could lead to some mosquito breeding, particularly **Cx. annulirostris**. The drains appear to be annually maintained with mowing. The drains largely appear adequate for drainage to prevent mosquito breeding, but could be improved with some minor silt removal. However if wet season pooling does occur, this could be rectified in these drains by installing a 750mm shallow v shaped concrete invert in the centre of the drains to allow good drainage to the nearby culverts under Ironwood Drive and Ivanhoe Road.

The unformed and unmaintained section of drain that extends through the fence off Ironwood Drive needs reforming with regrading and regular mowing. This area of drain is vegetated and would have relatively deep wet season pools that are likely to persist for long periods in the wet season, and are likely to breed considerable numbers of **Cx. annulirostris**. This drain should be inspected after the first rains and weekly afterwards to determine if it is a mosquito breeding site. If breeding is detected, the recommended insecticide solution is to apply methoprene pellets every 4 weeks.

2.1.15. Barringtonia Ave area.



Figure 41. Main drain along Greybox Drive.



Figure 42. Subsoil pipe end into open drain, Greybox Drive drain.



Figure 43. Sub soil pipe end. Greybox drain.



Figure 44. Drain junction downstream of sub soil pipe discharge.

These drain areas have been reported to require regular larviciding. Near the corner of the drain junction there is a sub soil pipe, with water up the pipe; (see Figure 43). This site is likely to breed **Cx. annulirostris** mosquitoes in the open drain and **Cx. quinquefasciatus** mosquitoes up the subsoil pipe during and after the wet season. The drain needs an inspection and treatment during the wet season and post wet season, with methoprene pellets the insecticide of choice to allow 30 day treatment regimens when breeding is detected. The main drain should be cleaned of silt to allow the pipe to drain adequately into the open drain without pooling up the pipe. This drain is another that could be improved in the medium to longer period with concrete inverts to improve drainage.

2.1.16. Drain on Coolibah Drive.



Figure 45. TAFE drain on Coolibah Drive.

This drain had fish in it and was not breeding any mosquitoes. A sample of the fish was not taken to determine if they are native fish. It appears this is a permanent situation with continuous dry season water discharging to the drain. The nearby source of the water from adjacent properties should be investigated to determine if the flow can be stopped. It is likely that the flow is due to overwatering and run off into culverts and drains. If the dry season flow can be reduced or eliminated, the drain should be regraded to ensure it is free draining. If either of these alternatives is not possible, one solution is to make this site a water feature with a small weir in the drain 5-10 m downstream of the culvert to ensure water remains in the drain and ensure it is always stocked with native fish.

2.2. NEAR TO KUNUNURRA LOCALITIES.

2.2.1. Southern edge of Lily Creek Lagoon.

At the end of Old Darwin Road at the Munganji locality (see Figure 49) there is a very shallow and extensive margin of Lily Creek Lagoon with Typha, brackish water fern, and other fern species. The edge has Leichardt Pine and River Red Gums, indicating long term water presence. Extensive invasive Neem trees are present landward of the water margin. Numerous wallaby tracks were observed around the water edge. A wide expanse and extensive margin of shallow water with Typha reeds extends out into Lily Creek Lagoon.



Figure 46. Edge of Lily Creek Lagoon, Munganji locality.



Figure 47. Edge of Lily Creek Lagoon, grass, ferns and reeds.

This margin appears to be a potential productive area for **Cx annulirostris**, **Ma. uniformis** and **Cq. xanthogaster** species, although a brief inspection of the margin at the Munganji locality did not reveal any larvae. The margin will need adult mosquito sampling for the latter two species and larval and adult sampling for the first species, during and soon after the wet season, and during the early and mid dry season, to determine if and when this type of margin is a productive source of mosquitoes. It is possible that most of the margin area is under biological control agents for mosquito larvae. However those areas physically disturbed by the creation of pools isolated from the main water body, such as the wheel ruts below, may be productive sources of mosquitoes. If this proves so, then vehicle barriers around wet margins to protect these margins may be warranted. The presence of Neem trees offers no protection or repellency for mosquitoes.



Figure 48. Earth track with wheel ruts at margin at Munganji locality.

2.2.2. Quarantine cattle yard area.



Figure 49. Drovers Road and Old Darwin Road vicinity.

The Quarantine cattle yard area is located on Drovers Road south of Kununurra. This cattle drench facility and wash-down bay has earth banks and fenced effluent pits, (see Figure 50). Three pits are present with each overflowing to each other. Green algae growth and duckweed (*Elodea* species) are present on the surface, but with clean margins, there is little opportunity for mosquitoes breeding at the moment. However the pits need to be checked regularly for mosquito breeding. The pits will need regular margin weed control. These pits are likely to over flow in the wet season and lead to high nutrient water contaminating nearby flood prone areas and allow nutrients to enter the Lagoon and promote algal and reed growth in the Lagoon. One solution is to install a sprinkler dispersal system to disperse the effluent over a wide area, while ensuring there is no additional surface flow into the pits by installing banks to divert surface water flow away from the wash down area and the pits.



Figure 50. Drench facility with fenced effluent pits.



Figure 51. Cattle watering trough.

The cattle water troughs were dry during the survey, but could be a minor source of native container mosquitoes such as **Ae. notoscriptus**, **Cx. quinquefasciatus** or **Ae. tremulus** in times of use. Emptying the troughs after use would prevent any mosquito breeding. The large above ground-water tanks nearby are probably not sealed.



Figure 52. Cattle yard on ground tank.



Figure 53. Cattle yard on ground tank, gaps in tank roof.

The large on ground water tank has gaps in its roof (photo above), which could allow the breeding of native container breeding mosquito species. The tanks should be inspected inside for mosquito breeding, and if any is detected, the tanks should be sealed with expandable foam or an alternative method.

Nearby between these facilities and the nearby Lake Kununurra is an extensive poorly drained, flood prone area with large areas of pooling in the wet season that would probably be a productive source of **Cx. annulirostris**. This whole area and the various types of pooling should be checked during and soon after the wet season to establish if there are productive mosquito breeding sites in this area.

2.2.3. Race course, rodeo, camping grounds, pistol club, and Drovers Road area.

The race course and rodeo facilities are located further west on Drovers Road near to Lake Kununurra (see Figure 49 above). The area is also used as a temporary camping ground, although this may only be around a few times per year when events are on. The facilities are serviced by septic tanks. Tap water is supplied by tall tanks which are pump filled from the nearby lake. The nearby Lake edge has a lot of Phragmites grass, Typha reeds and Neem trees. There is a nearby sign indicating a Salvinia control area. Exotic Salvinia water plants are ideal breeding sites for **Mansonia** and **Coquillettidia** mosquito species, so any **Mansonia** and **Coquillettidia** pest problems in this area could be exacerbated if these plants are not controlled or eradicated.

The closeness of the thick Typha reed margins of the lake indicates considerable potential mosquito breeding sites and potential mosquito exposure during evening or night time functions, so any function, especially camping use, would be benefited by mosquito avoidance and self-protection messages in advertisements or in public notices when functions are conducted. The presence of considerable numbers of agile wallabies, which are hosts for Ross River virus, indicates a higher potential for transmission of this arbovirus by vectors such as **Cx. annulirostris**.

The pistol club facilities located just south of the junction of Old Darwin Road and Drovers Road is adjacent to an escarpment, which is relatively close to Lake Kununurra. There is little in the way of infrastructure, so night time use and hence exposure to mosquitoes may not be a problem. There is water pumped to a holding tank for toilets that may not be sealed, and septic in this site may not be sealed. It would be useful to inspect these facilities for mosquito breeding, and seal those facilities where necessary.



Figure 54. Rodeo area and high numbers of agile wallabies.

2.2.4. Discovery Holiday Park, Lake Kununurra.



Figure 55. Discovery Holiday Park and Old Quarry locations.

The Discovery Holiday Park near the end of Lakeview Drive is adjacent to Lake Kununurra and a large backwater on the lake, with a nearby backwater lagoon that is a very extensive area separated by the Lakeview Drive road embankment from Discovery Holiday Park. The backwater and the backwater lagoon has a lot of floating algae and dead water weed on the water. This habitat is ideal for **Anopheles** mosquitoes, as well as **Cx. annulirostris**. However **Cx. annulirostris** is likely to be under considerable biological control by fish and aquatic insects in these areas, and will only be productive in cut off pools or dense fallen reed areas.

The Pump House restaurant and the Golf club is nearby at the end of Lakeside Drive. There will be considerable public exposure to mosquitoes in this area due to the presence of patrons of the nearby golf club, the caravan park and the Pump House restaurant. The commercial and public facilities in this area could promote or provide the use of repellents or other devices such as mosquito lanterns to protect patrons or customers. Some mosquito control at facilities such as caravan parks would benefit by bifenthrin or lambda-cyhalothrin barrier spraying low fringing vegetation or installing hedges or erecting shade cloth fencing so these can be used with barrier sprays.



Figure 56. Discovery Holiday Park. Backwater, Typha margin.



Figure 57. Backwater looking to lake and backwater inlet.



Figure 58. EVS trap at Discovery Holiday Park.



Figure 59. Louis Franks and Ebony Daniell, Shire EHO's.



Figure 60. Isolated lagoon north side of road to Discovery Park.



Figure 61. Lake, Discovery Park, Pumphouse, golf club, locality.

2.2.5. Old Quarry area.



Figure 62. Old Quarry area and access track to Lake Kununurra.

The Old Quarry road is a dirt track off the Victoria Highway, 100m west of Ivanhoe Road junction, which leads around the Old Quarry area and through a poor draining area to the edge of Lake Kununurra. This rough dirt track will have little or no wet season access. However it provides dry season access to areas that are likely to be important mosquito breeding sites as they are close to the Town area. The first part of the track traverses an area that has been disturbed by past land clearing and excavation, and has numerous poorly drained areas that could provide wet season breeding sites for **Cx. annulirostris**.

This area needs a mosquito ground survey in the wet season and early dry season to determine if productive mosquito breeding sites are in this area. Pre to early wet season application of methoprene pellets to any productive areas of breeding, with repeat inspections during the wet season would provide good larval control, but location of areas to be treated will require extensive and thorough ground surveys to locate breeding sites. Medium term mosquito control should be an engineering rectification of levelling or grading to re-establish good drainage. Any engineering rectification will need to be guided by an aerial topographic survey.

The old quarry excavations were not investigated during this survey because of the lack of access by road, but will need to be investigated as they may receive town drainage and nutrients during the wet season, and may be at least early wet season breeding sites for **Cx. annulirostris**. If the excavations have perennial water and any marginal vegetation and floating algae, they may be appreciable **Anopheles** species breeding sites. The determination of these excavations as mosquito breeding sites will depend on the presence of fish in the excavations. If there are no fish present, the addition of native fish early in the wet season could provide an ideal short to longer term mosquito control method.



Figure 63. Open water flood prone area at edge of Typha swamp.



Figure 64. Grass and Typha swamp land RHS Old Quarry Road.

Half way along the track on the RHS (see Figures 63 and Figure 64), there is an extensive Typha swamp, with thick grass growth at the landward margins. Some areas have open vegetation free areas that are likely to have shallow wet season ponding that could be productive mosquito breeding sites, and will need checking to determine if breeding does occur there. This area is a good permanent adult mosquito trap site, which could gauge the potential for wet season and post wet season mosquito numbers arising from this or nearby sites. However siting of a trap position will require investigation of wet season road access.

2.2.6. End of Old Quarry Road at edge of Lake Kununurra.

There were extensive neem tree growth and coffee bush thickets nearer the end of the old quarry Road dirt track, with numerous areas that are low lying and probably extensively flooded in the wet season. The drainage lines and depressions in this area should be investigated by a ground mosquito survey. If appreciable mosquito breeding is discovered, the engineering solution will require an aerial topographic survey to see if there is any feasibility to practically provide improved drainage of these areas to Lake Kununurra.

The Lake margin on the town side in this vicinity has a relatively narrow Typha margin with a steep bank that is not likely to be a major mosquito breeding site. The lake margin on the other side of the Lake opposite the end of the quarry track has extensive Typha growth and there appears to be little capacity for a practical engineering solution to this extensive Typha growth and probable mosquito breeding on that side. A temporary wet season to early dry season monthly EVS trap on the opposite side would help to determine if there is appreciable mosquito numbers originating from this area.

2.3. IRRIGATION AREAS.

2.3.1. Main and minor water channels.



Figure 65. Main irrigation channel near Pump House restaurant.



Figure 66. Minor irrigation channels.

The main irrigation channel and most of the minor channels appear to have been regularly weeded and have relatively clean margins, which discourages any mosquito breeding. In addition the main channels have appreciable water flow, further discouraging mosquito breeding. Many of the smaller feeder channels only contain water for a few days, so may not contain water long enough for mosquito breeding to develop. None of the main channel sections or minor channels inspected along Ivanhoe Road or Weaber Plains Road contained any mosquito larvae. However they also appeared to not contain any appreciable numbers of small fish, which indicates that if the channel margins are allowed to be thickly vegetated, they could develop some capacity for mosquito breeding at the margins.

2.3.2. Irrigation plantations Ivanhoe Road.



Figure 67. Flooded sandalwood plantation feeder channel.



Figure 68. Road side waste water drain.

A considerable area of the irrigation areas close to the town are sandalwood plantations. There is currently little or no sugarcane irrigation areas. The plantation areas are periodically flood irrigated with wide bays between the rows of trees from a feeder channel, and the flood bays dry out over a few days, hence

providing little opportunity for mosquito breeding. One area of Sandalwood plantation was observed in the process of irrigation that could have provided longer retention of water. It appears the area was flooded longer than normal by a temporary blockage of the feeder channel. This temporary blockage by dead vegetation was cleared during the inspection by the landowner and water started flowing and draining again. However the capacity for longer term pooling in the irrigation areas during the wet season needs to be investigated to determine if any mosquito breeding is occurring in the irrigation areas. Sandalwood plantation areas more than 5 km from the main residential areas are unlikely to provide appreciable mosquitoes for the town area.

The road side drain water appears to be longer lasting with appreciable vegetation and has more capacity for mosquitoes breeding. If these drains are not flooded for more than a week, they will not have the capacity to breed appreciable numbers of mosquitoes.

2.3.3. Irrigation areas along Weaber Plains Road.



Figure 69. Weaber Plains road and irrigation area.



Figure 70. Shallow ponded area along Weaber Plains Road.



Figure 71. Shallow ponded area with extensive shallow water.



Figure 72. Shallow water with large numbers of magpie geese.

This shallow ponded area has a high potential to be a mosquito breeding area, both during the wet season and whenever it is purposely flooded. The geese will add organic material to the water which will enable

large populations of mosquito larvae, particularly if there is appreciable areas of thick emergent grasses or floating dead weeds and grasses that prevent appreciable larval control by aquatic predators. In addition, shallow flooding is likely to encourage more emergent vegetation that will offer harbourage and protection for mosquito larvae. This site could breed large numbers of **Cx. annulirostris** and possibly **An. annulipes**, as well as floodwater **Aedes** species such as **Aedes normanensis**, **Aedes lineatopennis** and possibly **Aedes nocturnus** and **Ae sagax**.

This site needs to be investigated to determine if and when mosquitoes breed in it. If this shallow water nature of the bay is not required, more deeply flooding the bay to at least a metre deep would discourage emergent grasses and enable wave action at the margins to discourage mosquito larval survival. However as this bay is more than 10 km from the residential areas of town, any regular mosquito control is not as relevant as any similar area that is within 10 km of the town. These sites will be locally very productive for mosquitoes, and increase the potential for mosquito borne diseases such as MVE and RRV. The land owners and relevant authorities should be made aware of the mosquito breeding potential of these areas.

2.3.4. Waste water from irrigation areas.



Figure 73. Waste water drain 5km along Ivanhoe Road.



Figure 74. Waste water draining s/west of Ivanhoe Rd. 5km mark.



Figure 75. Waste water drain downstream 700m s/west of Ivanhoe Road.



Figure 76. Waste water feeder drain to main waste drain.



Figure 77. Waste drain culvert. Feeder waste drain.

The waste water drains from irrigation areas are generally overgrown with vegetation and are more prone to mosquito breeding. As an example there is a main waste irrigation water drain about 5 km along Ivanhoe Road. There is a lot of water flow into this drain from the adjacent irrigation areas and by the colouration, it appears these waters have high nutrient levels conducive to mosquito breeding. The drain has tallgrass margins at the start of the drain, but about 700m downstream it had stopped flowing as evaporation and infiltration had robbed it of water at the time of inspection. Downstream in the drain, the drying drain and remnant pools are discrete and vegetation free at the edges with no mosquito breeding evident.

The smaller feeder drains are much more overgrown with grasses and weeds on sides and inverts of the drains, with Typha reeds in some areas.

In the wet season and earlier in the dry season when these waste drains are full, they will have thick grass and occasional areas of Typha reeds in the invert of the drains. These waste drains could then be appreciable sources of **Cx. annulirostris**. Particularly important potential areas of mosquito breeding are at the ends of the waste drains where they enter poorly draining creeks or flood out areas and become low lying swamp areas.

All waste drains within 5 km of the town need to be inspected for mosquito breeding in and after the wet season to determine their capacity to breed mosquitoes. If they are significant sources of mosquitoes, they could be relatively easily treated with methoprene pellets. However the medium to longer term control relies on weediciding and drain cleaning, and ensuring all waste water drains flow freely to downstream areas and into the Ord River.

2.4. KUNUNURRA FACILITIES.

2.4.1. Waste facility, landfill.



Figure 78. Locations around waste facility.

The waste facility for Kununurra is located on the Old Darwin Road approximately 1.5km from the Drovers Road junction with the Old Darwin Road. There are extensive deep excavations in sandy soil but there are no potential mosquito breeding sites inside these excavations.

2.4.2. Vicinity of Land fill locality.

There is a large flood prone area to the north of the waste facility. This area was dry at the time of the survey but could be an appreciable source of **Cx. annulirostris** and **Anopheles** species during the wet season and in the early dry season. There is also poor draining land south of the waste facility along the Old Darwin Road. Land development has disturbed natural drainage patterns and has led to ill draining areas.

These areas will need to be checked carefully to determine their mosquito breeding capacity during the wet season and soon after on a number of times relating to different water levels and the presence of emergent or marginal vegetation.

2.4.3. Kununurra sewage ponds.



Figure 79. Kununurra sewage pond locality, and main irrigation channel.



Figure 80. Secondary Ponds, algae on ponds.



Figure 81. Margins clean with numerous ducks.



Figure 82. Secondary ponds. Floating duck weed.



Figure 83. Sewage ponds, clear margins, floating algae.



Figure 84. Floating duck weed windblown to edges.



Figure 85. Outlet pipe of effluent to main channel.

The Kununurra sewage ponds are located west of the town (see locality image Figure 79). The ponds are well maintained, with vegetation free margins that are not conducive to mosquito breeding. Effluent after treatment is piped to the nearby main irrigation channel where it is suitably diluted and there is no marginal vegetation in the receiving channel. The floating algae, and floating and wave piled duckweed (*Elodea* sp.) were not breeding mosquitoes during the survey. If marginal vegetation becomes established, these ponds could be very productive sources of **Cx. annulirostris**, and possibly **Cx. gelidus** and **Cx. quinquefasciatus**. The presence of numerous water birds also makes this site very relevant for the potential for MVE transmission.

Soil heaps on the west and south west side of pond area caused by past land clearing and development has interrupted surface wet season landward flow of drainage to the main irrigation channel. Many depressions exist throughout the area that could be important breeding places for **Cx. annulirostris**, particularly as this site is so close to residential areas. This poorly draining area needs checking in wet season for mosquitoes breeding. Wet season treatment of any breeding would be by the application of methoprene pellets, but medium to longer term rectification by levelling improved drainage is required.

2.4.4. Shire arbovirus surveillance and vector control facilities.



Figure 86. Sentinels chickens coop in corporation area.

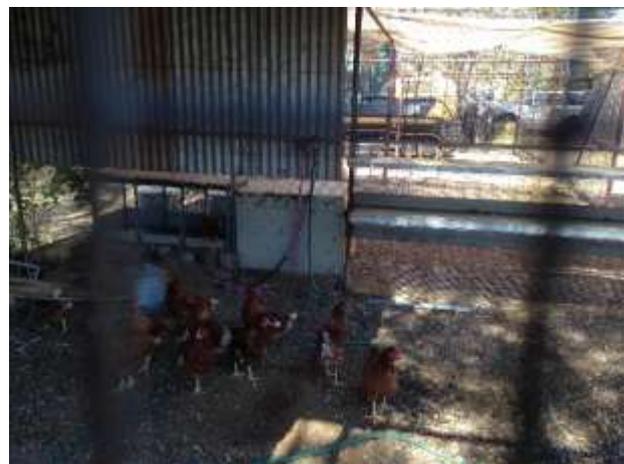


Figure 87. Sentinel chickens.

The sentinel chicken facilities are located in the Ngahluwah Aboriginal development area on St. Martins Way near Button Drive on the north-west side of the main residential area and not far from the “wet land area”. Although well-constructed, and afforded good security by this location, it is not sited for optimal detection of MVE or Kunjin activity arising from wild water birds. The existing site is separated from Lily Creek Lagoon by the main residential area and hence is not likely to act as an early warning method for flavivirus activity. The better site for a sentinel chicken flock is close to aquatic bird habitats such as near to Lily Creek Lagoon, Lake Kununurra or the sewage ponds. The location of an alternative site for this flock is recommended.



Figure 88. Existing permanent EVS trap site, Shire yard.



Figure 89. Existing EVS trap location, Shire yard.

The existing permanent EVS mosquito surveillance trap sites are located on the fence at the Shire yard on Bandicoot Drive, and at the sentinel chicken site on St. Martins Way. The traps are baited with carbon dioxide gas obtained from cylinders sourced from a local supplier. As stated above the sentinel chicken site, and hence the EVS trap site associated with the chickens, needs to be relocated to optimise both virus detection and relevant mosquito populations. Mosquito populations arising from the Lily Creek Lagoon are not likely to be well represented by trap positions so far from the most important sites of mosquito breeding and water bird activity.



Figure 90. Vector control equipment, operational fogger.



Figure 91. Vector control equipment storage area.

The current vector control equipment consists of a new Cougar brand ULV fogger. This unit is fully operational and serviced and operated with advice from Dave Walker and Clarke Pest Control. There is also a disused Cougar fogger that can be cannibalised for parts. The foggers use Twilight ULV insecticide and a wetting agent DC Tron is used. The insecticides are stored in an air-conditioned room.

2.5. WYNDHAM AREA.

2.5.1. The 6 Mile Creek area.



Figure 92. Aerial view of locality of 6 Mile Creek.



Figure 93. Close up of 6 Mile Creek.

The 6 Mile Creek area has been a location of mosquito complaints in the past. It is approximately 3 miles east of Wyndham town (the 3 mile area), with mileage distances referring to distances from the original port facilities. It is also between the airport and Wyndham town. There is a recreational club nearby on the north side of the Highway and a private residence associated with extensive bird keeping sheds on the southern side of the highway.



Figure 94. Lateral margins of 6 Mile Creek downstream of highway.



Figure 95. Main channel of 6 Mile Creek just below highway.



Figure 96. Isolated tidal pool in 6 Mile Creek invert, lower reaches.



Figure 97 Lower reaches of 6 Mile Creek, tidal.

The 6 Mile Creek, its tributary creek, and poorly draining areas on the lateral aspects of the creek below the highway and west of the bird sheds are high potential **Aedes vigilax** breeding sites. These sites should be inspected after the first big rains of the wet season and after the highest spring tides to determine specific breeding sites. Control can be by methoprene briquettes. There is little practical engineering control necessary here apart from possible tidal control on culverts on the highway, because there are so few residents affected. However if there is considerable use of the recreation club, and possible outdoor mosquito exposure, some control of high larval populations of **Ae. vigilax** by insecticides at peak periods would be warranted.

2.5.2. Wyndham Town, (3 Mile area).



Figure 98. Aerial view of Wyndham localities.

Wyndham town is about 3 miles east of the port area. The residential area is located on both sides of the highway to the port. During the survey, a mosquito complaint was investigated by an inspection of the yard and the placement of an EVS trap in the yard overnight.

2.5.3. Wyndham residence, mosquito complaint location.



Figure 99. Complaint residence. Septic tank with gap in lid.



Figure 990. Complaint residence. EVS trap.



Figure 100. Wyndham School. Possible mosquito access to septic holding tanks.

The complaint residence had a mosquito problem probably originating from artificial containers nearby (see Table1, Appendix 1), with the **Cx. quinquefasciatus** probably originating from the faulty septic tank in the yard. It was not possible to inspect inside the septic tank but a mosquito was observed coming out of the hole. Three species collected in the adult trap are artificial receptacle or tree hole breeding mosquitoes. In the current location and season, all of the species collected probably came from nearby artificial receptacles, and all can breed in functioning or disused septic systems, as well as small purposely filled receptacles.

Most residences in Wyndham have septic tank systems, which are actually septic treatment and holding tanks, where the treated effluent is then gravity piped to the sewage treatment plant near the Highway, rather than fed into an on-site absorption trench. Other locations in Wyndham had sections of their waste systems that were not adequately sealed against mosquito entry (see school system above) and there are probably many septic systems in the town that are breeding mosquitoes, and these are the probable cause of many complaints when they are not related to large outbreaks of salt marsh mosquito hatches originating from tide or rain events. The simple means of control of these mosquito sources is sealing the septics and sealing any damaged inspection lids or grates in pipe or vent systems leading to the septics. Particular care should be given to sealing all gully traps in all houses in Wyndham with fly wire in the grate instead of just having a slit grate. The responsibility for inspecting and rectifying problem septics and grates in the houses in Wyndham will be the owners of the property. The Shire of Wyndham /East Kimberley should undertake an education program to encourage the owners to rectify these problem sites. Generally the breeding of mosquitoes on private or other residential or industry property will be against Health regulations.

2.5.4. Wyndham oval.



Figure 102. Wyndham oval former water reuse facility.



Figure 101. Town water supply to water holding tank.

Effluent was previously used via a concrete holding tank near the oval to irrigate the oval. Now the holding tank contains town water and is only a freshwater holding tank. There was no mosquito breeding in the holding tank, primarily because of the low nutrient levels and the presence of aquatic insect predators of mosquito larvae. This tank should be periodically checked for mosquito breeding.

2.5.5. Sentinel chicken site.



Figure 102. Sentinel chickens, Wyndham.



Figure 103. Sentinel chickens in coop, Wyndham school.

The sentinel chicken flock is in the school grounds and maintained by the school. The adult mosquito EVS trap is not associated with the chickens, but is located within a 1 km in the Anglican Church grounds and is operated and serviced by the vicar. There appears to be little **Cx. annulirostris** potential within or close to Wyndham town, as most of the potential mosquito breeding sites are saline habitats associated with **Ae. vigilax**, so siting of the chickens and the monitoring trap is not so important for this long dispersing species. However if opportunity allows, the positioning of the EVS trap would be better within 50 m of the chickens, for better indications of mosquitoes associated with the chickens. The church location is also relatively exposed to wind, and there are competing lights from the nearby basketball ground.

2.5.6. Wyndham Caravan Park and 3 Mile Creek area.



Figure 104. Caravan Park dam wall, partly breached overflow.



Figure 105. 3 Mile Creek downstream from caravan park dam.



Figure 106. 3 Mile Creek, upstream of pedestrian path culvert.



Figure 107. Pedestrian path culvert looking upstream.

The caravan park has a dam in the upper reaches of 3 Mile Creek and is tidal from the salt flat to just upstream of the Great Northern Highway culvert on the highway (above RHS). The 3 Mile Creek flows around the Wyndham caravan park to the highway culvert and then towards the extensive salt mud flats. The caravan park dam may be a source of mosquitoes early in the wet season and post wet season, but may have aquatic predators in it after it fills during the wet season, and may not be a productive source while it flows or is relatively full.

The section of the creek after it overflows from the caravan park dam to the pedestrian culvert is deeply incised and will have residual pools during and after the wet season. This creek line may be a mosquito source early in the wet season but again may have aquatic predators for most of the wet season and early dry season. However both sites will need checking during the early wet when they first fill, particularly if there is thick vegetative grass and reeds at the margins. The area of wet season and post wet season freshwater ponding with thick *Eleocharis* reeds just upstream from the pedestrian culvert (Fig. 108) is a likely very productive area of **Culex annulirostris** and **Anopheles** species mosquito breeding in the wet and early post wet season.



Figure 108. Pedestrian path culvert, with tidal weir effect.



Figure 109. 3 Mile Creek down stream of path, tidal ponding.

The culvert at the pedestrian path has a relatively steep drop on the downstream side and forms a fortunate partial or complete tidal barrier. If any exceptional tide gains access above the pedestrian culvert, this ponding water in the dead *Eleocharis* reeds may breed ***Ae. vigilax*** after very high tides and after the first rains. If there is no tide access to this site it will be a very productive site for ***Cx. annulirostris***.



Figure 110. Downstream of highway road culvert towards salt flats.

The downstream side of this pedestrian culvert and for the length of the invert of the creek to the salt mud flat is highly likely to breed high numbers of ***Ae. vigilax***, and should be checked after exceptional high tides and after first rains. The invert of the 3 Mile Creek after the pedestrian culvert is tidal and non draining. It would be difficult to make it free draining because the invert of the creek is below the level of the receiving mud flats.

An engineering method to afford a partial solution is to have the creek invert filled with gravel and solid fill to the natural ground surface, with erosion prevention gabions after the culverts to slow the wet season flows.

An insecticide option is to use staked methoprene briquettes installed every 5 meters along the invert of creek before the rainy season, or inspection and treatment with methoprene pellets or briquettes after high tides and the first rains.

2.5.7. Wyndham sewage ponds.



Figure 111. Wyndham sewage pond, new pond.



Figure 112. Wyndham sewage pond, new pond.

The single new Wyndham sewage pond has good, stable, vegetation free margins. There was no mosquito breeding in the ponds when inspected during the survey.



Figure 113. Old ponds. Dry but will fill in wet season.



Figure 114. Depressions adjacent to old ponds.



Figure 115. Creek like depression landward of old ponds.



Figure 116. Creek like depression, non-draining.



Figure 117. Drain line from ponds area through fence.

The two older ponds are now disused. The ponds have a residue of organic matter and are edged with thick grass, affording food and shelter for any mosquito breeding. When they are flooded during the wet

season, they are likely to be productive sources of **Cx. annulirostris**. Past land disturbance around these ponds has created many potentially productive mosquito breeding sites. There are depressions with establish grasses and reeds in these depressions, which make them ideal mosquito breeding places. These sites are likely to be very productive sources of **Ae. vigilax** and **Cx. annulirostris** early in the wet season, and may continue to breed **Cx. annulirostris** as long as they remain flooded later in the wet season. These sites will need regular checking for breeding as they are close to residential areas. Any breeding could be controlled with methoprene briquettes or pellets. The old ponds when filled could be less productive by weed and grass removal around the margins.

2.5.8. Wyndham sewage effluent disposal area.



Figure 118. Mud flat with high effluent mangroves on horizon.



Figure 119. Altered habitat of Sporobolus grasses and ponds.



Figure 120. Ponding effluent and grass margin, 1 October 2015.



Figure 121. Extensive area of brackish grasses.



Figure 122. Effluent discharge area in tall mangroves.

The effluent from the old and now the new treatment pond is piped about 700 m south west from sewage ponds across a bare mud flat to a former small mangrove creek line. The continual discharge of effluent to this site has dramatically altered the former habitat over many years, with the result the fresh water component has enabled dense and tall mangrove growth, various pooling areas of effluent over a wide area, and an extensive network of salt water tolerant *Sporobolus* grass to establish around depressions. These depressions and pools will be productive sources of *Ae. vigilax* and possibly *Ae. sagax* and *Cx. sitiens annulirostris*. Water samples taken during the wet season should be tested to determine the salinity levels of surface pools in this area to determine if the pools are capable of breeding fresh or brackish water mosquitoes.

Control of any breeding site by insecticides could be achieved by timely installation of staked methoprene briquettes in and around tidal pools.



Figure 123. Photo Louis Franks 2/11/15 after spring tide (8.23m).



Figure 124. Photo Louis Franks 2/11/15. Tide flooded area. Effluent mangrove forest in background.

The tide during the inspection survey (7.78m) did not reach the effluent discharge site in the thick mangroves, or any of the surrounding drying pools of effluent. However the high tide the following month on 29/10/2015 (8.23m) did flood the area (photos Fig 125 and 126, 2/11/15), and hence indicates the tidal threshold for flooding the pools near this effluent area that will lead to mosquito breeding is about 8 m. This tide threshold should be refined during late dry season tides in coming years.

This site is likely to be a most productive source of mosquitoes for the Wyndham town and should be rectified as soon as possible. Rectification of this new habitat could be achieved relatively quickly by prevention of discharge to this site. Temporary reduction of effluent discharge could be achieved by bringing the old ponds back into operation to give an increased holding capacity, and to reduce the discharge volume by allowing more evaporation. The effluent could also be used to irrigate the oval using the infrastructure already in place, if the effluent is of sufficient quality to use for this purpose. However such use of these old ponds will only be temporary, and a more permanent solution could be to installing a new pipeline to pipe the effluent to a larger creek-line further down the tidal reach that is regularly flushed by tides.

In the short term, if possible, the effluent should be stored in the ponds or reused by spray dispersal in the dry season and released in the wet season, when it will be diluted and more likely to drain away with flow on the mud flats and mangrove creeks.

2.6. WYNDHAM PORT AREA.



Figure 125. Wyndham port area.

2.6.1. Tidal flats and culverts.



Figure 126. Drains from high mud flats areas to road culverts.



Figure 127. Culverts partially blocked with debris and silt.



Figure 128. Tidal creeklines from road culverts.



Figure 129. Road culverts blocked by vegetation and silt.

There are many culverts between the airport area and the port area that lead to downstream tidal areas, or connect tidal areas. Some have downstream inverters that have residual tidal pools, while others are partially blocked with vegetation and silt and retain storm or tidal water. Some areas are potential **Ae. vigilax** mosquito breeding sites. During the current survey many sites were inspected after a high tide and most of the culverts directly connected to tidal flats were not breeding mosquitoes. This was apparently because the tidal flow in many is frequent enough or does not remain long enough to become a mosquito breeding site. However, not all were inspected. The ones inspected and others should be inspected a few days following high tides, both early in the wet season and at the end of the wet season, to determine those that breed mosquitoes and need rectification. In many instances rectification could be simple measures such as removal of blocking vegetation or silt. Others may require measures such as resizing or correcting culvert levels to facilitate adequate drainage. Those that are breeding mosquitoes can be treated with methoprene briquettes or pellets in the short term.

2.6.2. Mud dump areas.



Figure 130. Mud dumping area, downstream is free draining.



Figure 131. Mud dumping blocking drainage.



Figure 132. Retained pool formed by mud dump LHS background.



Figure 133. Extensive retained tidal water with *Ae. vigilax* larvae.

The recent dumping of mud on a tidal flat in the port area has disrupted tidal drainage. During the present survey, *Ae. vigilax* larvae were found in the retained water after recent high tides. These dump areas need to be organised to prevent retained water after high tides. Dumped mud needs to be from upper margins of tidal areas and drainage pathways need to be created to allow free drainage from any dump areas.

2.6.3. Port facilities areas.



Figure 134. Non draining drainway near tank farm, Port area.



Figure 135. Partially blocked tidal creekline in port area.

The port area has a number of poorly draining depressions or poorly constructed drains that will retain tidal or rainwater. Many of them will be **Ae. vigilax** breeding sites after rain. These sites all need to be located and referenced, and a plan drawn up to rectify them. In many instances this rectification can be performed with a backhoe to clear slit or create new drainage pathways, or to install new culverts or partially fill small low lying areas.

2.6.4. Old crocodile farm area.



Figure 136. Old crocodile farm area.



Figure 137. Crocodile farm. Filled and levelled area of old ponds.



Figure 138. Recently levelled crocodile ponds areas.



Figure 139. Downstream of crocodile farm showing depressions.

The former crocodile farm was reported to be a mosquito breeding area in the recent past. During the current survey the site was observed to be partially rectified, with all the crocodile holding ponds filled in and most of the ground surface levelled to prevent the retention of surface water. However in the lower reaches of the area there is still some further filling and levelling required to remove all potential ponding areas that could breed mosquitoes.



Figure 140. Deep tidal excavation associated with crocodile farm.



Figure 141. Outlet of deep excavation pit to tidal areas.

The deep excavation was not breeding mosquitoes during the survey. It appears to be reached regularly by tides and hence is not conducive to mosquito breeding. However it should be checked at other times of the year to determine if it does breed mosquitoes under certain circumstances of low water or low tides.

2.6.5. Wyndham Hotel Area.



Figure 142. Wyndham hotel. Bird water.



Figure 143. Wyndham Hotel. Disused swimming pool.

The Wyndham Hotel has an old internal drainage system and various possible receptacles that could breed domestic mosquitoes such as **Ae. notoscriptus** and **Cx. quinquefasciatus**. No mosquito breeding was located during the current inspection. However as the international port is so close to the hotel, it would be appropriate, from a Quarantine viewpoint, to ensure the possible domestic breeding sites in the hotel site are rectified. The hotel site should be inspected after the start of the rain season for ponding and mosquito breeding. If the pool it is to continue in an unmaintained state, it should be cleaned of debris such as leaves and treated with methoprene briquettes as per label for the volume of water retained.

The general area around the hotel and other nearby properties or facilities includes some stormwater drains and depressions that could breed mosquitoes at other times. A general mosquito survey should be conducted around the public and private facilities in the general port area during the early wet season to determine the locality of any other actual or potential mosquito breeding sites.

2.6.6. Pioneer cemetery and Wyndham Port area, tidal flats.



Figure 144. Between Pioneer cemetery and port.

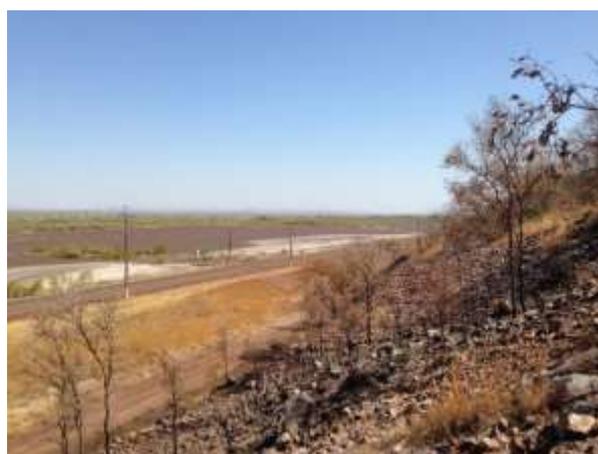


Figure 145. Recently flooded tidal flats with good tide drainage.

There are extensive tidal flats between Wyndham and the port area, with mangrove creeks in the middle of the flats that are relatively frequently reached by tides. The tidal flats are flooded by high tides but drain back to the mangrove creek-lines soon after a tide event. The mangrove areas and the extensive tidal

flats between the Pioneer Cemetery and the main port area are not likely to breed mosquitoes unless there is some artificial disturbance in margin area that retains tide water from the highest tides.



Figure 146. Pioneer Cemetery tidal flat a few hours after tide



Figure 147 Pioneer Cemetery a few hours after tide

The tidal flat near Pioneer Cemetery has a mangrove creek that is relatively close to the highway. An inspection one day and two days after the tide indicated there was no mosquito breeding in the water retained on the flat or in the creek-line. Some retained water was retained in *Sporobolus* grass pools, which is generally an indicator of ***Ae. vigilax*** breeding site. However it appears the tide water is not retained long enough on the flats or in the grass pools in these sites to become mosquito breeding sites.

3.0. MEETINGS AND DISCUSSIONS

Various meetings and discussions were undertaken with various officers in Kununurra.

These included;

3.1. Meeting 1. - Meeting with Wayne Richards (A/Director Shire of Wyndham /East Kimberley), Louis Franks (EHO Shire of Wyndham /East Kimberley) and Peter Whelan (Mosquito Consultant) Monday 28 September 2015.

After introductions and aims of the review, the general Shire of Wyndham /East Kimberley mosquito surveillance and control program was discussed. The program is briefly outlined in part in the selected parts of the draft Shire of Wyndham /East Kimberley MMP at Appendix 5.

Larval control.

Wayne and Louis listed the various locations where larvicides were applied last wet season. These included the various drains that were already established as having mosquito breeding, including Barringtonia drain, TAFE entrance on Coolibah drain, Wetland off Ivanhoe Road, Gardenia St. drain, Argentea St. drain, and Ghost Gum St. drain. All these sites were treated with methoprene pellets after routine inspections.

Mosquito borne disease cases.

These are more fully listed in the complete version of the draft Shire of Wyndham /East Kimberley MMP, but are not detailed in Appendix 5.

Briefly there were 13 cases of RRV in the Shire of Wyndham /East Kimberley in 2015, and most were in January. Most were from out of town locations around Kununurra with only 1 case from Wyndham. Cases occurred in the locality of River Farm, Airport Farms (locality near airport), Packsaddle Plains, and Mills Road. On a per capita basis, few were from Kununurra itself and most were in longer term residents rather than tourists.

Arbovirus surveillance.

New EVS traps had just arrived and will enable a more comprehensive trap program from now on. During the survey period traps were only set in 2 locations at the permanent sites in Kununurra (sentinel chicken site at Ngahluwah community area) and the Shire yard on Bandicoot Drive) and 1 site in Wyndham (Anglican church on Koolama St. near Shire offices).

As at February 2016 the EHO's are setting traps in Kununurra at 4 locations; at Kununurra airport, sewage ponds, Lakeside Caravan Park, and Shire Gardens. Traps are also being set as at February 2016 in 4 locations in Wyndham; at Dulverton St, Koolama St., Reginal St and the Sewage Ponds.

There are two sentinel chicken flocks with one in Kununurra at the Ngahluwah community area and one in Wyndham at Wyndham School. Chickens are bled fortnightly by the EHO's in the wet season and monthly in the dry season if there are no seroconversions.

Adult mosquito control.

There is a fogging program in the Wyndham area when the trigger indicators of mosquito borne disease indicate a disease transmission problem. This is generally significant seroconversions to MVE or Kunjin virus in sentinel chickens, human cases of MVE, or a demonstrated outbreak of RRV. Fogging is undertaken by the Shire of Wyndham /East Kimberley in consultation with the WA Department of Health. The current fogging routes and program are outlined in Appendix 3.

3.2. Meeting 2. Discussions between Louis Franks and Peter Whelan.

Long term data

There is little long term data on mosquitoes for Kununurra. This is primarily due to the difficulties in local identification of mosquitoes and the practicalities of setting and retrieving routine traps in various locations with a small workforce.

Wyndham sewage ponds

The manager of the ponds is Mike Boyes of Water Corporation.

Vector control equipment

The foggers and insecticides are stored in the shed at the Shire of Wyndham /East Kimberley yard in Kununurra. The insecticides are stored in an air conditioned portion of this shed. Other field equipment is stored in a garden shed behind the Shire offices, and includes a ladle, some boots and sample equipment .

Roads

Main Roads WA are responsible for main roads including culverts on these roads. The Shire of Wyndham /East Kimberley is responsible for roads in most town areas except for main roads such as Highways sections through towns. In Wyndham, Main Roads are responsible for the Great Northern Hwy through the town area and to the port and hotel locality up to Gully Road, and then it is the Port Authority responsibility.

Mosquito publicity.

There is a media program organised by the Shire (see Appendix 4). This appears to be appropriate and well conducted. The tourist radio has mosquito messages, but while they are unlikely to reach many of the local audience, they may have some impact on tourist behaviour in relation to self-protection against mosquitoes.

Availability of mosquito self-protection products in local outlets.

Peter Whelan made an inspection of local stores and found a good range of mosquito self-protection products.

Coles had plug in devices containing allethrin and "Clip On" repellent devices containing metofluthrin, as well as standard repellents.

Mitre 10 had "Raid" DIY bifenthrin for barrier spraying, "Thermacell" mosquito repellent and control lanterns, and "Thermocell" hand held gas powered pad repellent devices.

3.3. Meeting 3. John Piercy (Shire of Wyndham /East Kimberley Asset Management Officer), Nav Rajeha (Shire of Wyndham /East Kimberley Senior Technical Officer), Louis Franks (Shire of Wyndham /East Kimberley EHO), and Peter Whelan (Entomology Consultant), 2 October 2015.

The agenda items and discussions included;

Drains in suburb areas of Kununurra.

Peter Whelan indicated his findings of mosquito breeding in the drains and overwatering as the probable reason for sustained flow and aquatic reeds in the drains, and drain and weed maintenance needs. The Shire of Wyndham /East Kimberley will look into any possible contribution to watering regimes and flow in drains. The Shire will look at possible maintenance needs in drains.

Lake and Lagoon margins.

Lake and Lagoon margins with Typha reeds and probable mosquito breeding sites were discussed. The possible contribution to mosquito breeding by areas of dense reeds, and particularly dead weeds from the weedicide program were outlined. The Department of Waters has responsibility for Lake maintenance issues and previously carried out reed removal with a machine. The aspect of weed control will need to be followed up with the appropriate officers in the Shire of Wyndham /East Kimberley and the Department of Water.

Sewage ponds.

The sewage ponds in Kununurra were in excellent condition and were not breeding mosquitoes. The findings on the Wyndham effluent discharge to the tidal area was outlined. Peter Whelan stated that this was possibly the most important artificial mosquito breeding site in Wyndham, which is adding to the potential Murray Valley encephalitis and Ross River virus disease transmission in the town. The points raised about suitable effluent disposal will need to be addressed by the Water Corporation staff in Wyndham.

4.0 CONCLUSIONS AND RECCOMENDATIONS

4.1. Mosquito breeding, and larval surveillance and control.

Larval control should only be undertaken in locations where larvae have been just located or a larval monitoring program indicates the timing and location where larvae are expected in the short term. Adult trapping records should be examined to aid in determining locations where mosquito larvae can be expected, particularly the locations where roving adult traps indicate unknown breeding sites.

Larval surveys for tidal influenced areas are required around 3 to 4 days after rain or tide events. Timing of larval surveys in tidal areas is more critical than freshwater sites, when tidal species larvae may only be present in pools up to 4 days after tide inundation before they moult into pupae, which makes control very difficult. Larval surveys for freshwater species should be made around 6 days after rain events for temporary rain filled or recently flooded sites, as the most common species, **Cx. annulirostris** can develop from recently laid egg rafts to pupae in 6 to 7 days during the wet season. Larval inspections of selected and known freshwater sites during the wet season should be made in regular locations at the start of the wet season and at least monthly up to June in locations where methoprene pellets are used. More extensive larval surveys should be undertaken twice per year; just after the first appreciable rains of the wet season in January and mid-way through the wet season in February a week after rain, to look for new sites that develop because of new civil or agricultural developments, or other changes in habitats that lead to mosquito breeding.

The sampling of sites for the location of larvae should be made with a standard dipper, sample bottles, and a pipette. Larval dipping should be made in vegetation or other physical locations where larvae can be expected, and numerous dips should be made in each location to cater for the probable uneven distribution of larvae and their preference for certain locations. Fourth instar larvae should be searched for in particular, but a sample of all instars and any different looking larvae should be made. An estimate should be made of the type of instars and the approximate number per dip so later comparisons between location and time can be made. All collection details should be entered on the sample bottle, including location, date, number of larvae per dip, and presence of fish or other predators. A sample of larvae should be made and taken to the laboratory or office for formal identification. All sample data and identification should be entered into a data base.

The procedure for larval surveillance and larval sampling is outlined in Appendix 6.

Generally the threshold for larval control in fresh water sites should be around 2 fourth instar larvae per dip. In permanent or perennial freshwater sites with semi aquatic vegetation and fish and other aquatic predators present, there may continuous egg laying and relatively stable numbers of early instars, but very few or no 3rd or 4th instars, indicating that biological control is achieving sufficient control and larvicides may not be required. It is helpful in freshwater sites with thick aquatic or semi aquatic vegetation to take more dips or use a bucket for sampling, to get an estimate of the number of larvae per square metre to gain an indication of possible production of larvae over the whole area of habitat, which will help determine whether larval control is warranted.

Temporary freshwater breeding sites are generally transient, have higher temperatures, and take longer for predators to appear, and development of larvae to pupae may proceed within 7 days, so the presence of early instar larvae only in these sites may require larval control, before they proceed to develop to later instars and pupae.

In tidal sites with larvae, there are usually few effective predators, and early instars will generally proceed to develop to later instars and pupae, so a detection of any larvae in a large uniform habitat area indicates control is warranted. In tidal sites with thick vegetation, the presence of 2 larvae per dip on average warrants control, as sampling is generally under-estimated in these sites.

Larval control can be by a range of measures, with the most practical and appropriate in the Shire being the application of methoprene pellets or briquettes, and the rectification of small sites by physical or engineering measures. Pellets are useful in habitats that may last for a week up to 30 days. If the habitat is likely to remain for over 30 days, briquettes are more useful and will generally give 90 days control. Any breeding site with pale looking larvae in comparison to untreated sites indicates the pellets or briquettes are still effective and re-treatment is not required. Briquettes are very useful in pre-treatment of perennial and productive sites such as the invert of tidal creeks or tidal depressions, where the briquettes can be applied in sites a week before high spring tides occur and retreatment of these sites will not usually be required until after 90 days. For briquettes in these tidal situations, it is useful to attach the briquettes to stakes in a net bag with a float and cable ties so that the briquette is not covered by mud and is not displaced. Note that many tidal sites that are productive in the late dry season or early wet season are generally unproductive in the mid wet season if continuous freshwater is present and flowing, as there is no available damp mud microhabitat for egg-laying, and fish predators will usually be present.

Many of the principles for mosquito surveillance and control can be found in detail in the WA Health Mosquito Control Manual 2015, (see References). The specific sites and control options are detailed below.

4.1.1 Drains.

There are a number of storm drains in Kununurra that are breeding mosquitoes or have a varying potential to breed mosquitoes. Most of the locations of potential mosquito breeding located in drains during this survey are related to higher nutrient levels or vegetation in the drains, and these locations are generally where there is longer term dry season flow in the drain with waste water from over irrigation of lawns, park areas, footpath verges, or wash down operations. Possible over watering on grass verges and parks is leading to aquatic reed growth in some drains, which will promote extended and higher mosquito breeding. The breeding in drains is relatively important in Kununurra, as the drains are within or close to urban residential areas, and people will be their closest sources for blood meals.

The present control of breeding with methoprene pellets is satisfactory. However the present inspection and control of larvae in drains needs to be examined to determine if the inspections and control can be expanded to include more drains. All the drains throughout Kununurra need to be located and indicated on a vector control map. The aspect of vector control maps is outlined in Appendix 6. Each drain needs to be sampled for mosquito breeding at various times of the year and given a priority reference for when they should have repeated inspection or control.

Some of the dry drains have well maintained inverts by mowing and have little capacity to breed mosquitoes during the dry season. However these drains still need to be inspected during the wet season to determine if they are capable of breeding mosquitoes.

Many drains require some form of rectification. All suburban drains should be examined for silt and weed removal requirements. The drains with Typha reed growth, in particular Gardenia St. drain and to a lesser extent the Argentea St. drain need application of weedicide such as glyphosate a number of times throughout the year.

While weedicide applications to water appear contrary to the Guiding Principle 6 of the Vegetation Management Plan, which states “use of chemicals in and close to water is to be avoided” (see Reference),

it is suggested that the use of glyphosate is the most practical method, which is also the least disruptive to the invert of the drains, particularly if it is applied when water is not flowing in the drains, or the drain invert is dry. While Guiding Principle 7 of the Vegetation Management Plan states that “riparian vegetation and cumbungi around drainage outlets will be retained unless it can be shown to be contributing to upstream flooding”, it is clear that riparian vegetation in drains increases the management needs of the drains, and contributes to mosquito breeding in the drains, which appears to be a more considered approach to vegetation removal in drains. The object should be to eliminate the reeds so that maintenance requirements are reduced, and they have less capacity to breed mosquitoes. Some drains such as those near the “wetland” area and Button Drive area will need reforming to promote better flow during the wet season.

Those drains that have dry season flow should be examined to determine the source of the dry season flow. If this flow is caused by over watering or waste water from other sources, there should be an examination of the watering patterns or frequency to determine if the addition of water to nearby drains can be substantially eliminated or reduced. Drains with longer term retained water such as Gardenia St. drain, and drains off Ivanhoe Road, Greybox Drive and Ironwood Drive could be considered for small concrete inverts to promote flow away from residential areas to other drain or water infiltration areas.

4.1.2. Freshwater depressions and poorly draining areas.

There are a number of poorly draining areas close to urban areas of Kununurra. These need to be inspected at the appropriate time of the year for a better evaluation of their mosquito breeding capacity. As well, any possible and practical rectification methods need to be determined. Particular areas include the area between the sewage ponds and the main irrigation channel, the “wetland” area, and the Old Quarry and areas bordering the Old Quarry Road.

Other flood prone areas further from residential areas should also be considered for drainage enhancement if they prove to be appreciable mosquito breeding places. These sites include the flood area between the cattle yards and Lily Creek Lagoon, and the extensive flood prone area n/w of the dump.

The depressions and poor draining areas around the tank farm at Wyndham port area and the depressions around the Wyndham sewage ponds would be productive sources of **Ae. vigilax** in the early wet season, and possibly **Cx. annulirostris** in the mid to later wet season. All the Wyndham area should be surveyed for similar non draining areas with a view to rectifying them by filling or draining. The short term insecticide solution to control any breeding in similar areas in Kununurra and Wyndham is to install staked briquettes of methoprene in mesh bags or floats so that control can be achieved over a few months.

In some instances, an assessment of the drainage needs will involve either on ground or aerial topographical surveying, as well as on ground assessment during the wet season. Some small areas may need small filling operations, while others may need simple drains constructed with a backhoe or front end loader.

4.1.3. Lake and Lagoon margins.

Lake Kununurra and Lily Creek Lagoon have extensive areas of Typha reeds around their margins and in creek line entry point to Lily Creek Lagoon. A proper assessment of the capacity of these Typha areas

should be conducted to determine their seasonal capacity as sources of mosquitoes. A specific investigation will be needed to determine whether these reeds are sources of **Mansonia** or **Coquillettidia** mosquitoes, as these species will not be detected in normal surface larval sampling because they are usually attached to underwater roots and stems of reeds and grasses. It is possible that large areas of Typha are not as important as artificial drains and depressions, particularly those drain sites with thick vegetation and higher nutrient levels.

Typha reeds reduction should be discussed with the Department of Water and the Department of Environment and Conservation. Appropriate Environmental approvals will be needed for any Typha removal around Lake Kununurra and Lily Creek Lagoon. In the Vegetation Management Plan, it is stated that there needs to be a “long term weed removal and rehabilitation plan” for the lake and lagoon. Consideration of mosquito breeding in such vegetation should be an additional guiding principle in a weed removal plan. Reed reduction should be attempted where possible around certain points of Lily Creek Lagoon, particularly those margins closest to urban areas. Weedicide of margins around Lily Creek Lagoon, if possible by approval, should be attempted from the Lagoon side by boat, rather than the land side.

4.1.4. Creeks entering Lily Creek Lagoon.

Both Little Lily Creek and Lily Creek have silt and sand loads that can promote shallow and extensive areas of reeds in their lower reaches. It would be beneficial to install silt traps in the lower reaches of these creeks at sites before the creeks enter Typha areas, to prevent the further expansion of these Typha areas. These silt traps can be relatively simple, but need to be at sites where they can be cleaned of silt on an annual basis.

Clearing of cumbungi in these areas is supported in Principle 3 of the Vegetation Management Plan, which states that “clearing of cumbungi will be limited to areas defined for recreation and amenity, or areas defined as having experienced large increases in cumbungi growth. There can be no argument that these areas have experienced appreciable cumbungi growth and continue to expand, and if they are confirmed as appreciable mosquito breeding sites, will have a serious detrimental effect on recreation and amenity.

4.1.5. Sewage and waste water ponds and effluent.

The sewage ponds in Kununurra are in good condition with vegetation free margins, and were not breeding mosquitoes at the time of the survey. This was despite areas of floating duckweed and banks of dead algae that can sometimes provide breeding sites for mosquitoes. These ponds need to be maintained in their present condition to prevent mosquito breeding, with periodic checks at other times of the year to determine if any mosquito breeding occurs.

The cattle yard waste water ponds require periodic inspections to determine if they become sites of mosquito breeding. The installation of a sprinkler dispersion system or an infiltration area appears to be warranted to prevent high nutrient water from contaminating nearby flood prone areas, and to prevent nutrients entering the Lagoon and promoting algal and reed growth.

The new sewage pond in Wyndham was in good condition with vegetation free margins and was not breeding mosquitoes. The old ponds were dry during the survey. These will flood in the wet season. When

they first flood, they will become substantial sources of a number of species of mosquitoes, and will need inspection and control.

The sewage effluent release site from the Wyndham ponds onto the salt flat and mangrove area should be investigated for its seasonal capacity to breed mosquitoes. The treatment pond should be assessed to reduce effluent release. There should be due consideration to install a new pipe to deliver effluent further down stream from the present disposal site to a daily flushed tidal site.

The possibility of bringing the old ponds back into operation as short term or dry season holding ponds to reduce effluent release to the mud flat disposal site should be investigated. Filling these ponds to capacity is better than leaving them intact to flood in the wet season. Further effluent release reductions in the dry season may be possible by effluent reuse on the oval using existing infrastructure. If the old ponds can not be used as holding ponds, they should be levelled and the area made free draining.

4.1.6. Irrigation plots around Kununurra.

At the time of the survey, no mosquito breeding was detected in irrigation plots or the main or minor irrigation channels. The lack of breeding in irrigation plots during the current survey was primarily a function of the dry season, when any irrigation water infiltrates quickly. However the site on Weaber Plains Road where there were numerous geese could be a highly productive site for mosquito breeding. Any such sites, within 5 km of urban residential areas or concentrations of rural houses, where irrigation water stays on site for more than 7 days, should be investigated for mosquito breeding and to determine methods to prevent longer term flooding that promotes mosquito breeding.

There are a number of situations where mosquito breeding could develop in irrigation areas. This would primarily involve shallow vegetated feeder channels or irrigation bays where water is retained for periods longer than a week. This water retention would allow **Cx. annulirostris** mosquitoes to develop. This could occur in the wet season, or in situations where channels are blocked by silt or vegetation. Any such areas should be located and investigated by periodic inspections of the irrigated areas in the wet season, and to promote the reporting of such areas to the EHO for advice.

4.1.7. Waste water from irrigation areas.

The highest capacity for mosquito breeding in the irrigation areas is in the waste water after irrigation. The waste water drains are not maintained in the same manner as the feeder channels, and hence they contain varying amounts of grass or reeds. In addition the waste water receiving areas are usually flood out areas where artificial swamps could develop, which could be very high sources of mosquitoes. These waste water channels and disposal sites will have high nutrients and be capable of breeding high numbers of **Cx. annulirostris**.

All waste water channels should be inspected and marked on a vector control map. They should be periodically inspected through the year to determine whether they become appreciable mosquito breeding sites. Priority should be given to those channels and drains that are within 5 kms of urban residential areas of Kununurra or concentrations of rural residences. If appreciable mosquito breeding is detected in relevant waste drains, they should be subjected to mosquito control by methoprene in the short term. In the medium to longer term, they should be subject to maintenance procedures of weed

removal and weedicide spraying. They should be reformed or reconstructed where appropriate to drain directly to the Ord or other large free flowing creeks or rivers. Any silt blockages that act to retain water in the drains should be removed to ensure all drains are free flowing.

4.1.8. Roadside culverts.

There are many culverts on roads and tracks that are partially blocked or have flow reduced, which can cause upstream retention of storm water, and lead to mosquito breeding.

The retention of tidal or saline water is a particular problem in the Wyndham area, both on main roads roads and roads in the Port area of responsibility.

All road culverts should be located and listed on a checklist, with rectification needs and possible solutions brought to the attention of the relevant body responsible for the relevant roads.

4.1.9. Tidal flats and Tidal creeks.

In general most of the tidal flats around Wyndham town and the Port area are not appreciable breeding sites for **Ae. vigilax**. The main salt marsh mosquito breeding sites are likely to be associated with the various drains and creeks that lead to the salt flats. These creeks are generally incised by erosion to invert levels below the natural surface of the upper salt flats, with the result that they retain salt water after very high dry season tides. From the survey evidence and a post survey inspection by Louis Franks, it appears that tides over 8.0 m are necessary to flood the major potential tidal mosquito breeding areas. Potential creeks that are likely to be large sources of **Ae. vigilax** are the tidal sections of the incised inverts of 3 Mile Creek and 6 Mile Creek.

Control of mosquito breeding in the creeks in the Wyndham area could include the short term application of methoprene pellets 2 to 3 days after tidal or rain flooding of these creeks, or the pre-emptive installation of staked methoprene briquettes just prior to the high tide or rain periods. In some locations, such as 3 Mile Creek at the pedestrian pathway culvert, the enhancement of tidal barrier weirs could prevent tides from entering further upstream areas of creeks. There may be other sections of drains or creeks where the installation of low rock tidal gabions with appropriate erosion protection could prevent tidal ingress into the upper section of creeks.

There are also many poor-draining areas around the high tide limit in the Wyndham area. An inspection of all tidal margins in the general Wyndham area should be made at appropriate tides and after rain to locate these potential mosquito breeding sites. Larval mosquito control will depend on available personnel, and it may only be possible or practical to treat the major sources closer to urban areas. At least 5 indicator sites should be selected as appropriate sites to regularly monitor for larvae after tides or rain. Generally around 15 mm of rain is sufficient to lead to ponding in tidal depressions, but this will need ongoing validation and checking. Surveys for larvae after spring tides over 8 m will need to be made 10 days after the highest tides each month from November to March. Tide charts will need to be examined before each late dry season to select dates for tidal larval site surveys. If possible a tide pest chart should be prepared to advise the public when expected **Ae. vigilax** pest problems are likely to occur (See web site; NT Disease Control, Medical Entomology , pest mosquito periods).

4.1.10. Urban septic systems.

The septic system of on property holding tanks in Wyndham is likely to be causing appreciable dry season mosquito problems. All property owners with septic treatment and holding systems on all properties in Wyndham should be targeted by the Shire of Wyndham /East Kimberley for an education program for faulty septic lids, unscreened gully traps, vents, or inspection points.

4.2. Exotic vector surveillance.

Both Kununurra and Wyndham have a potential for importations or introductions of exotic mosquito species from either overseas or from Queensland, with species such as **Ae. aegypti** or **Ae. albopictus** being a particular threat. While Quarantine authorities have carriage for detections within port areas, there is no program for exotic detections just outside port areas in Wyndham, and there is no specific exotic detection program for Kununurra town. It is considered that the Shire, as a receptive area for these species, should operate a limited exotic vector surveillance program with a limited number of tyre traps and ovitraps (suggested 2 tyre traps per town and 3 ovitraps per town) , perhaps operated on a season basis during the wet season from January to March inclusive. If possible the new Gravid Aedes Trap (GAT, see Ritchie et al 2014 Reference) developed in Queensland should be trialled in SWEK as a replacement for ovitraps, as these traps will collect adults, which will be quicker to collect and identify. The principles of operating an exotic mosquito surveillance program are illustrated in the paper on the successful eradication of **Ae. aegypti** from Groote Eylandt in the NT in Whelan et al 2009 (see References). Identification or forwarding for identification of any larvae or adults from GAT traps should be done at least weekly.

4.3. Adult Vector monitoring.

It is understood that the number of EVS traps are to be increased, and some roving traps will be set to determine better permanent mosquito monitoring points. It is necessary to have full year and long term mosquito population data to be able to better anticipate mosquito control needs and to understand disease transmission cycles. It would be optimal to carry out fortnightly adult mosquito monitoring during the wet season at a range of sites, subject to personnel availability, and particularly at the new permanent sites. The previous permanent mosquito trap sites should be augmented with additional traps close to appreciable potential mosquito breeding sites. During the dry season, monthly trapping would be sufficient, in recognition of the probable EHO personnel limitations in the Shire.

Suggested sites in Kununurra include the end of Lily Creek in the vicinity of Lily Creek Lagoon and the Lakeside Caravan Park, the Old Quarry Road area, the vicinity of the Kimberleyland Caravan Park, the Discovery Holiday Park, and near where Little Lily Creek enters Lily Creek Lagoon. At least 4 trap positions would be advisable. Other roving traps (at least 3 per month) are required in the rural area where RRV transmission has been recorded and other sites near swamp-land and reed areas within 5 km of Kununurra, to determine if there are locations with high populations of vectors that are not being detected by the permanent trap positions. Trap positions should be well away from competing lights.

In Wyndham the trap site at the Anglican church is unsuitable. Other trap site locations could include Dulverton St. at the rear of a house on the edge of the suburban area, a site near the sewage ponds, one near 3 Mile Creek and one in the port area. If the suggested 4 traps in Wyndham cannot be set fortnightly during the wet season, they should be set at least monthly in relation to high tide and rain events. Ideal periods are 10 days after the highest monthly tides of the late dry season, and 10 days after the first appreciable wet season rains that lead to localised pooling in creeks and depressions. Traps set before 9

days and after 17 days after high tides or rain will not collect peak numbers of mosquitoes arising from tide or rain. Again at least 3 roving trap should be set at potential breeding places to determine possible sites that have high vector numbers that are not being detected by the permanent trap sites.

Trap collections of more than 100 **Ae. vigilax** or 200 **Cx. annulirostris** per night at locations within 500m of residential areas would be likely to pose pest problems for residents, and the results of trapping over these thresholds should be included in timely public advice in relation to self protection messages. Trap collections of over 500 **Cx. annulirostris** in the wet season from December to May inclusive within 500 m of residential areas would be regarded as posing a severe pest problem and a potential vector disease risk, and should be included in public messages as posing a public health risk for MVE or RRV, and adult fogging of selected harbourage areas should be considered.

4.4. Sentinel chickens.

The existing sentinel chicken site in Kununurra should be relocated to a site nearer to Lily Creek Lagoon, as the existing site is too far from aquatic bird habitat and seasonal mosquito populations to act as an early warning system for MVE transmission. Chickens in Kununurra should be bled fortnightly from the first rains in the wet season to at least the end of May in the early dry season, with monthly bleeds during the remainder of dry season until the start of appreciable rains or December, unless seroconversions occur in the previous bleed. Longer term data should be examined to determine if this is still the appropriate bleeding period.

The flock in Wyndham at the school is relatively close to the sewage ponds and the effluent disposal site on the mud flats, so is located in an appropriate place at the moment. Chickens in Wyndham need to be bled from the first rains of the wet season until the early dry season (May) or until **Cx. annulirostris** numbers become very low.

4.5. Adult Mosquito Control.

Adult mosquito control should only be undertaken when adult vector monitoring indicates there is a mosquito problem. Any fogging program or ad hoc fogging should be referred to the WA Health Medical Entomology team for advice and assistance.

The adult mosquito control program in Wyndham has appropriate fogging routes. However more adult surveys need to be undertaken to determine where appreciable mosquito harbourage sites are located, and more emphasis should be made on fogging these places in preference for prescriptive fogging residential areas.

The equipment and insecticides are located in Kununurra and can be resourced at appropriate times. Fogging should only be conducted during the evening or early night when appropriate triggers are reached for mosquito borne disease risks, or for severe nuisance problems from potential vector mosquitoes during the period of mosquito disease risk.

The fogging program in Kununurra will need to be investigated as per route, timing and triggers. Fogging should only be conducted when sentinel chickens seroconvert to MVE or Kunjin virus during the high MVE risk period from March to May, or soon after human cases of MVE or Kunjin disease occur, or during periods when relatively high RRV transmission is occurring, or when high to very high vector numbers at appropriate times indicate a significant disease risk. Fogging should preferably be undertaken in appreciable mosquito harbourage areas, and these will usually not be in urban residential areas.

4.6. Mosquito Publicity.

As many of the mosquito breeding situations in and around Kununurra and Wyndham cannot be controlled with insecticides or rectified in the short to medium term, the present public awareness program should be retained and revised to see if more methods of public communication can lead to changing people's behaviour to better protect themselves from mosquito attack. Alerts to people of the risk periods of both high mosquito numbers and disease transmission risk periods should be based on current mosquito trapping results, sentinel chicken results, and disease transmission risk periods derived from past transmission periods.

There will be regular pest problems from tidal mosquitoes in the Wyndham area due to the extensive tidal areas around the various sections of Wyndham and the very long range of **Ae. vigilax** of up to 50 km from large breeding sites. Residents of both Wyndham and Kununurra should be alerted to the fact that periodic nuisance and potential vector mosquitoes will occur in pest numbers and they may not be amenable to practical insecticide or rectification control. The public will need to be advised to take effective self protection measures against mosquito bites during these periods when mosquitoes are appreciable pests.

The public should be made aware of the regular and ad hoc mosquito control or rectification measures undertaken by the Shire, and the results from vector monitoring and sentinel chickens. The Shire should organise appropriate publicity of the Shires approach to the mosquito and disease reduction strategy, and this may include information sheets, community meetings at appropriate times, or through local media.

4.7. Activity Chart

The various elements and timing of the mosquito surveillance and control program are presented in the Activity Chart below.

Activity Chart

Activity	Where	How Many	How often	When	When completed	Thresholds	Follow up action
Sentinel Chicken bleeding	W. and K. flocks.	All chickens	Fortnightly Monthly	Start of Wet. June	May Dec.	Flavi + ve	Publicity. Reporting. Fogging discussion.
Tidal Larval survey	W	5 Indicator sites	Monthly 10 days after 8m tides or 15mm rain in wet	Nov	March	>2 per dip any site	Extensive larvicide pellets or briquettes all reg sites.
Freshwater larval survey	W and K	5 Indicator sites K	Monthly in wet	Dec. 6 days after 15 mm rain	June	>2 per dip any site	Examine all regular f/w control sites.
Seasonal larval survey	W and K	5 roving sites K 3 roving sites W.	One day per month	Jan	Feb	After regular rain	Add new sites to regular vector control map
Regular adult trap setting	W and K	4 traps K. 4 traps W	Monthly	Dec	June	200 Cx ann. 100 Ae. vigilax	Publicity re pest. >500 Cx. ann. Fogging discussion.
Ad Hoc adult traps	W and K	3 traps per month.	Monthly	Dec	April	100 any species	Evaluate vector control map
Larval control freshwater	W and K	All regular sites	Monthly	Dec	June	2 of 4th instar per dip	Evaluate survey data
Larval control methoprene pellets	W and K	Recc rate. All positive sites.	30 days	Tide sites, week before 8 m. F/W 2 days after 15 mm rain	4 day after 8m tide or 10 days after rain.	Larvae present, no white larvae	Review vector map
Larval control briquettes	W and K	1 briquette per 3 m length of site, or indiv pools	Every 90 days	Set before 1st 8 m tide Oct	Tide sites become fresh and full.	>2 per dip. Larvae present, no white larvae	Review vector control map
Ovitrap and tyre survey	W and K	3 ovitrap. 2 tyre traps.	Sample every two weeks for two months.	January	March	When exotics detected	Id larvae. Report to WA Health, Quarantine.
Adult Fogging	W route. K route.	All determined harbourage sites.	Once to twice in one week when required.	V high vectors. MVE cases or sent+ve after discuss.	No more new MVE cases. No more new ch +ves. Vect nos normal.	MVE, case or chicken seroconvt. RRV >10 cases per month.	Pre fog publicity. Evaluate adult trapping data.

W = Wyndham K= Kununurra

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John Piercy (Shire of Wyndham /East Kimberley Asset Management Officer), Nav Rajeha (Shire of Wyndham /East Kimberley Senior Technical Officer),

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6.4 Report Preparation

Gwenda Hayes who assisted in report layout and editorial comment.

7.0 APPENDICES

Appendix 1 Results of mosquito surveys.

Table 1: Mosquito adult collections, Kununurra and Wyndham 30/9-1/10 2015

Date	Location	Trap type	Number of mosquitoes	Genus	Species	Sex
01/10/2015	Wyndham Anglican church	EVS CO2 baited	1	<i>Culex</i>	<i>quinquefasciatus</i>	male
30/09/2015	Wyndham Dulverton St.	EVS CO ₂	10	<i>Culex</i>	<i>quinquefasciatus</i>	female
			4	<i>Aedes</i>	<i>tremulus</i>	female
			1	<i>Aedes</i>	<i>tremulus</i>	male
			1	<i>Tripteroides</i>	<i>punctolateralis</i>	female
30/09/2015	Kununurra Lakeside resort	EVS CO ₂	2	<i>Culex</i>	<i>quinquefasciatus</i>	female
			2	<i>Culex</i>	<i>annulirostris</i>	female
			1	<i>Culex</i>	<i>hilli</i>	female
			1	<i>Coquillettidia</i>	<i>xanthogaster</i>	female
			1	<i>Coquillettidia</i>	<i>xanthogaster</i>	male
30/09/2015	Kununurra Discovery caravan park edge of lagoon	EVS CO ₂	4	<i>Culex</i>	<i>annulirostris</i>	female
			1	<i>Culex</i>	<i>hilli</i>	female
			3	<i>Coquillettidia</i>	<i>xanthogaster</i>	female
			1	<i>Mansonia</i>	<i>uniformis</i>	female
			1	<i>Uranotaenia</i>	<i>sp</i>	female
			13	<i>Aedeomyia</i>	<i>catasticta</i>	female
			7	<i>Anopheles</i>	<i>annulipes</i>	female
			17	<i>Anopheles</i>	<i>bancroftii</i>	female

Table 2: Mosquito larval collections, Kununurra and Wyndham 1-2 October 2015

Date	Location	Habitat	Number	Genus	Species	Instars	Vegetation
01/10/2015	Kununurra Messmate Way, lagoon edge	lagoon edge clear water	1	<i>Culex</i>	<i>hilli</i>	4th	Dead Typha reeds
01/10/2015	Kununurra Messmate Way, lagoon edge	storm drain	10	<i>Culex</i>	<i>annulirostris</i>	1st	Green filamentous algae
						,2nds,3rds,4ths pupae	
01/10/2015	Kununurra drain Lakeside	storm drain clear water	6	<i>Culex</i>	<i>annulirostris</i>	1st,2nds,3rds,4ths	Dead Typha reeds
						pupae	
01/10/2015	Wyndham port, mud dump	tidal pool	3	<i>Aedes</i>	<i>vigilax</i>	3rds	Sporobolus grass, Samphire herbs
Total			20				

Appendix 2 - Common mosquito species in the Top End of the NT.

Their biology and disease significance

Peter Whelan,

Medical Entomology Branch

Department of Health and Community Services

January 2004

Culex annulirostris "The common banded mosquito".

Breeding sites

This species exploits temporary ground pools, poorly draining grassy wet season depressions and shallow reed swamps. Potential breeding sites include seasonal grass floodways, low-lying areas adjacent to creeks, as well as persistent reed swamps and other wetlands. The perennial sections of swamps and creeks are relatively open, well defined, and do not contain significant areas of semi aquatic or aquatic vegetation, are generally not appreciable breeding sites.

The greatest potential for increased breeding of this species will be in impeded or blocked floodways and drainage floors, storm drainage and sewage facilities and artificial water features. The capacity of these sites to breed mosquitoes should be rectified by engineering means.

Any new dams and ponds have the potential to be colonized with freshwater *Eleocharis* and *Typha* reeds which can provide ideal breeding sites for *Cx. annulirostris*. If these impoundments are not maintained free of thick grass and reed growth at the margins, they will become appreciable sources of *Cx. annulirostris* mosquitoes over the medium to long term.

Seasonal abundance

The highest numbers are expected in mid-dry season (July) and early wet season (January).

The pattern of abundance is expected to be an increase in numbers coinciding with the start of the wet season in temporary wet season filled depressions, followed by a steady post wet season rise to a peak in July. Breeding will occur in longer lasting creeks and floodways as grass growth and receding water levels hinder the impact of aquatic mosquito predators and isolated pools emerge at the margins.

Perennial creeks and swamps are unlikely to be significant source of this species by the mid dry season as the water retreats to open water or narrow channels with fish and other aquatic predators.

Dispersal

Although *Cx. annulirostris* can disperse up to 10 km from highly productive sources (Russell 1986), there is a usually a significant drop in *Cx. annulirostris* numbers up to 2 km away from significant sources (Whelan, et al. 1997b).

Pest numbers

The pest threshold for *Cx. annulirostris* near the Leanyer Swamp area adjacent to the northern residential suburbs of Darwin is approximately 600 per CO₂ trap per night trapped at a point between the urban areas and the breeding sites (DHCS & DCC 1989). *Culex annulirostris* is not as significant a pest as some of the *Ochlerotatus species* due to its habit of biting only after sundown, and being less persistent in the presence of lights, personal protective clothing and repellents.

Trap collections within development areas of approximately 100 would probably represent a pest threshold for exposed people in the 1-2 hours before sundown.

Disease significance

Culex annulirostris is the most important vector of arboviruses in the NT (Whelan & Weir 1993). It is a recognized and good vector of Murray Valley encephalitis virus (MVEV), Kunjin virus, Ross River virus (RRV), and Barmah Forest virus (BFV) (Merianos et al. 1992, Whelan et al. 1993). Many other arboviruses have been isolated from this species (Whelan & Weir 1993).

However even relatively small numbers may be responsible for transmitting viruses with the risk primarily a function of suitable vertebrate hosts, reservoirs and vector numbers. As this species bites primarily after sundown, self-protection measures can be relatively easily employed to give a good degree of protection against mosquito bites.

However if new mosquito breeding sites are created by interference with natural drainage patterns and contamination of creeks and floodways with organic wastewater or the disruption of fish populations, a significant increase in vector numbers could increase the disease risk.

Culex quinquefasciatus "The brown house mosquito"

Breeding sites

This species breed in polluted water and artificial receptacles filled by rain or purposefully filled. Unsealed septic tanks and poorly designed sewage facilities are particularly productive breeding sites. Breeding sites of *Cx. quinquefasciatus* may be more productive during, and for the few months following, the wet season depending on wastewater persistence. Septic tanks are required to be installed such that they are completely mosquito proof. An inspection of any septic tanks by an Environmental Health Officer is recommended when first installed and then annually to ensure that they remain mosquito proof and do not cause surface pooling of contaminated water.

Seasonal abundance

Locally present depending on breeding sites that tend to be more productive in the dry season.

Dispersal

Probably disperses in the order of 200m to 1km for very large breeding sites.

Pest numbers

Pest threshold is probably in the order of 30 to 50 per CO2 trap. It is generally under-represented in CO2 traps

Disease significance

It can be a minor pest for humans but is not regarded as a potential disease vector in Australia at present.

Coquillettidia xanthogaster, "The golden mosquito".

Breeding sites

Coquillettidia xanthogaster breeds primarily in association with semi aquatic reeds such as *Typha* and *Eleocharis*. The extent of these reeds in dams and drains will be dependent on the water management and maintenance of the margins of the drains and impoundments. The extent of these reeds in impoundments will largely be dependent on the depth of water and the inside slope of the impoundments. Any dams or pits should be constructed with steep internal sides to reduce the extent of these reeds.

Seasonal abundance

This species has a larval stage in the order of three weeks compared to many other species that have a larval duration of 1 week. Adults tend to emerge in a sharp peak around the full moon. This species can be expected to be abundant from February to August with a peak around June and July.

Dispersal

This species can disperse relatively long distances and probably up to 10 km.

Pest numbers

This species will bite humans readily. The pest threshold is probably similar to *Cx. annulirostris*, and would be around 100 per CO2 trap. The pest aspect of this species is elevated because of its habit of biting in the day as well as in the evening and night.

Disease significance

Coquillettidia xanthogaster is not a vector of human disease in the NT.

Mansonia uniformis "The water hyacinth mosquito"

Breeding sites

This species is closely associated with semi-aquatic and aquatic vegetation, particularly thick floating aquatic vegetation.

Seasonal abundance

It is generally abundant near extensive breeding sites from March to July.

Dispersal

This species does not tend to disperse very far from its breeding site and probably less than 500 meters.

Pest numbers

This species is an appreciable pest species and tends to bite readily in the shade in the day as well as during the evening and night. The pest threshold is probably between 50 to 100 per CO2 trap in the vicinity of people.

Disease significance

This species is not a vector of human disease in the NT.

Anopheles annulipes s.l. "The common Australian Anopheline"

Breeding sites

Anopheles annulipes s.l. breeds in open sunlit pools and swamps, often with vegetation. In the NT it breeds primarily in shallow margins of long lasting pools with some or little vegetation. Appreciable breeding sites are likely to exist in seasonally flooded areas associated with creeks and extensive swamps.

Seasonal abundance

Post wet season peaks corresponded to the period after the waters begin to recede, leaving large areas of isolated pools where biological control agents do not persist.

Dispersal

The effective flight range of this species is from 1.6 to 2 km.

Pest numbers

The pest threshold is in the region of 100 per CO2 trap in the vicinity of exposed people.

Disease significance

This species is a potential vector of malaria, and productive sites within the development should be eliminated or reduced.

Anopheles farauti s.l. "The Australian malaria mosquito"

Breeding sites

An. farauti s.l. breeds in either brackish or freshwater pooling in vegetated swamps. It is a sibling species with at least three species present in the NT. One species is brackish breeding while the other two are freshwater species. New breeding places could be provided by the development of dams or impoundments, particularly if isolated pooling with dense reed growth occurs.

Seasonal abundance

It was most numerous from May to July.

Dispersal

The effective flight range is in the order of 1.6 km.

Pest numbers

The pest threshold is in the order of 50 to 100 in a CO2 trap.

Disease significance

This species is the most important potential vector of malaria. It is of medical significance if a case of imported malaria occurred in the vicinity of medium to high densities.

Aedes reesi "The black floodwater mosquito"

Breeding sites

Aedes reesi is a floodwater species and breeds in fresh to slightly brackish, vegetated ground pools often in association with *Cx. annulirostris*, *Ve. funerea* or *Ae. normanensis*. It is favoured in low-lying grassy drainage floors with artificial depressions and seepage.

Seasonal abundance

It was most abundant in the late wet to post wet period in April.

Dispersal

Probably disperses in the order of 1 to 2 km.

Pest numbers

Pest threshold is probably in the order of 50 to 100 per CO2 trap. It will probably not be a significant pest here unless new breeding sites are created.

Disease significance

It can be a minor pest for humans and is probably capable of transmitting Ross River virus and Barmah Forest virus.

Aedes normanensis "The floodwater mosquito"

Breeding sites

Aedes normanensis is a floodwater species and breeds in open ground pools with or without vegetation and sometimes in association with *Cx. annulirostris*. Breeding sites are likely in the floodways and drainage floors particularly in impeded and blocked drainage floors.

Seasonal abundance

It has a wet season abundance. At Woodcutters mine south of Darwin it was most abundant in January.

Dispersal

The effective dispersal distance is in the range of 2 to 4 km.

Pest numbers

The pest threshold is likely to be around 50 in a CO₂ trap. It is likely to be a pest from January up to March.

Disease significance

It is a pest for humans and is capable of transmitting Ross River virus and Barmah Forest virus. Personal protection measures will be required when it is present in pest numbers.

***Aedes vigilax* “The salt marsh mosquito”**

Breeding sites

The most extensive and productive breeding sites will be the upper tidal section of the mangrove areas around the coast, in brackish swamps where extensive reed growth occurs, or in flood plains associated with tidal rivers. The larvae are usually absent from the mid wet to the mid dry season in the major habitats, as the habitats are either flooded and have high numbers of aquatic predators such as fish, or are dry.

Seasonal abundance

Aedes vigilax is likely to be most abundant in the late dry season and the early wet season (August to January). Generally the numbers increase after each succeeding spring tide from August to December and reach their highest numbers after the early heavy rains in December or January. The pattern and levels of abundance can vary from one year to another, due to the variable height of the spring tides each year and the amount and timing of rain in relation to the tides.

There can be a sudden appearance of adult saltmarsh mosquitoes seeking blood 9 days after flooding of the breeding site. They are likely to pose an appreciable pest problem for 7 to 10 days per month over the late dry season and early wet season.

Dispersal

The dispersal of *Ae. vigilax* from a breeding area is related to the distribution, area and productivity of their specific breeding sites, as well as the specific dispersal characteristics of this species. Large numbers can disperse over long distances to cause a pest problem at remote areas.

Ae. vigilax has a long flight range. Relatively high populations have been recorded at Katherine in the early wet season, which is up to at least 100 km from the nearest tidally influenced breeding site.

Pest numbers

Public complaints regarding *Ae. vigilax* and corresponding collections in CO₂ baited light traps placed between the residential area and the swamp near the suburbs bordering Leanyer Swamp in Darwin indicated that pest numbers occur at levels in excess of 50 *Ae. vigilax* per CO₂ trap per night (DHCS and Darwin City Council 1989, P. Whelan unpublished data).

A CO₂ trap collection of 50 *Ae. vigilax* per night is approximately equal to a biting rate of 50 mosquitoes per hour at the peak biting period on an unprotected person (DHCS and Darwin City Council, 1989, P. Whelan unpublished data). This species is regarded as the most important pest mosquito in the Darwin area because of its aggressive biting habits, its ability to bite during the day as well as the night, and its sudden emergence in plague proportions.

Disease significance

Aedes vigilax is a vector of Ross River virus disease in the Top End of the NT (Tai et al. 1993, Whelan & Weir 1993). It is also a vector of Barmah Forest virus disease (Merianos et al. 1992, Whelan, et al. 1993). The greatest potential transmission period of these viruses in the Top End of the NT is in December and January, when *Ae. vigilax* occurs in relatively high numbers, and during humid months when the longevity of the mosquito population is likely to be extended.

Relatively new arrivals that may be non-immune to these arbovirus diseases are more vulnerable. The potential disease aspects, together with the probable pest problems, emphasize the need for personal protection when this species is present.

Other species of mosquitoes

The pertinent characteristics of species likely to be minor pest species other than those dealt with above are outlined briefly below.

***Anopheles meraukensis* “The freshwater reed *Anopheles* mosquito”**

Anopheles meraukensis breeds in similar sites to *An. annulipes s.l.*, although often in clearer unpolluted water with reeds and grasses. It occurs in highest numbers in the late wet and early dry season when the water levels are high. Breeding sites may be associated with the flooded grass and reed areas in freshwater swamps, particularly Melaleuca swamps.

***Anopheles bancroftii* “The black malaria mosquito”**

Anopheles bancroftii breeds in shaded freshwater swamps, often in association with paperbark and *Eleocharis* reeds. It is often in relatively high numbers in the post-wet season near breeding areas. It is a potential vector of malaria but is not as efficient as some of the other species because of its relative short longevity.

***Aedes elchoensis* “The tree hole mosquito”**

Aedes elchoensis breeds in rain filled tree holes. It is a common species but generally does not reach large populations because of the limited availability of breeding sites. It is highest where there are dense stands of Eucalyptus trees that probably include older individuals with rot hole breeding sites. It is a very minor pest for humans and is only seasonally present. It is not known as a vector of human disease.

***Aedes notoscriptus* “The receptacle mosquito”**

Aedes notoscriptus breeds in artificial containers filled by rain or in natural rain filled tree rot holes. It was only present at very low numbers during the current survey. However if artificial receptacles such as old tyres and drums are filled with rainwater, new breeding places will be provided. It is a suspected minor vector of Ross River virus and Barmah Forest virus. A management plan should be in place to remove or adequately store receptacles so that they do not become breeding places for these mosquitoes.

***Aedes kochi* “The Pandanus mosquito”**

Aedes kochi breeds in *Pandanus* leaf axils filled by rain. Appreciable *Pandanus* areas associated with creeks and floodplains. This species does not disperse far and usually only causes a minor and transient localized pest problem. This species is not known to be a vector of arboviruses in the NT.

Potential Introduced species

There are a number of species that are not present in the NT but could be imported and become pests or present a serious public health problem.

Aedes aegypti "The dengue mosquito"

Ae. aegypti breeds in artificial receptacles such as tyres, tins, drums, rainwater tanks, wells, pot plant drip trays, roof guttering and anything that will hold rainwater. It is only found in close association with human habitation.

It is a vector of Dengue Fever (*Ae. aegypti*) but is not present in the NT. However it has the potential to be imported from Queensland in tyres or other containers that may have held water that are sourced from areas where *Ae. aegypti* occurs (e.g., Charters Towers, Townsville, Cairns), (Whelan and Tucker 1998). It is therefore recommended that all receptacles that can hold rainwater including old machinery and tyres in particular be stored under cover, holed or filled with sand or soil to prevent the retention of rainwater.

No used tyres should be sourced from Queensland unless they have been super chlorinated or sprayed with a suitable insecticide to kill any dormant *Ae. aegypti* eggs. Additional items that should not be sourced from Queensland include pot plant drip trays and other vessels capable of holding water.

Any mosquito larvae found in receptacles imported from the relevant areas of Queensland should be submitted to the MEB in 70% alcohol or methylated spirits. If *Ae. aegypti* are found, the MEB will then need to initiate elimination measures as a public health measure.

Appendix 3 Fogging program Wyndham area.

WORK INSTRUCTION	Mosquito Fogging Wyndham
RESPONSIBLE DIRECTORATE	Community Development
RESPONSIBLE OFFICER/S	Louis Franks, Ebony Daniell (EHO's)
MANAGER APPROVAL	Louise Gee
REVIEWED/MODIFIED	Date:22/05/15
REVIEW DUE	Date:
RELATED ORGANISATIONAL DIRECTIVES	Mosquito Program Brief WI/HTH-5767

INSTRUCTION:

OSH

- The Cougar fogger must be used with a ute that is the same height as the trolley it is stored on (Ranger Land cruiser and the Wyndham Leading Hand Hilux are compatible).
- When the fogger unit is moved on/off the ute, a minimum of two persons are required.
- The fogger unit must only be taken on/off the ute using the trolley or a crane.
- The fogger unit must be strapped down when in the back of the ute and when stored on the trolley.

Chemical application

- Tank capacity is 55 litres. Chemical ratio: 1 litre of Twilight: 20 litres of DC Tron. When level drops to where the tank sits in the machine (the green metal part of machine) then this ratio should be re-filled.
- Rotary switch 'target rate' should be set to **.200** This setting delivers approximately 15ml per Ha.
- 'Fog' has a drift area that has been taken into account on the map/route, there is no need to re-fog areas. Wind speeds must be between 5-16 kph to operate the fogger. Outside of this range, the fogging is not effective.
- Flush the spraying system after each day of use.
- Current cost of Twilight per 5 litre container: \$545, DC Tron per 20 litre drum: \$85

These chemicals must be stored in a ventilated area and be locked up when in storage.

DIRECTIONS FOR FOGGING IN WYNDHAM

FIRST RUN – RESIDENTIAL AREA

DRIVE AT 15KM/HR

Do not respond to public requests to re-fog or fog areas not detailed on map. Fogging must not be done on private property.

Residential Area (part A)

Start the fogger on the back road behind the District High School (Welch Street)

Fog up past the school and turn left onto Great Northern Highway

Turn Right onto the small road that joins onto Koolama

Turn left at Koolama Street

Right onto Kangaroo Drive

Right onto Kabbarli Street

Right onto Civic Way

Left onto Koolama

Left onto St. Pauls Way

Right onto Kabbarli St. and immediately turn right onto St. Peters Way

Drive to the end of St. Peters Way

Turn Right onto Koolama and drive along in front of the Shire office

Turn left onto the small side street that meets Great Northern Highway

Turn left onto Great Northern Highway and drive along in front of the shops

Turn left onto Bonaparte Street

Turn off the fogger at the end of Bonaparte St.

Distance Travelled: 3.5km

Time Taken: 17.5 minutes

Residential Area (Part B)

Drive to the Hospital entrance on Mindaroo Street

Turn the fogger on at the entrance to the hospital and drive up Mindaroo Street

Turn Left at Koojarra St.

Follow Koojarra Street all the way around

Turn left at Dulverton

Drive up to the end and turn left at Delamere

Left onto Kwinana Street

Left onto Dorrigo

Left onto Delamere and finally

Left onto Denman

Turn the fogger off at the end of Denman.

Distance Travelled: 3.2km

Time Taken: 16 minutes

SECOND RUN – INDUSTRIAL AREA, PORT & COMMUNITY CLUB

DRIVE AT 15KM/HR

Industrial/Commercial Area

Start the fogger at the depot and depart up Coverley Street

Turn left onto Murphy Street

Right onto Kimberley Street

Left onto Ord Street

Right onto Sharpe Street

Turn left onto Great Northern Highway then

Right onto Baker Street

Drive to the end of Baker Street and enter Wyndham Caravan Park

Do one loop around the caravan park

Turn left outside the Caravan Park

Travel on the dirt road and take the first right which eventually joins with Koolama street

Turn right at the intersection with bitumen (Kangaroo Drive)

Turn left onto Great Northern Highway and travel up to Kimberley Street

Turn right back onto Kimberley Street

Left onto Flinders Street

Left onto Coverley Street

Right onto Cato Court and then back out to Coverley Street

Right onto Coverley Street and finally

Left onto Martin Place

Turn the fogger off at the end of Martin Place.

Distance Travelled: 3.5km

Time Taken: 17.5 minutes

Drive to Wyndham Community Club (9 Mile) and fog for approx. 2 minutes

Distance Travelled: -

Time Taken: 2 minutes

Drive to the Wyndham Port

Wyndham Port

Drive out to the Port and start the fogger just before the first house on O'Donnell street (red roof).

Drive up O'Donnell Street

Turn right onto McPhee, which then turns into Reginald Street

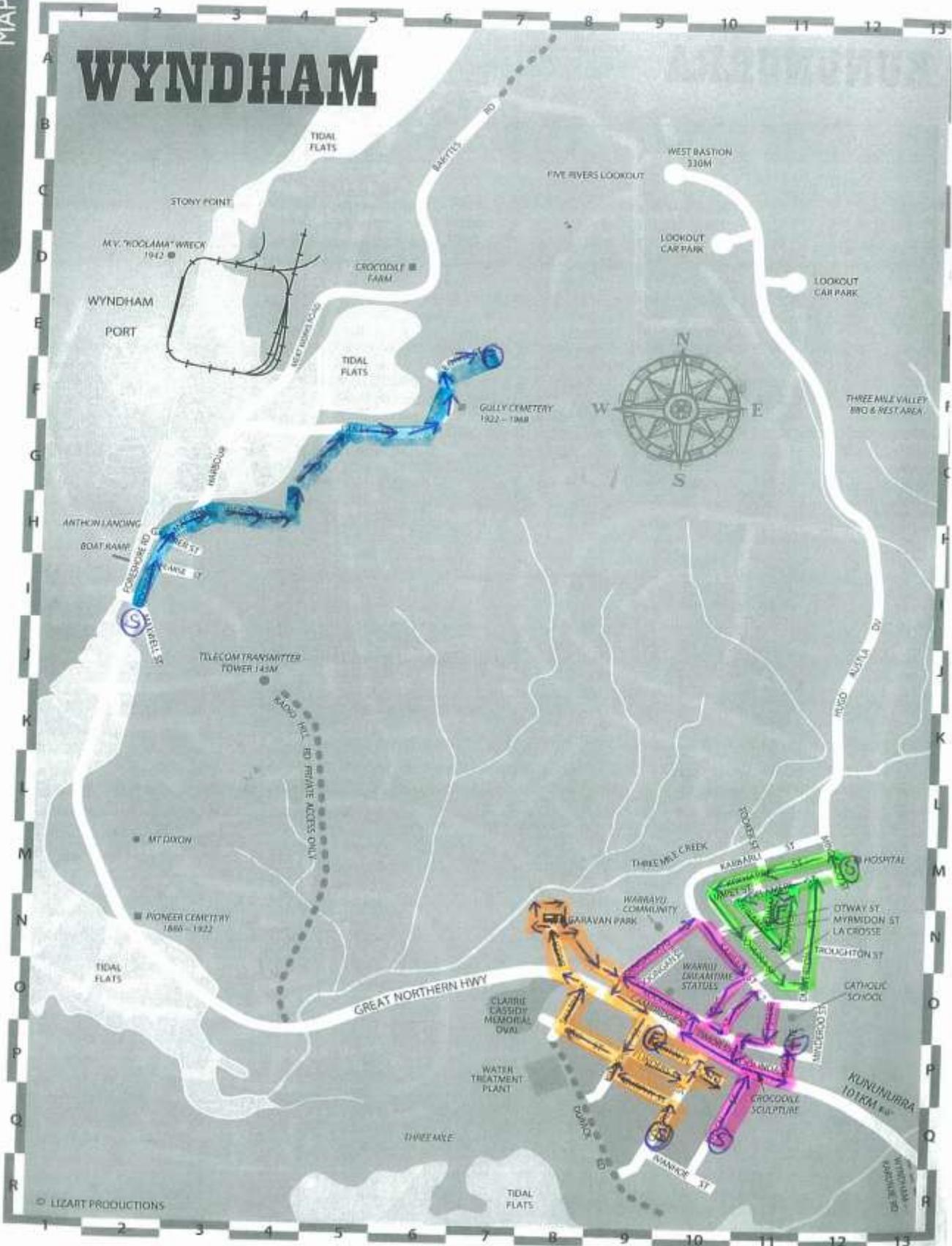
Turn Right onto Gully Rd

Follow up to George Street

Turn fogger off at the end of George Street

Distance Travelled: 2.3km

Time Taken: 11.5 minutes



INFORMATION

Title: Warning to protect against mosquito bites for the Kimberley

The Department of Health has reiterated its warning to residents and travellers to take precautions to avoid mosquito bites during the school holiday period following further detections of the mosquito-borne Murray Valley encephalitis (MVE) and Kunjin (KUN) viruses throughout the Kimberley.

These viruses have been detected in a number of sentinel chicken flocks across the Kimberley, which are used as an early warning system for virus activity by the Department of Health and the University of Western Australia.

Department of Health Medical Entomologist, Dr Peter Neville, said MVE and KUN viruses are only transmitted to humans through a bite from an infected mosquito.

“While the risk of being infected and becoming unwell is low, the illness caused by these viruses can be severe and even fatal. The only effective protection is to take precautions to avoid mosquito bites,” Dr Neville said.

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Department of Health Medical Entomologist, Dr Peter Neville, said MVE and KUN viruses are only transmitted to humans through a bite from an infected mosquito.

“While the risk of being infected and becoming unwell is low, the illness caused by these viruses can be severe and even fatal. The only effective protection is to take precautions to avoid mosquito bites,” Dr Neville said.

“Initial symptoms of MVE include fever, drowsiness, headache, stiff neck, nausea and dizziness. People experiencing these symptoms should seek medical advice quickly. In severe cases, people may experience fits, lapse into a coma, and may be left with permanent brain damage or die.

“In young children, fever might be the only early sign, so parents should see their doctor if concerned, particularly if their child experiences drowsiness, floppiness, irritability, poor feeding, or general distress.”

Dr Neville said Kunjin virus usually caused a milder illness than MVE, but in rare cases also causes severe symptoms, including headache, neck stiffness, fever, delirium and coma.

No human cases of MVE or KUN disease have been reported so far this year, but the viruses have now been detected in four sentinel chicken flocks in the Kimberley including in Kununurra.

People do not need to alter their plans to visit the Kimberley region but it is important to avoid mosquito bites by taking a few simple steps when camping, fishing or undertaking other outdoor activities:

- avoid outdoor exposure around dawn and early evening
 - wear protective (long, loose-fitting, light-coloured) clothing when outdoors
- apply a personal repellent containing diethyl toluamide (DEET) or picaridin to exposed skin or clothing. The most effective and long-lasting formulations are lotions or gels.

Due to the current weather conditions, the Department of Health have advised the Shire that fogging is not necessary.

Please contact the Shire Environmental Health Department on 9168 4100 if you would like further advice.

FOR MEDIA COMMENT PLEASE CONTACT:

John Moulden, President, Shire of Wyndham East Kimberley (08) 9168 4100

Appendix. 5 Selected Extracts from draft of 2015 Shire of Wyndham East Kimberley Mosquito Management Plan (Draft). Strategic Community Plan 2012-2022.

Strategic Community plan

Goal 3: Protection and enhancement of lifestyle values, community facilities and the environment to provide safe and inviting communities

Objective 2.4: High standard of health and community facilities and services available to all residents

Strategy 2.4.1: Advocate for improved health and community services

Community Engagement

The Shire of Wyndham East Kimberley's CP/GOV-3100 Community Engagement Policy has been considered in relation to this plan.

Engagement will take place in accordance with the Shire's Community Engagement Guidelines and will include:

A community mosquito survey has been undertaken to assess concerns from residents and local stakeholders. If fogging occurs a one week notice period will apply.

Goal

To reduce the numbers of nuisance or disease vector species through management practises to ensure an adequate quality of outdoor amenity can be achieved, and educate the community of their personal responsibilities.

Aims

To meet the requirements of Section IX of the Health Act 1911 with respect to vector borne diseases.

To meet the requirements of the residents to have a reasonable quality of outdoor life.

Objectives

The Shire of Wyndham /East Kimberley aims to minimise the likelihood of people being bitten by nuisance and disease carrying mosquitoes by implementing a mosquito management plan that includes:

Educating the public the risks of mosquito borne disease, to take action to minimise their contact with mosquitoes and to encourage measures that can be taken to reduce numbers around the home.

Coordinating the chicken sentinel program within the Shire of Wyndham /East Kimberley

Application of larvicide in mosquito breeding areas

Larvae and mosquito surveillance

Mosquito fogging in appropriate circumstances

To ensure the ongoing research and application of emerging practices, technologies and treatment options.

To review the effectiveness of this plan and continue to make alterations to ensure best practise is followed and results are optimised.

Statutory Requirements

Department of Health:

Health Act 1911

Shire of Wyndham East Kimberley:

Health Act 1911 – Shire of Wyndham East Kimberley Health Local Laws 2003

Public Education & Awareness

The public are a vital stakeholder for this MMP and have a responsibility in any integrated program to manage mosquitoes. Due to the high transient residential population in the region it is important that educational programs are ongoing to ensure information is received by all residents. It is also essential to consider the large number of tourists that visit the region in the dry season months and convey public health messages to these people wherever possible.

The education program is centred around but not limited to the following –

- Information displays at local events such as Christmas Markets, Barra Bash, Brown Water Classic fishing events. Fishing is the number one recreational activity where people are bitten by mosquitoes in the Kimberley
- Letter PO Box drops.
- Display information posters on all local notice boards.
- Promotion of the program through local media such as local radio station Waringarri 6WR, ABC Kimberley, and the Kimberley Echo newspaper.
- Disseminate warnings when environmental and mosquito monitoring indicate a risk of mosquito-borne disease is likely through local media.
- Advise the public of planned chemical and physical mosquito control activities. Ensure while out in the field conducting monitoring or treatment that the appropriate signage is put up.
- All telephone and written complaints will be recorded.
- Inform and educate the public about their responsibilities for personal protection measures and backyard mosquito control such as -
 1. Avoiding exposure in areas of high mosquito activity, especially during dawn and dusk.
 2. Ensure insect screens on houses are intact to prevent mosquitoes entering.
 3. Wear long, loose fitting clothing when outdoors.
 4. Use personal repellents containing diethyl toluamide (DEET) or picaridin.
 5. Locating potential containers, emptying the water out and leaving the container inverted.
 6. Fitting mosquito proof cowls to septic tank system vent pipes. Ensure septic tanks lids are sealed to prevent mosquito access.
 7. Screen and seal rainwater tanks to prohibiting mosquito access;
 8. Filling in depressions in the ground with soil or sand to eliminate a breeding site;
 9. Ensure pools are well chlorinated and filtered and free from dead leaves.

Mosquito Surveillance - Larval Survey

All identified breeding sites will be monitored regularly during the mosquito season or after large tides or floods to determine the larval activity. The survey involves taking a water sample with a larval dipper to establish the approximate number of larvae per m², and the stage the larvae have reached in their life cycle. Water depth and

temperature also have an effect on the frequency of the surveys. Both of these factors influence the numbers of larvae and potentially the number of mosquitoes and how quickly they breed. The findings of these surveys will determine if there is a need for the application of larvicide to prevent the emergence of adult mosquitos.

Mosquito Surveillance - Trapping of adult mosquitoes

Adult mosquito traps are used to monitor the numbers and species of adult mosquitoes found in particular areas. The traps that are used by the Shire of Wyndham /East Kimberley rely on CO₂ (regulator attached to cylinder), a light source to attract mosquitos and a small fan to keep the adult mosquitos contained. These traps can be placed in various areas around town sites and in particular in areas that are reporting higher than usual numbers of mosquitos. The mosquitoes caught in the traps are counted and identified.

Once the mosquitos have been trapped and identified Environmental Health Officers can target the program to the relevant species of mosquitos and their breeding sites.

Land use

Ideally, residential developments should be located well away from mosquito breeding sites to minimise contact and impacts with mosquitoes and residents. This is however not usually practical or achievable in the Kimberley region due to the magnitude of the natural environment in comparison to the size of the town sites.

Sentinel Chicken Program

There is currently one flock of chickens in Kununurra and one flock in Wyndham that are part of the WA Sentinel Chicken Surveillance Program. This program is run by the Department of Health and the University of Western Australia (UWA).

The program is used to provide an early warning of an increased level of flavivirus activity in WA, whereby fortnightly blood samples are taken from the chicken flocks and the blood is sent to UWA for analysis for MVE, and Kunjin Virus. Should elevated numbers of positive results be confirmed the Department of Health issues a media release to urge people to take personal protective measures against mosquitoes.

Vegetation

Physical control methods are measures taken to reduce the potential for mosquito breeding and harbourage through adapting the natural or built environment. Breeding sites can be reduced by decreasing the amount of vegetation within drains, marsh or other known breeding sites.

Chemical control using larvicides

Larvicides kill mosquito larvae and prevent the emergence of the larvae into pupa and ultimately adult mosquitos. Larvicides can be used successfully to treat specific areas that are known breeding sites. As these known breeding sites can be specifically targeted this means that the effectiveness of the treatment is high, which can greatly reduce the number of adult mosquitos in the environment.

The following larvicides are currently used as part of the Shire's mosquito management program:

S-methoprene ProLink XR Briquettes and pellets are an insect growth regulator. S-methoprene is absorbed by the larvae and prevents the larvae from emerging from the pupal stage. The Shire will apply this product in accordance with the required application rates throughout the mosquito season. This product is available in several different

formulations, including the slow-release briquettes, which ensure ongoing reliance of the larvicide into inundated marsh land, providing ongoing control.

VectoBac G - contains spores and endotoxins of naturally occurring bacterium. The spores and endotoxins are concentrated by filter feeding other purpose. VectoBac G is toxic only to the larvae of certain diptera. It does not harm other aquatic, marine or terrestrial fauna. Maruyama machines which have a long throw rate are used to distribute Vectobac G

Adulticides

Adulticiding refers to the killing of adult mosquitoes, and is the only form of chemical control once the mosquitos reach adulthood. Adulticiding is not target specific and works like a large scale insect spray, killing other insects, including predators and beneficial insects. Adulticiding can only be utilised when weather conditions are fine and there is no wind or rain. It should be noted that the environmental impact, particularly on natural wetland/marsh areas can be significant and is undesirable.

In particular adulticiding can be particularly useful during times of flood or during times where there is an outbreak of mosquito borne disease and decreasing the adult population quickly is vital.

Residual surface treatment chemicals are now available that have similar mode of action to traditional adulticides, however are applied to internal and external surface areas at or around known breeding sites/harbourage areas, and kill mosquitos that land on the surfaces.

The following adulticides are currently used as part of the Shire's mosquito management program:

Twilight – this chemical is used in the ULV Cougar fogger and is a phenothrin and piperonyl butoxide based insecticide concentrate used for the control of adult mosquitoes and flies.

Biflex Aqua Max – is a bifenthrin insecticide that is used as a barrier treatment. The chemical is sprayed on surfaces such as trees and fences to kill mosquitos that land on the surface.

Record Keeping

It is critical that good record keeping practices are carried out. The following records but not limited to should be kept on the Shire's system -

- Annual complaint register
- RRV/BFV/MVE notifications and interview documentation
- Adult and complaint based trapping results
- Larval sampling surveys
- Chemical/bio-larvicide treatments
- Reports
- Product labelling/MSDS
- Media releases

Maintaining this standard of record keeping should ensure current staff and any future employee/s involved with delivering the MMP have access to background knowledge.

Contiguous Local Authorities Group (CLAG)

State Government funding of mosquito control activities is available to adjacent local governments to form a CLAG, with the grouping being based on considerations of geography and management of disease vector mosquitoes. As the Shire of Wyndham East Kimberley is so geographically remote, it can be considered as one CLAG group.

The Shire applied for funding in 2015-2016 for contribution by the State government for treatment chemicals and equipment.

Staff training

It is essential that personnel involved in the operational aspects of the MMP are suitably qualified, trained and/or supervised. Skills required to carry out the requirements of the MMP safely and effectively are -

1. Basic mosquito ecology
2. Principles of integrated mosquito management
3. Surveillance/monitoring techniques
4. Collection and recording of mosquito samples
5. Standard operating procedures for equipment
6. Safe storage, handling and application of chemicals/larvicides in accordance with product labelling and MSDS
7. Use of appropriate PPE in accordance with product labelling, MSDS and environmental conditions
8. Calibration techniques
9. Information technologies/geographical information systems
10. Budget management

The Department of Health offer an in depth mosquito management course approximately every two years which teaches most skills and competencies required. Specific skills and local knowledge can be attained under direct supervision and field work with EHO Specialist.

The Department of Health is also available to offer advice and assistance to regarding the MMP and its implementation.

Appendix 6. Mosquito surveillance and monitoring techniques.

Whelan PI. 'Mosquito surveillance and monitoring techniques.' Mosquito Management Manual, Department of Health, Western Australia 2015.

LIST OF CONTENTS

- 1.0 INTRODUCTION
- 2.0 THE PRELIMINARY PHASE
 - 2.1 Information Search
 - 2.2 Vector Control Maps
 - 2.3 Preliminary Sampling
- 3.0 BASE LINE DATA PHASE
- 4.0 OPERATIONS PHASE
- 5.0 EVALUATION PHASE
 - 5.1 Larval Evaluation
 - 5.2 Adult Evaluation
 - 5.3 Engineering Evaluation
 - 5.4 Disease Evaluation
- 6.0 MOSQUITO SAMPLING TECHNIQUES
 - 6.1 Larval Surveys
 - 6.1.1 General
 - 6.1.2 Ground Water Habitats
 - 6.1.3 Artificial Receptacle Sampling
 - 6.1.4 Equipment for Larval Sampling
 - 6.1.5 Procedures for Ground Water Habitat Sampling
 - 6.1.6 Procedure for *Aedes* Ovitrap Sampling
 - 6.1.7 Procedures for Receptacle Sampling
 - 6.2 Adult Surveys
 - 6.2.1 General
 - 6.2.2 Human Biting Collection
 - 6.2.3 Animal Collections
 - 6.2.4 Animal Bait Traps
 - 6.2.5 Window Traps
 - 6.2.6 Net Traps

- 6.2.7 Carbon Dioxide Traps
- 6.2.8 Light Traps
- 6.2.9 Truck Trapping
- 6.2.10 Spray Catches
- 6.2.11 Resting Station Collections
- 6.2.12 Fay Traps
- 6.2.13 BSG Traps
- 6.2.14 Gravid Traps
- 6.2.15 Sticky Ovitrap

7.0 RECORDING DATA

8.0 LIST OF FIGURES

9.0 REFERENCES

1.0 INTRODUCTION

Mosquito surveillance is the process of providing information on aspects of mosquito populations by carrying out surveys. It is a vital part of any mosquito control program and should be started before any direct control begins. The underlying aim of carrying out any surveillance program is to determine the what, where, when and why of any possible mosquito problem. When it has been established that a control program is necessary, the ongoing surveillance program will assess whether the mosquito populations are being reduced and, more importantly, if the control program is achieving reductions in pest problems or mosquito borne disease. The results of the mosquito surveys are used to;

Determine the need for a mosquito control program.

Plan the program by providing adequate information to allow decisions on the type and extent of control.

Guide the day to day activities of the program.

Permit evaluation of the effectiveness of the control program.

Mosquito surveillance can be separated into four phases corresponding to the four periods of a control program. These stages are the preliminary phase, the base line data phase, the operational phase and the evaluation phase. The object and the details of mosquito surveys are different for the different stages of a control program.

2.0 THE PRELIMINARY PHASE

The object of the preliminary phase is to define the nature and extent of the mosquito problem. This will indicate whether a control program is necessary and if so, the extent of the area to be controlled and particular areas of priority. The preliminary phase should be completed before the base line data phase is put into operation, although sampling during the preliminary phase can provide some of the base line information. The preliminary phase should incorporate three elements that include an information search, drawing vector control maps and initial sampling of adult and larval mosquitoes.

2.1 Information Search

The first step in the initial survey is to gather together all the relevant files, literature and references that will be relevant to a mosquito control program in a particular area. All the information should be organised and accessible for ready reference.

Contacts should be established with Local, State and Federal Authorities for information and help. The information needed should include:

- a. What species of mosquitoes are potential problems in your particular area? Is it a pest problem or a potential disease problem?
- b. When do the mosquito problems occur? Is it a seasonal problem and what is a likely reason for seasonality? What data is available from medical records and reports on previous mosquito borne disease outbreaks, including seasonal distribution and the spatial distribution of cases?

- c. What information and equipment is needed to carry out mosquito surveys and control operations in your area?
- d. How can the mosquitoes be identified?
- e. What is the relevant biological information on the problem species, including habitat preferences and seasonal abundance?
- f. What are the local climatic/environmental variables that may affect local mosquito populations?
- g. What is the distribution of the major mosquito habitats?
- h. Is there any mosquito collection data from past records?

2.2 Vector Control Maps

The next step is to draw up a preliminary vector control map. This map should be updated as the preliminary surveys progress. The vector control map should show all the relevant details of the nature and extent of the mosquito problem and enable the planning of mosquito surveys and future control operations.

Vector control maps usually relate to a town and should extend at least 2 km and ideally up to 10 km from the urban boundary. All maps of the local area for at least 10 kilometres around the town should be assembled, including vegetation maps, topographical maps and maps of built-up areas. These should be incorporated onto one map. The map should show the location and nature of actual and potential mosquito breeding sites, such as rivers, creeks, lakes, dams, marshes, storm water drains, borrow pits, depressions, sewage ponds, mangroves and dense forest. Maps can be hard copies or electronic interactive maps. Examples of a stylised vector control map is shown in Figure 1.

Incorporated on the map should be the residential areas, night recreation areas, roads, railways, access routes, industrial sites, concentration of animals, areas of pollution, and tidal influenced areas. Google earth images and aerial photographs are of particular value in an initial survey, so that vegetation zones can be used as a guide to mosquito habitats and access to particular habitats can be planned. This map can be updated by additional information as it becomes available and by a reconnaissance survey, to verify the accuracy of the details.

Marked on the vector control map should be a buffer zone around urban areas based on the flight range of the most important species of mosquitoes in that area.

Generally the buffer zone will be in the order of 1.6 to 4 kilometres from the perimeter of the urban residential development. The buffer zone should expand at breeding sites or points of dense vegetation which are continuous with areas inside the buffer zone. Most of the mosquito monitoring and control activities should be carried out within the buffer zone unless the initial monitoring indicates a need to expand the area of operation.

2.3 Preliminary Sampling

For vector control operations, the initial larval and adult sampling sites are determined from the vector control map. The various methods and detailed procedures for larval and adult sampling are dealt with in Section 6.0.

When a complete picture of the mosquito fauna of an area is required, every available type of breeding sites including crab holes, plant axils, receptacles, creeks, swamps, water filled depressions and any other water accumulation should be considered and examined for mosquito breeding. However for well-established pest and disease problems, it is only necessary to examine and sample the potential breeding sites of the principal problem species.

With preliminary surveys, there is no substitute for a lot of legwork, and a determined effort to penetrate into all vegetation zones or areas of likely mosquito breeding. The golden rule of larval surveys is to sample around the entire boundary of any potential mosquito breeding area. This is very important, at least initially, to determine if a particular habitat or part of a habitat is more prolific than others, and to find the source or sink of the water in the breeding site. The initial larval sampling should be carried out in the likely mosquito problem period, and be completed in a few weeks, with initial adult sampling being conducted at the same time to detect possible undetected sources.

During preliminary sampling, consideration should be given to the selection of suitable permanent sampling stations for larvae and adult mosquitoes. This choice will be based on a quantitative assessment of the breeding sites and on the relative numbers of adults or larvae present.

The preliminary adult sample sites should be many as possible near all the probable breeding sites located during the initial larval survey and at relevant points in and around the buffer area as determined from the information on the vector control map. The number of trap sites can then be reduced down to a manageable number for routine sampling. The most productive and the most informative trap sites are chosen for routine sample sites. Once the routine adult sample sites are chosen, usually within the first two months, these should not be changed, so that base line information can be gathered to allow accurate assessment of changes over the season and years, and to assess control measures.

The initial survey must note the particular habitats where mosquitoes are found, so that knowledge of the preferred habitat for each species can be compiled. Note that mosquito populations can change dramatically in a few weeks, both in size and species composition. These changes can occur with variations in tides, rainfall and vegetation, or due to other factors that are less obvious.

3.0 BASE LINE DATA PHASE

During the base line data phase the permanent larval and adult sampling situations selected during the preliminary phase are regularly sampled.

All climatic data is collected and organised, including information on rainfall, tides, temperature and any other climatic variable that is likely to affect mosquito populations. During this phase there will be dynamic changes occurring in the mosquito habitats and all of these changes should be noted and correlated with the larval and adult sampling. Base line data on mosquito complaints and details of mosquito borne disease should also be compiled for later comparison.

This phase should last at least 12 months to cover the major habitat changes and seasonal variations. It is during this phase that plans for a control strategy should be formulated. Strategies for disease control or vector control should be examined so that an integrated control program can be drawn up.

4.0 OPERATIONS PHASE

When a mosquito control program is implemented, it needs to be guided by regular larval and adult sampling of the selected sample points of the area being controlled. Sampling should be from the same points and with the same regularity as the base line data phase. These regular and ongoing surveys will indicate the current status of adult and larval populations in the control area. Changes in habitats can occur seasonally or with artificial influences and give rise to mosquito population fluctuations. Usually the adult sampling program or the larval sampling will show the response to the changes.

Sometimes there will be public complaints that may not tie in with the sampling data and require additional or supplementary larval or adult sampling. At other times, the adult sampling data will show increases that are not obvious in the larval sampling data. Additional larval surveys are then required to locate any additional mosquito breeding or to determine the reasons for the increased adult levels.

The regular operations survey should allow areas of mosquito breeding to be defined and quantitatively assessed so that ongoing priorities for control can be decided.

5.0 EVALUATION PHASE

After control measures have been carried out, it is most important to assess their effectiveness and to identify any remaining problems.

5.1 Larval Evaluation

Evaluation of larval insecticide control operations should be done on the day or the day after control, with the results compared with a pre-control survey. Areas that have been missed can be re-treated and any operational and technical difficulties should be reviewed and rectified.

5.2 Adult Evaluation

Evaluation of larval control includes the comparison of adult population indexes before and after larval control. Evaluation of larval control using adult mosquito information is generally imprecise because the adult population will take some time to decrease, and there may be dispersal into control areas from other areas. In assessing the efficiency of adult control programs, it may be necessary to carry out age determination assessments on the sampled females to determine whether emergence or re-invasion has occurred.

5.3 Engineering Evaluation

The assessment of engineering measures such as draining and filling should include a comparison of twelve months sampling data before and after the completion of the engineering measures. The evaluation of engineering measures will usually require a short and longer term assessment to cope with possible gradual habitat changes in the years after engineering measures.

5.4 Disease Evaluation

Disease evaluation will reflect the real benefits of the mosquito control program. Different parameters of disease can be compared with the base line data after control measures have been completed. If disease parameters are not decreasing, the original hypothesis and vector control strategies need to be critically evaluated.

6.0 MOSQUITO SAMPLING TECHNIQUES

6.1 Larval Surveys

6.1.1 General

The purpose of larval surveys is to find out where and when the mosquitoes are breeding and what type of habitat they are breeding in. Generally we can divide the sampling procedures into the sampling of ground water habitats and artificial receptacle sampling. Most mosquito control operations are concerned with ground water habitats, while receptacle sampling is a more specialised survey to gain information on receptacle breeding *Aedes* species.

6.1.2 Ground Water Habitats

For field sampling of ground water habitats, it is important to traverse the entire margins of the breeding site to determine the entry or exit points and possible source of the water. Permanent indicator sample points that represent the habitat should be chosen after extensive initial sampling. Sampling should then be quantitative so that the relative importance of all the breeding sites or habitats can be assessed.

In an extensive breeding site, this may include a point in each vegetation or water type known to be a breeding site. These permanent points should be at sites where there is year round access. These permanent larval sampling sites should be sampled at least once per month over the twelve month period, using the same sampling techniques, and recording all the important variables as shown on the larval collection form. For tidally affected areas, these sampling frequencies will have to be coordinated with the tides. Increased frequency of sampling is necessary for transition periods between times of little mosquito activity and times of increased activity, such as the start of summer or the start of the wet season.

All sample sites should be marked on the vector control map. Additional larval samples should be taken at different points throughout the year to make sure the permanent points are efficient indicators of larval breeding sites.

The sampler must be careful not to change the nature of the sample site itself by repeated sampling. These permanent larval sampling sites will enable an assessment of how the breeding habitat and the species and numbers of mosquito larvae changes over a 12 month period. It will pin-point those important factors in the habitat that lead to fluctuations in mosquito numbers.

6.1.3 Artificial Receptacle Sampling

Artificial receptacle sampling is primarily to detect the presence of *Aedes aegypti* or other related *Aedes* species in an area, or to determine the receptivity of an area for *Aedes* species introduction. The presence or receptivity is assessed by recording all the available information on the number, type, and characteristics of various receptacles in each particular area. The detection of these *Aedes* species can be assisted by adult sampling techniques, but usually the specialised techniques such as ovitraps or receptacle surveys are required.

Ovitrapping is a specialised sampling technique using special egg laying substrates dipping into water in a dark coloured receptacle. The ovitraps are usually left out for a week and then the paddles or ovi-strip are inspected for eggs. The eggs can be hatched, and either the larvae or the emerged adults are examined for species determination.

An artificial receptacle breeding survey is carried out to determine all the relevant particulars of receptacle breeding mosquitoes in a certain area. The primary aim of a receptacle survey is to examine artificial receptacles, but natural receptacles are also examined.

The priorities for receptacle sampling can be guided by the initial ovitrap data. Detailed receptacle surveys can then be carried out in certain suburbs or limited areas.

Aedes receptacle surveys record all the relevant receptacle information for each premise. If the number of premises is very large, as in a large town, a sample of premises can be made by selecting a number of streets at random and then sampling each property in that street. If the town is small, as many premises as possible should be sampled for receptacles.

For exotic *Aedes* species, particular attention should be given around airports, seaports, boat berthing facilities, dry dumps and industrial areas.

6.1.4 Equipment for Larval Sampling

- a. An enamel dipper painted white on the inside with a relatively long handle. A deep soup ladle is ideal. A long piece of wood can be attached to the dipper for difficult to reach situations. (see Figure 2)
- b. White enamel pans, trays or pale coloured buckets. These have the advantage that more water can be sampled at one time when larval populations are not particularly concentrated. They are not convenient in shallow water or where there is a lot of vegetation obstruction.
- c. A pipette or dropper. Ensure that the tip of the pipette is wide enough to allow large larvae and pupae to be sucked up.
- d. Small stoppered or topped vials. These can be glass or plastic. Mosquito larvae can be collected live into these small vials or into vials of 70% alcohol (ethanol) or 70% methylated spirits.
- e. Note book, labels and pens. Labels are best written in pencil and placed inside the collection receptacle with larvae.
- f. A bulb pipette. This is a large bulb with flexible tubing that can be utilised for sucking water plus larvae out of crab or tree holes or plant axils.
- g. A pale bucket, a long piece of rope and a powerful torch for examining wells and rain-water tanks.
- h. If you have an inaccessible area, a 4 wheel drive vehicle is an advantage. An all-terrain vehicle such as the Argo is extremely useful in large swamp situations.
- i. Suitable clothing, such as hat, overalls, rubber boots and carry bags.

6.1.5 Procedures for Ground Water Habitat Sampling

Mosquito larvae are usually found where surface vegetation or debris are present. In larger bodies of water, larvae are generally confined to marginal areas or floating surface materials.

- a. Before looking for larvae, examine the data of the adult catches to see what species you are looking for. This will give you an idea of the preferred habitats of your species, with its water type and vegetation requirements.
- b. Examine the vector control map and aerial photographs for vegetation patterns and likely areas of mosquito breeding. Plan the access route and plan your specific search sites. If a large

area is of uniform vegetation then examination at selected points only can reduce the amount of work.

- c. When searching for mosquito larvae, the searcher must be prepared to walk and to penetrate through thick vegetation into the selected points chosen on the aerial photographs. There is no substitute for legwork and perseverance.
- d. When approaching a margin of a water body, it is important to note the vegetation patterns. The different types and habit of grass, reeds, or other vegetation may be clues to deciding exactly where the mosquitoes are likely to be and which habitats must be sampled.
- e. When you have selected particular habitats look at the water first before disturbing it with the feet, the ladle or by shadows. Note the presence of fish and other predators and look for larval activity.
- f. Use the dipper at likely places. If looking for *Anopheles* larvae let the top layer of water run into the dipper or skim the top layer of water. Very shallow water at the extreme edges or the water on the top of floating algae is also a source of *Anopheles* larvae. With *Culex* larvae the dipper sample will need to be deeper and next to clumps of vegetation or grass. When sampling for larvae, proceed carefully, as disturbance and shadows cause larvae to go to the bottom. Let water run into the dipper from vegetation clumps and scoop the dipper up just before it fills up with water. With *Aedes* larvae you need a quicker motion as they will dive rapidly to the bottom, (see O'Malley 1995).
- g. Record the number of dips made. Usually these are in multiples of ten, with dips being made only in likely places (after you have established the types of habitat where the larvae are).
- h. Transfer the larvae to the vial with the aid of the pipette. Take a water sample in another vial for salinity and pH examination.
- i. Record all habitat information on a notebook or form with a code label inside the vial. The degree of pollution, vegetation, degree of shade, water colour, possible salinity and predators present should be noted.
- j. Note the larval instars present and relative proportion of each instar. *Culex* species eggs should also be searched for, especially at the side of pools or where scum has been blown by the wind. Note all larval information on collection forms. Set forms for direct larval recording are more convenient for information gathering, identification records and later compilation. An example of a set larval form is shown in Figure 3.
- k. Surveys of larvae should be made at least once per month, with increased frequency during the breeding season or major habitat changes, to establish the time required between surveys.
- l. For mosquito species such as *Mansonia* and *Coquillettidia*, larvae may be found by pulling up aquatic and semi aquatic plants and washing them in a pale coloured bucket to dislodge them from the vegetation, or pumping out water from a bottomless isolation drum placed over emergent vegetation and pouring all the sampled water through a fine sieve.
- m. Sometimes there may be a need to muddy up pools and sit and wait for larvae to rise to the surface.
- n. Some species, such as tree hole breeders or crab hole breeders require sampling with a piece of flexible tubing or more specialised equipment. Trees such as figs and *Poinciana trees* that have areas between the main branches capable of holding water are productive sites. Other trees such as boabs, mangroves and eucalypts can have hollow broken branches with water inside the hollow. These sites need to be looked at a few days after rain.

- o. With salt marsh mosquitoes, it is important to time the search for larvae two to three days after the highest tides of the month or rain.
- p. For fresh flood water *Aedes*, inspection of rain filled depressions is needed two to three days after rain.

6.1.6 Ovitrap and Procedures for Aedes Ovitrap Sampling

Ovitrap or egg traps are special traps used for detecting the presence of *Aedes* receptacle breeding mosquitoes. There are a number of types of ovitraps, using various materials as the receptacle and various substrates used for egg laying.

The types range from sticky ovitraps for adult sampling as the mosquitoes lay eggs, lethal ovitraps which aim to impart insecticide to adults as they lay eggs, and general ovitraps which sample eggs.

General ovitraps use glass jars or plastic buckets as receptacles. Generally glass jars have the advantage of being clear to allow ease of inspection of the sides and bottom for eggs or larvae. The glass is unsuited to egg laying, so very few eggs are attached to the sides, reducing the loss of eggs for analysis.

The disadvantage of glass is the need for painting or encasing black protectors for a dark background to prevent breakages. Other disadvantages are the fragility, weight and additional space required in transportation.

Plastic buckets are generally light, stackable, cheap, and do not need painting or enclosure in a black cover. Plastic buckets can be black but red is seen by mosquitoes as dark and allows ease of inspection of scum and eggs on the sides. The disadvantage of plastic is that *Aedes* tend to lay eggs on the sides, as well as the paddle or ovi-strip.

The types of paddles or ovi-strips include 'Masonite' paddles, red velour strips, or red painted tongue depressors. Generally 'Masonite' paddles have the advantage of roughness, grooves and a wide wet wick zone favouring egg laying. Red velour has the advantage of a wide coverage of the receptacle, good wick area and ease of observation for counting eggs. It can also be impregnated with an insecticide to act as a lethal ovitrap to kill adults as they lay. Tongue depressors need to be roughened and painted red to improve suitability for egg laying.

Standard ovitrap procedure

- a. A standard ovitrap consists of a black receptacle with a 'Masonite' paddle attached to the inside of the receptacle in a vertical position, with the rough side facing inwards. The paddle has a white painted line half way up the paddle as a water level indicator.
- b. Ovitrap sites should be secluded, shaded, low to the ground, near vegetation and protected from rain and animal disturbance. If possible the ovitraps can be placed between two bricks or stones, or behind or under a suitable object such as a wash trough.
- c. The ovitrap should be placed near or within fifty (50) metres of human habitation.
- d. Water is added to the ovitrap to the white line on the paddle or receptacle. The water should be fresh and can be either tap water left to stand for a few hours or rainwater. Ovitrap should also have a food source for the larvae, with aged grass infusion water or fish flakes ground fine to provide suitable food for both young and older larvae. Ovitrap for Quarantine purposes should have a methoprene pellet added each month to prevent any possible adult escapees.

- e. The ovitrap should be numbered, and the number, town, location, the date placed, and the date retrieved should all be recorded in a record book or an information system.
- f. The ovitrap should be left for a week and then reinspected.
- g. On inspection, it should be noted in the record whether the trap is tipped over, dry or otherwise disturbed by ants, frogs or polluted.
- h. If there is any remaining water in the trap, pour it into a clear glass jar and inspect if for mosquito larvae. Larvae are collected alive into a small receptacle for rearing or identification.
- i. If there are only fourth instar larvae present, then all the larvae can be put into a vial of 70% alcohol and labelled with an identification number.
If there are any younger larvae they should be reared to fourth instar, together with larvae reared from the eggs on the paddles. The identification number should correlate with information in the record, including the ovitrap number and the location. The labelled vials should be filled to the top with alcohol and stored adequately to prevent breakage until they are submitted to specialists for identification, along with the records or form.
- k. The paddles with attached eggs are left in a plastic bag for one day and allowed to dry out gradually. They are then placed in fresh water in trays, together with any young larvae from the ovitrap collection in step h. The eggs can then hatch and the larvae are reared to fourth instar for identification. Hatched paddles should be inspected for unhatched eggs under the microscope and then dried and re-flooded if necessary. The paddles are then sterilised and scrubbed to remove any old hatched eggs.
- l. The replacement ovitrap is refilled, with a new paddle, fresh water, and the ovitrap replaced for later inspection. If the ovitrap cannot be inspected within one week, the ovitrap should be collected and replaced with a fresh ovitrap or left in position until dry and then collected for inspection. The ovitrap and paddle should both be identically labelled and attached together.
- m. For regular ovitrap monitoring purposes, all ovitraps should be collected every six months, and taken to the laboratory where they should be filled completely with fresh water to hatch all eggs and examined after one week. Then the ovitraps should be thoroughly cleaned with boiling water and scrubbed to remove any old eggs, and then repositioned.

6.1.7 Procedures for Receptacle Sampling

- a. If possible, contact the person responsible for the property and inform them of your intentions and reason.
- b. Examine the entire premises, both indoors and outdoors for any receptacles, and note the type of receptacle and the presence of water or larvae in each receptacle.
- c. Each receptacle should be sampled for larvae.
- d. The first step in sampling larvae is to look carefully at the surface of the water for larvae or pupae.
- e. With a ladle, gently lower the ladle deep into the receptacle so that larvae can be seen against the white background of the ladle. The ladle can then be slowly extracted with the larvae and water.
- f. The receptacle can then be emptied carefully into a white bucket or tray for further examination.

- g. Tyres can be prised open and the inside water can be scooped with a ladle, ensuring that the ladle makes contact with the bottom of the tyre.
- h. In rainwater tanks, the bucket and a length of rope can be used, with the bucket lowered down into the water to provide a pale background for detecting larvae. The torch should be used to examine for the presence of larvae. Water should also be extracted from the tap into a bucket and examined.
- i. Blocked roof gutters can be checked for breeding by using a ladder or a long stick with a mirror attached to one end. A sure sign of a blocked gutter is a dripping down pipe a few days after the last rain.
- j. The axils of trees and other plants with leaf axils such as bromeliads and lilies can be sampled with a bulb pipette.
- k. All the larvae found should be collected and put in the vials with an identification number. The identification number should correspond to notebook information on the town, street, premises number, date, type and water characteristics of the receptacle. The vials should be filled with 70% alcohol. If there are many larvae, all stages of larvae should be collected, with different looking larvae included.
- l. If there are only first and second instar larvae, they should be collected into a clean receptacle with original water, labelled, and reared to a later instar.
- m. The larvae can be reared by taking the sample in a sealed receptacle back to a base, loosening the top of the receptacle, and leaving the receptacle in a cool shaded place until the larvae develop.
- n. For overseas arrival boats, and in other areas where exotic *Aedes* are suspected, receptacles can be sampled by looking for the presence of eggs. Scrapings can be made from just above where the water line would have been in the receptacle. The scrapings can be made by a paint scraper or a chisel and collected into a receptacle. The scrapings are put into a labelled sterile receptacle for later microscope examination or rearing of the eggs.
- o. If a return trip to an area is anticipated in three to four days, fresh water can be added to any dry receptacles or tree-hole axils where *Aedes* eggs are suspected, and the water can be collected after a few days for examination.
- p. The labelled larval samples, together with records should be submitted to recognised experts for species identification or confirmation.

6.2 Adult Surveys

6.2.1 General

The purpose of adult sampling is to get an indication of a mosquito species presence or population fluctuations in time or space. For regular adult sampling during control programs, the method chosen may not necessarily be the method that catches the most number of mosquitoes, as long as it accurately reflects population changes.

Once-off adult sampling rather than regular sampling from the same trap sites is of limited value in a mosquito control program, but is useful to determine the presence of various species in initial surveys or to locate particular areas of high mosquito activity. Once-off surveys need to be timed

during potentially productive periods and include as many methods as possible to increase the accuracy of species records.

There are a number of ways to collect adult mosquitoes, and the method used will depend upon the aim in making the collection. All of the adult collection methods have a bias that will be more or less applicable for certain species. Direct quantitative comparisons cannot be made between species from different trap type collections unless the bias of each trap is known. If there is little information on the mosquito fauna in an area, it is best to use as many different methods as possible to ensure that you collect as many species as possible.

For routine monitoring purposes, a single method is usually most convenient. Once a method is chosen, it is important that the method and equipment is standardised, so that comparisons actually reflect the variations in the mosquito population and are not the result of a change of trap type or location. The types of adult trapping methods are outlined below. Examples of adult collection record forms are shown in Figure 4 and Figure 5.

6.2.2 Human Biting Collection

These collections are usually the simplest and most direct way to sample a mosquito problem. It involves collecting the mosquitoes that are about to bite a person. If you wish to find out which mosquitoes are causing a problem for people, the obvious and most accurate method is to carry out a human biting collection. The collection site must be selected out of the wind, near vegetation, in the area to be assessed. If this is in a town or near a residence it should not be in a lit area or under street lights.

Most biting collections are carried out at night, just after sundown for a defined period, but there are variations for different species. The collector sits quietly with one or both legs exposed and collects mosquitoes that are about to bite. The mosquitoes are usually collected by the use of a mouth aspirator (sucking tube) (see Figure 2) or a specialised vacuum mechanical aspirator. A dull or red light torch is necessary for night collections. The mosquitoes are transferred from the sucking tube to a mesh covered paper cup or collected in the detachable receptacle on the mechanical aspirator. They can be killed prior to being identified by placing the receptacle in the freezer for 10 minutes.

The freshly killed specimens can be pinned or placed between layers of loose tissue paper in pill boxes or small tins. Pinned specimens should be correctly labelled and forwarded for identification in special pinning boxes (see Figures 6 and 7).

The choice of the time to conduct biting catches in any particular area should be made on the basis of catches of 10-20 minutes duration every hour over a 24 hour period. This will establish peak biting times for each species so that standardised time catches can be made from week to week or season to season. Generally the first hour after sunset is used as a standard period for man biting collections and collections are usually made for 20 to 30 minutes. If the adult mosquito population is very high, the collection time can be shortened. Collection should be recorded on standardised collection forms (see Figure 4) for later comparison and analysis.

A variation of this technique is the human attraction collection, where the collector uses an aspirator or wide net to collect mosquitoes attracted to the vicinity of collector before they attempt to bite. This is useful for rapid surveys for day biting species, where the mosquitoes can be relatively easily seen. Human attraction collections are usually made in sheltered vicinities where adult mosquitoes tend to harbour during the day. For dengue vector *Aedes*, these collections can be made using a sweep net around the legs over a 5 minute period.

6.2.3 *Animal Collections*

Mosquitoes can be collected from tethered animals. This method involves collecting mosquitoes that are attracted to a particular animal and does not necessarily include those mosquitoes that are attracted to humans. This method, using a mechanical aspirator and protective clothing for the collector, can be used safely and painlessly to catch large numbers of mosquitoes.

6.2.4 *Animal Bait Traps*

For animal bait trap collections, the animal can be enclosed in a trap set out for a night time collection. The trap is designed so that mosquitoes can enter easily but can't find their way out. Mosquitoes can be collected from the trap the following morning by the use of a mouth or mechanical aspirator such as a small car vacuum with a catching attachment. Magoon traps are large specially built animal bait traps housing an animal inside a net protected cage and surrounded by a trap body that allow mosquitoes easy access but limited egress.

Animal bait collections do not give the same results as human biting collections. There are variations in the attractiveness of various mosquito species to different animals, and animal bait collections may be less suitable to assess the relative numbers of various species of mosquitoes that prefer to bite people in particular. They are however safer than human biting collections when there is a risk of mosquito borne disease, and are usually more convenient than direct animal collection.

6.2.5 *Window Traps*

These traps are mounted on windows in houses or special experimental huts, and rely on trapping mosquitoes as they enter or leave via a limited route. They are mainly used in programs such as malaria programs, where an assessment of the numbers and species that enter and leave houses is used to determine likely vectors.

6.2.6 *Net Traps*

Net traps are used around a person or an animal and rely on the habit of mosquitoes approaching low to the ground and then trying to leave by flying up. Mosquitoes enter under the net to feed on the bait animal and are then restricted in their escape by the insect net. A collector catches the mosquitoes from the inside of the net. This method can be used to collect large numbers of mosquitoes, especially when a large bait animal is utilised. It can provide good specimens and can be used with little risk of the collector getting bitten. A person can be substituted for a bait animal and if further protected by an inner net, this can be a safe and convenient way to assess species specifically attracted to people.

6.2.7 *Carbon Dioxide Traps*

Dry ice will attract some species of mosquitoes. Cylinder traps with entry funnels utilising carbon dioxide are constructed so as to allow entry to insects attracted to the carbon dioxide but restricting their exit. This method is used when relatively clean catches of mosquitoes are required and but will only catch certain species of mosquitoes that are both attracted to CO₂ and will enter the funnel.

A variation of this method is the passive trap developed by Scott Ritchie and colleagues in Queensland. The passive trap uses no mechanical suction, with mosquitoes attracted to below the

trap by cylinder delivered CO₂. The mosquitoes tend to fly up into the open bottom of the trap and are killed and retained on the inside of the trap with insecticide impregnated honey baits on the walls as they feed. The baits can be used as a virus surveillance tool by analysis for arboviral RNA excreted by the feeding mosquitoes. The advantages of this trap is that it requires no battery power, and can be regulated by timers to the cylinder regulators to catch large number of mosquitoes over certain periods of the day for up to a week between services.

6.2.8 *Light Traps*

Light traps are the most commonly used adult surveillance technique. There are many different types of light traps that can be used to attract and trap mosquitoes. Light can be used by itself or in combination with carbon dioxide. There is a variation in species and numbers collected using light alone or light plus carbon dioxides as attractants. The advantages of these traps are that they can be operated all night and can sometimes collect large numbers of insects. They can be permanent or simple and portable, and there is a variety of power sources available.

Light traps can be used to obtain the relative numbers of some species of mosquitoes that are active at night. The CDC light trap is usually made up of a small incandescent bulb, a fan and a catching receptacle (Figure 8). It is suspended about 2 m above the ground in a sheltered position but with a wide range of view. It should be placed in a position where it does not compete with other light sources and care may have to be taken to prevent ants from devouring the catch. Traps are set before sunset and collected after sunrise. To increase trap catches, a supply of "dry ice" or gas from a bottled source can be discharged near the trap entrance.

Other modifications can be made to increase the trapping efficiency, such as the CFG trap that incorporates counter flow geometry where modified air flow increases the catch.

The Mozzie Magnet trap utilises counter flow geometry and a propane gas bottle to both power the trap and supply the CO₂, and catches mosquitoes continuously into alcohol or dry over a period of days to weeks. The advantage of traps like the Mozzie Magnet trap is longer term and larger catch trapping without an operator, but has disadvantages in sensitivity to movement, fungus in the catches, and technical difficulties in operating continuously.

Special carbon dioxide baited light traps are commonly used as a standard adult mosquito monitoring technique in Australia. The EVS (Encephalitis Virus Surveillance) trap consists of an insulated can that contains the dry ice, a small battery driven fan incorporating a "grain of wheat" light suspended below the can, and a collecting receptacle attached to the trap body. Various wavelengths of light can be used to attract different species of mosquitoes.

If light alone is utilised, trapping should be done on similar moon phases, as attractiveness of the light will vary considerably. When a permanent trap site is chosen, it should not be changed during a program. Trap results can vary markedly from one site to another due to the proximity of the vegetation, exposure to wind, the effect of lights and other less obvious factors. Trap results are recorded on the standardised collection forms (see Figure 5).

6.2.9 *Truck Trapping*

A large rectangular mouthed funnel shaped vehicle mounted insect trap can be used to collect only flying insects. This is a direct sample of what is flying and has no bait bias that may be present in the trap methods. This method can be used to indicate the times of flight activity of different species of mosquitoes. Collections are usually made over a fixed route at regular intervals. It can also be useful in assessing the efficiency of adult vector control treatments by comparison of pre and post control sampling. One disadvantage is the height of the mouth of the trap on the vehicle, which gives a bias to a certain height of collection.

6.2.10 Spray Catches

Aerosol spray catches inside houses can be carried out to determine what species and numbers are inside houses. Mosquitoes are collected from sheets laid on the floor.

6.2.11 Resting Station Collections

Most adult mosquitoes rest in the day in cool, dark, humid places. Careful searching may locate particularly productive resting places, from which regular collections can be made. These collections can then give an idea of the relative mosquito population. These particular sites are usually productive for only one and two separate species. Some typical sites include wells, under bridges, in storm water drains, verandas, hollow logs, dense fern patches, overhangs on creek banks, and caves. The mosquitoes are collected with an aspirator, small hand held adapted vacuum collector, or a large powered suction sampler.

6.2.12 Fay Traps

The Fay trap is a day-time trap which is quite specific for *Aedes aegypti* adults of both sexes. It is based on the attraction of contrasting gloss black and white panels and involves a wind orientated cover and a cylinder, housing a battery operated suction motor and a suspended collection bag. The trap is placed near a suspected *Aedes aegypti* breeding location to establish the presence of *Aedes aegypti*.

6.2.13 BG Traps

This trap was originally designed to attract the dengue mosquito *Aedes aegypti*. However, this trap also attracts other *Aedes*, *Culex* and *Anopheles* mosquitoes. The trap consists of a collapsible white cylinder with white mesh covering the top. In the middle of the mesh cover is a black tube through which a down flow is created by a 12V DC fan that causes mosquitoes in the vicinity of the opening to be sucked into a catch bag. The catch bag is located above the suction fan. The air then exits the trap through the mesh top. This design generates ascending current and it is claimed to be similar to that produced by a human host, both in its direction, geometrical structure, and chemical composition of the attractants. Attractants, a combination of lactic acid, ammonia, and fatty acids are given off by the BG-Lure®. The lure releases the long-lasting attractant for up to five months. There have been reports that the lure is not very effective for some species. The trap can be made much more effective for *Aedes* species by the addition of solid dry ice or CO₂ gas from a cylinder and regulator. Models can vary in size and there are 240v power models for continuous operation. Other lures such as octanol could be used.

6.2.14 Gravid Traps

This is a trap designed to collect gravid *Culex* mosquitoes and is most effective for the collection of mosquitoes of the *Culex pipiens* complex. The trap consists of a pan over which is suspended a suction trap similar to a standard CDC miniature light trap. An attractant such as hay infusion is added to the water in the pan and the attracted gravid mosquitoes are sucked into the collecting receptacle by the battery operated fan. The trap can be set over night or all day. Collecting gravid mosquitoes increases the chance of collecting mosquitoes infected with pathogens.

Sticky ovitraps

Sticky ovitraps are composed of acetate sheets with an adhesive facing inwards to the inside of the ovitrap and placed inside an ovitrap suitably baited with water and feed or organic rich water. Female receptacle breeding mosquitoes are attracted to the ovitrap and are caught on the adhesive. This method is useful in exotic *Aedes* sampling to determine the presence of adults that come to lay eggs, or to remove them from the population.

7.0 RECORDING DATA

The results of all collections should be entered on standardised collection forms. Examples of collection forms are shown in Figures 3, 4 and 5. Essential items to be recorded are locality, date, collector's name, sampling station, type of collection, number of mosquitoes, sex of mosquitoes, species of mosquitoes, population index (larvae per dip, number of adults biting per hour), and meteorological and habitat data.

All collection forms should be collated and kept in date order as permanent records of the program. In addition, ongoing tabulation and graphing of all results should be maintained on a weekly basis so that a quick visual inspection will show the current status of mosquito populations. Other variables such as tide data, river height, temperature, control operations, and any other locally important characteristic, should be incorporated into the visual presentation or analysed with the monitoring data to gain an insight into the reasons for population fluctuations. The monitoring data should also be analysed with information on pest thresholds or cases of mosquito borne disease to determine whether the control program is achieving the ultimate aims.

The surveillance results should be critically examined at least once per month to determine underlying causes for variations and whether the variations can be attributed to any of the measured variables. Indications of variation that can be attributed to one particular variable should be critically examined and tested wherever possible, either in the field or the laboratory.

Each year the whole program should be examined to determine annual patterns of abundance and any reasons for annual variation. Annual Reports should be compiled outlining all aspects of the program and include up to date vector control maps, changes in procedures and equipment, and details of all control operations. Assessments and conclusions about the surveillance program and the overall control program should be made so that annual progress can be assessed.

If the surveillance programs and an integrated control program have been properly planned and carried out, you should see reductions in mosquito populations and corresponding reductions in potential or actual mosquito borne disease.

8.0 LIST OF FIGURES

Figures 1:	Vector control map
Figure 2:	Equipment for Mosquito Surveys
Figure 3:	Mosquito Larval Collection Form
Figure 4:	Adult Survey Form (Man biting collection)
Figure 5:	Adult Mosquito Trap Record
Figure 6:	Killing and mounting of mosquito adults.
Figure 7:	Preparation of insects for shipping.

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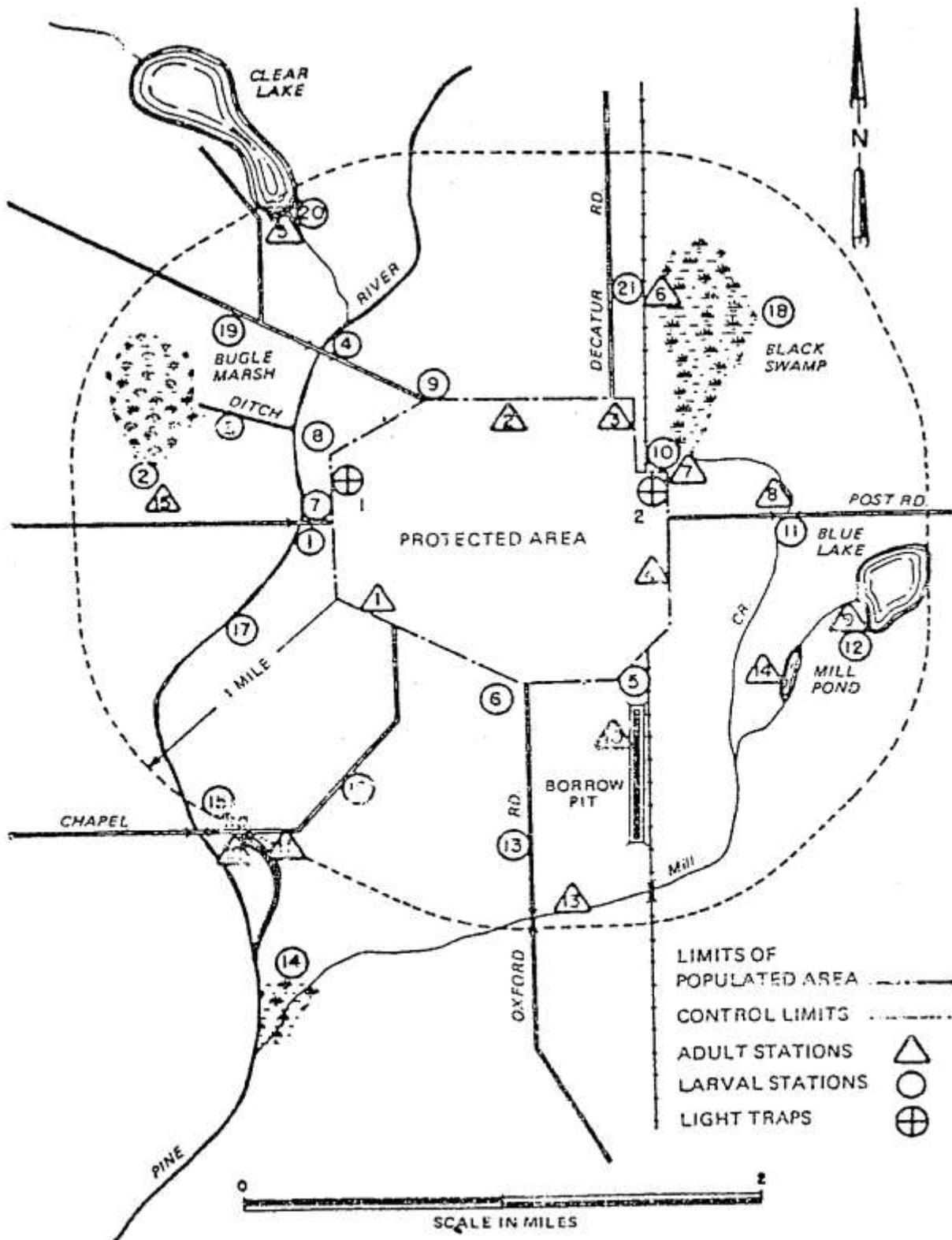
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Schematic Map Showing Mosquito Sampling Stations

Figure 1: Vector control map

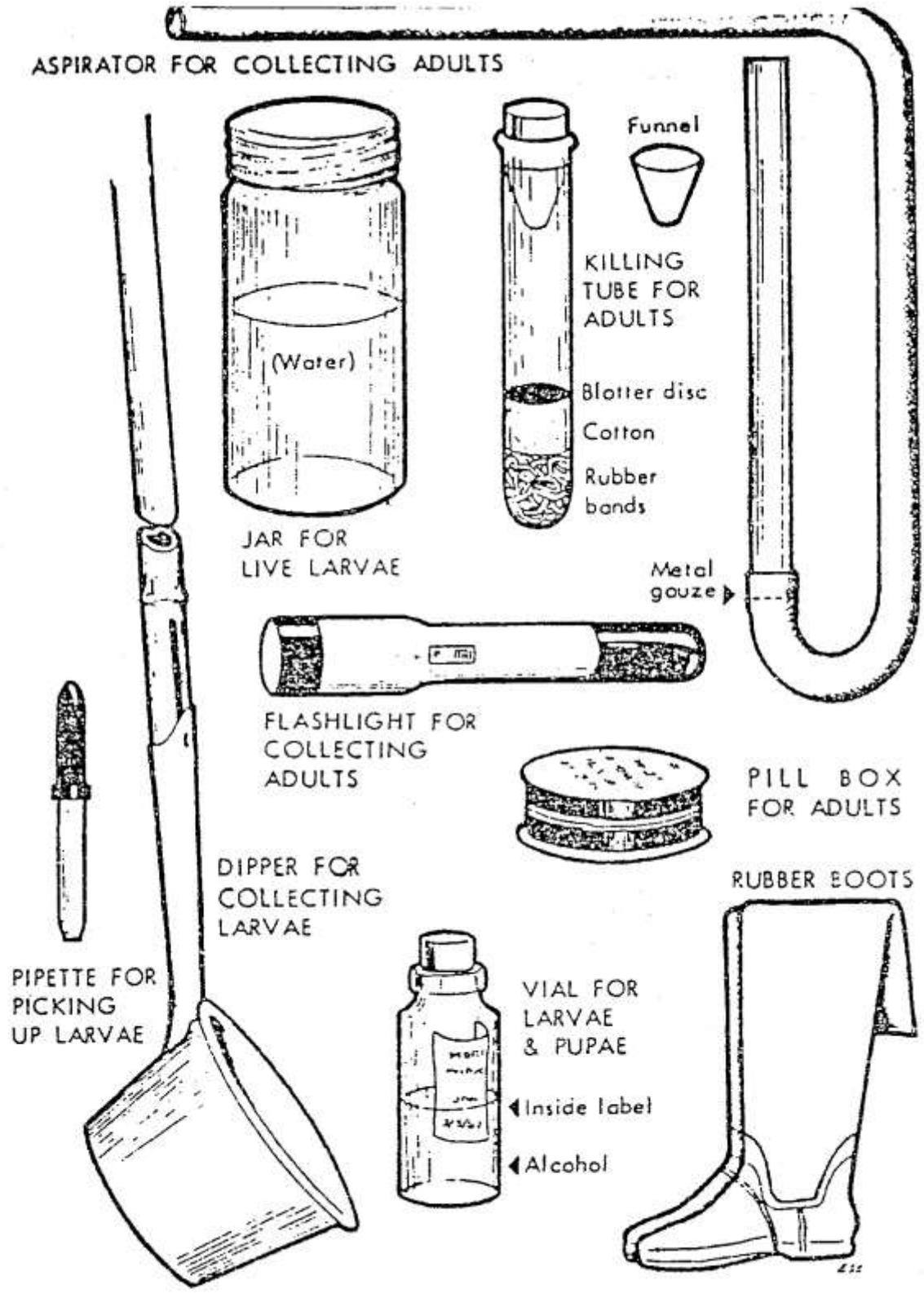


Figure 2: Equipment for mosquito surveys

Fig 4 : Adult survey form (man biting collection)

ADULT SURVEY

MAN BITING COLLECTION : INDOORS/OUTDOORS

AREA No: COLLECTION SITE:.....
 STATION No:
 SEASON: TEMPERATURE: START END
 WET DRY HUMIDITY : START END
 CLOUDY FINE RAIN WIND SPEED: START END
 DIRECTION: START END
 No. OF COLLECTIONS:..... HOME: LOW LEVEL PIERS
 COLLECTION METHOD: SCREENED UNSCREENED SCREENING FAULTY
 PAROUS RATE:..... WALLS: BRICK TIMBER BLACK VENEER

TIME	TOTAL No.		CUP No.	No.FEED	SPECIES		
	An	C			ANOPHELINE	CULICINE	
6-7							
7-8							
8-9							
9-10							
10-11							
11-12							
12-1 AM							
1-2							
2-3							
3-4							
5-6							

TOTAL

No. per M/H

COLLECTION DATE

SIGNATURE OF COLLECTOR

Fig 5 : Adult mosquito trapping record



Figure 1. Chloroform tube; A. rubber bands; B. cotton plug; C. tissue plug.

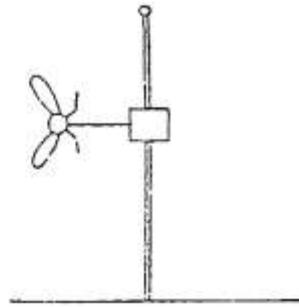


Figure 2. Mounting mosquito adults on minuten nadeln.

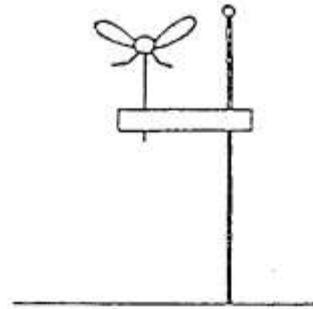


Figure 3. Mounting mosquito adults on minuten nadeln.



Figure 4. Point to head of insect pin.



Figure 5. Apply polish to point.

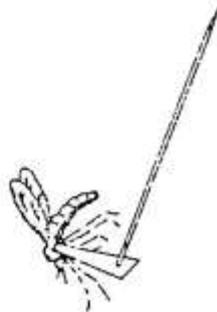


Figure 6. Touch polish to pleural aspect.

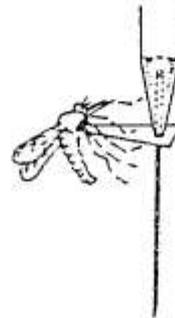


Figure 7. Adjust height of point with setter.

Figure 7: Preparation of insects for shipping

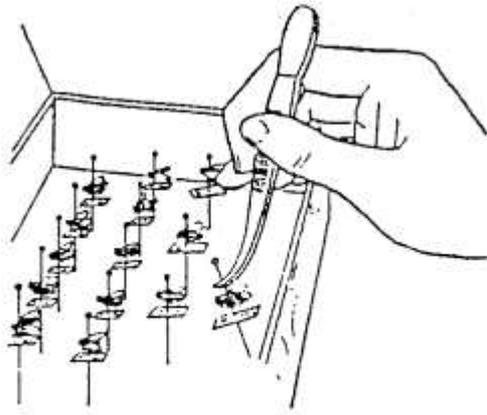


Figure 1. Pinned specimens in box.

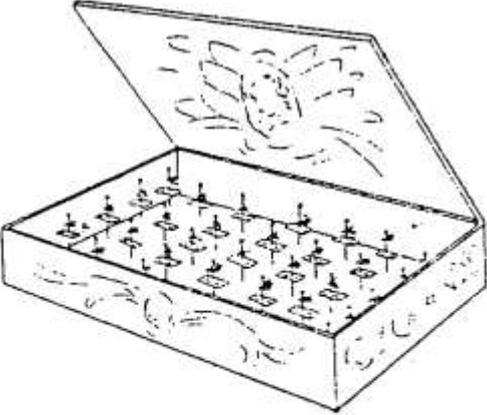


Figure 2. Box ready for packing.

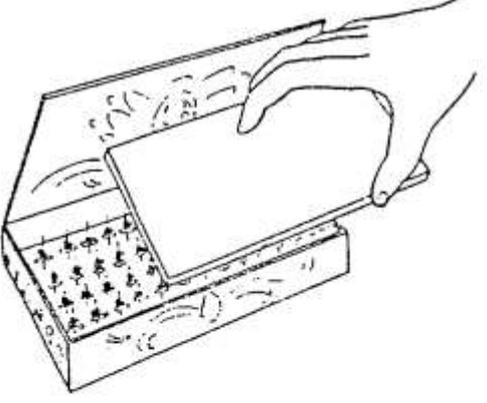


Figure 3. Adding cardboard protector.

Legend
PREPARATION OF INSECTS FOR SHIPPING



Figure 4. Adding cotton cushion.

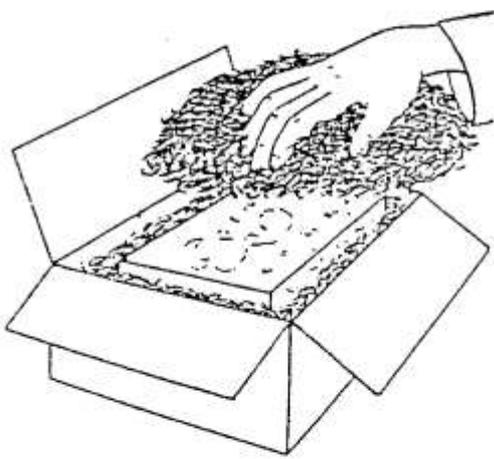


Figure 5. Exterior packing.



SHIRE of WYNDHAM | EAST KIMBERLEY

MOSQUITO MANAGEMENT PLAN

2016 |

DRAFT

CONTENTS

1	Introduction	4
1.1	Shire of Wyndham East Kimberley	4
1.2	Goal & Objectives.....	5
1.3	Strategic Implications	5
1.4	Statutory Requirements.....	6
2	Nuisance & Disease Risk.....	6
2.1	Mosquito-borne Disease Risk	6
2.2	Nuisance	7
3	Mosquitoes.....	8
3.1	Life Cycle.....	8
3.2	Species of Interest.....	9
4	Breeding Sites – Land Ownership and Responsibility.....	12
5	Environmental Considerations	13
6	Monitoring & Surveillance	14
6.1	Larval Survey	14
6.2	Adult Trapping.....	14
6.3	Sentinel Chicken Program	15
6.4	Mosquito-borne Disease Notifications.....	15
6.5	Complaints	15
6.6	Exotic Species Surveillance.....	16
7	Mosquito Control Methods.....	16
7.1	Cultural Control	16
7.2	Physical Control	17
7.3	Biological Control	17
7.4	Chemical Control.....	17
7.4.1	Larvicides.....	18
7.4.2	Adulticides.....	19
8	Stakeholders	19
8.1	Internal Stakeholders	19
8.2	External Stakeholders	20
9	Training	20
10	Resource Requirements	20
11	Annual Review & Report.....	21
12	References.....	21

1 INTRODUCTION

The Shire of Wyndham East Kimberley (the Shire) Mosquito Management Plan (MMP) is an Operational Program that gives guidance to the Shire on the control and management of seasonal mosquitoes.

The MMP presents an integrated approach, which examines various control measures that can be used to minimise the number of adult mosquitos present in populated areas and to reduce the risk of mosquito-borne disease.

Mosquito management within the Shire is necessary for two reasons:

- Some species of mosquitoes can be vectors of disease
- Some mosquito species are aggressive biters, causing significant nuisance issues

Mosquito management within the Shire will be active during all months of the year however escalated during the wet season when mosquito numbers and disease risk are highest.

1.1 Shire of Wyndham East Kimberley

The Shire covers an area of 121,000 square kilometres and is one of four local governments that make up the Kimberley region. The Shire experiences extremes in weather with distinct dry and wet seasons which greatly influence mosquito breeding patterns.

Kununurra

Kununurra is located in the Ord Valley, situated near to Lily Creek Lagoon. Kununurra was developed in the early 1960s to service the construction of the Ord Irrigation Scheme. The town has seen the transformation of ancient river plains into one of Australia's most diverse and productive agricultural areas. Harnessing the mighty Ord River opened up the area to horticulture, agriculture, aquaculture and eco-tourism.

From its beginnings as a service town for workers, Kununurra has grown to a population of about 7000 people and is home to most of the Shire's residents and town services.

Kununurra experiences temperatures consistently high in the summer months along with a relatively high rainfall, mostly experienced from November to March. The mean annual rainfall for Kununurra is 858mm. It is during these months mosquito populations increase due to the favourable weather conditions and significant amount of pooling water in surrounding bush land.

Wyndham

Wyndham is Western Australia's most northern town and the second largest town in the Shire. It is a small town with a population of just 1000, but Wyndham was once a bustling town, with the arrival of news of gold discoveries at Halls Creek.

The Wyndham Port was first established at the base of the Bastion in the 1880's and today provides for the state ship service, the import of fuel, ammonium nitrate and general freight and the export of iron ore, nickel and live cattle. It is also a popular stop over for cruise ships.

Wyndham, like Kununurra, is surrounded by cliff and gorge country and has five rivers flowing into the Cambridge Gulf. The Cambridge Gulf is a massive waterway providing

access to recreational mariners and commercial fishing operators with entry points into five rivers, being the Pentecost, Forrest, King, Durack and Ord Rivers as well as numerous creeks.

Wyndham experiences consistently high temperatures in the summer months along with a relatively high rainfall, mostly experienced from November to March. The mean annual rainfall for Wyndham is 840mm. It is during these months mosquito populations increase due to the favorable weather conditions and significant amount of pooling water in surrounding bush land.

Wyndham peak tides can reach 8.4 metres. *Aedes vigilax* mosquitoes breed naturally on the salt marsh. Due to the close proximity of Wyndham to this significant breeding area populations of mosquitoes are common throughout the year and are noticeably problematic after large tides.

Remote Areas

The vast area of the Shire includes many remote communities, resorts, working cattle stations and mining camps. The largest remote community is Kalumburu, the most northern settlement in Western Australia, with a population of approximately 400 people. Many of these remote locations are inaccessible by road during the wet season. Due to resource restraints and the inaccessibility of these remote locations during the peak mosquito season, this mosquito management plan focuses on the main population centres of Kununurra and Wyndham.

1.2 Goal & Objectives

The goal of this Plan is to reduce nuisance and disease risk associated with mosquito populations by committing to environmentally and financially sustainable mosquito management practices.

The objectives of this Plan are to:

1. Identify existing and potential breeding areas;
2. Detail the preferred mosquito management options;
3. Ensure public education and awareness campaigns are ongoing;
4. Inform land owners, residents, Shire staff and the general public of Council's mosquito management actions;
5. Ensure information retention by documenting mosquito management actions;
6. Strategically guide the financial direction of mosquito management.

1.3 Strategic Implications

In accordance with the Shire's Strategic Community Plan 2012-2022, our mission is to enable the East Kimberley to develop in a manner that will achieve social, cultural, economic and environmental benefits for all. The Mosquito Management Plan strives to address the following strategic directions:

Goal 2: Greater returns from regional investment to ensure sustainable provision of appropriate physical and social infrastructure

Objective 2.4: High standard of health and community facilities and services available to all residents

Strategy 2.4.2: Ensure community compliance with Environmental Health regulations

Goal 3: Protection and enhancement of lifestyle values, community facilities and the environment to provide safe and inviting communities

Objective 3.4: Protection and enhancement of community facilities

Strategy 3.4.1: Manage, maintain and upgrade public parks and amenities to ensure they meet community need and are accessible to people of all ages and abilities

1.4 Statutory Requirements

Department of Health

Health Act 1911

Part VII of the Health Act 1911 provides modes of dealing with nuisance and preventing spread of infectious disease, which can be applied to mosquito breeding sites.

Shire of Wyndham East Kimberley

Health Act 1911 – Shire of Wyndham East Kimberley Health Local Laws 2003

Part 6, Division 2 of the Health Local Laws 2003 details measures to be taken to prevent mosquito breeding.

Department of Environment Regulation

Environmental Protection Act 1986 The Convention on Wetlands of International Importance (the Ramsar Convention)

The Shire contains two Ramsar listed wetlands: the Lakes Argyle and Kununurra Ramsar site and the Ord River Floodplain Ramsar site.

2 NUISANCE & DISEASE RISK

Mosquito management within the Shire of Wyndham East Kimberley is important to address both mosquito-borne disease risk and nuisance mosquitoes.

2.1 Mosquito-borne Disease Risk

Not every mosquito species is a vector of disease. However, known vectors of mosquito-borne diseases, such as Ross River virus (RRV), Barmah Forest virus (BFV), Murray Valley encephalitis (MVE) and West Nile virus Kunjin strain (WNV_{KUN}), are present within the Shire. These diseases all have a significant impact on the health, social and financial well-being of residents and visitors to the region.

Ross River virus and Barmah Forest virus

Ross River virus (RRV) and Barmah Forest virus (BFV) are the two most common mosquito-borne diseases in Australia. The two viruses have similar life cycles and cause similar symptoms in people. In nature, RRV and BFV pass back and forth between animals and mosquitoes. The only way humans can catch the diseases is through the bite of a virus-carrying mosquito.

The WA Department of Health has developed RRV risk maps based on proximity to known mosquito breeding habitats and historical RRV rates. Kununurra has been categorised as having a frequent high RRV disease risk, indicating that the town experiences problems with nuisance and disease carrying mosquitoes most years. The crude rate of RRV in Kununurra is 2.5 cases per 1000 residents per year. Wyndham has a lower incidence with a crude rate of 1.5 cases of RRV per 1000 residents per year.

Overall, there have been 177 cases of RRV reported between 2003/04 and 2014/15 in the Shire of Wyndham East Kimberley. This represents an average of 15 cases per year and an annual age standardised rate of 191 cases per 100,000 population over this period which is a statistically significant increase of almost 5 times compared to the rate for the state as a whole. The BFV rate in the Shire is also significantly higher at approximately 4 times the State rate.

Murray Valley encephalitis virus and West Nile virus Kunjin strain

Murray Valley encephalitis virus (MVE) and West Nile virus Kunjin (WNV_{KUN}) strain are endemic in the Kimberley region and can be active during and in the months following heavy wet season rains with February to April being the season of most risk. In nature, MVE and WNV_{KUN} cycle between mosquitoes and water birds, while humans are only incidental hosts. Disease symptoms caused by MVE occur in approximately one in 1000 people bitten by infective mosquitoes. Most do not develop symptoms at all.

No human cases of MVE have been detected in recent years in Wyndham or Kununurra. The last human case of MVE in the Shire was detected in 2011 and historical records indicate that five human cases of MVE have been detected within the Shire since 1989, three in Kununurra, one in Wyndham and one in Oombulgurri. The Shire has had three reported cases of WNV_{KUN}, since 1989 all from Kununurra, with the most recent occurring in 2006.

Exotic and emerging mosquito-borne diseases

Exotic diseases such as Dengue, Zika virus, Chikungunya, Malaria, Yellow fever and Japanese encephalitis are transmitted by mosquito species that are not present in the Kimberley region. Local transmission of these viruses does not occur in Western Australia.

2.2 Nuisance

As well as being a disease risk, mosquitoes can also be a considerable nuisance. Some mosquito species in the Shire are known to be aggressive biters, causing discomfort and pain to affected residents which can impact significantly on lifestyle.

Of particular concern are *Aedes vigilax* mosquitoes, which cause significant nuisance problems for Wyndham. These mosquitoes breed in coastal saltmarshes surrounding

Wyndham and are aggressive biters that can travel tens of kilometres from their breeding sites.

3 MOSQUITOES

3.1 Life Cycle

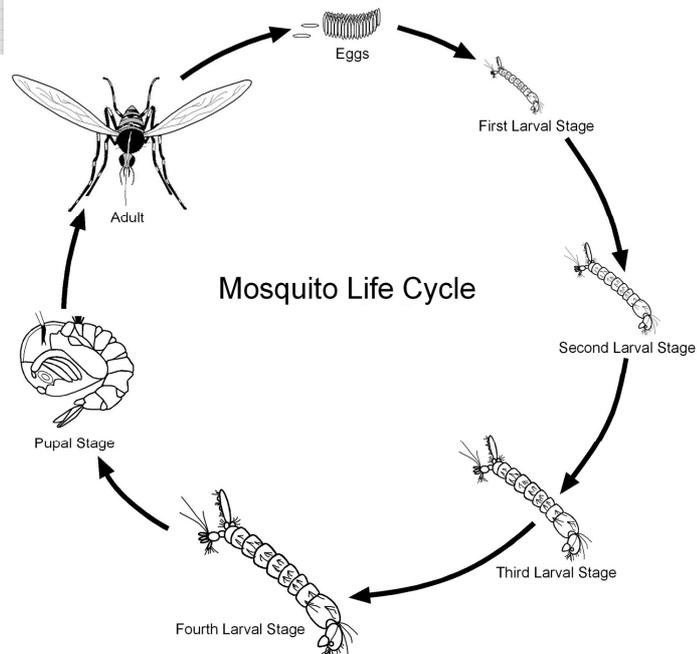
An understanding of the general life cycle of mosquitoes is important for control. Where possible, the preferred method of control is to act upon the larvae, before they emerge into flying adults and disperse.

Eggs are laid by the adult mosquito and float on the surface of the water, soil or plants. *Anopheles* species lay their eggs as a single unit on the surface of a water body. *Aedes* deposit their eggs on a moist surface that will eventually be subject to water inundation. The *Aedes* are generally associated with temporary water bodies and are desiccation resistant meaning they can last long periods out of the water. *Culex* species deposit their eggs in clusters that float on the surface of a water body.

Larvae hatch from the egg and live in the many different kinds of water habitats. The larvae grow through four different stages (instars) before becoming a mature larva. This process can take between 4-10 days depending on the species and environmental conditions. The *Culex* and *Aedes* species of larva have siphons that they breathe from and hang suspended from the surface of the water. The *Anopheles* species do not have a siphon and lie flat along the top surface of the water to breathe. The larvae feed on microorganisms and other organic matter within the water.

Following the final larval stage (4th instar) the larva moults into a pupa. Pupae are still mobile in the water, but do not feed and are not affected by larvicides. This final stage can last for as little as 2 days before the adult emerges.

The newly emerged adult rests on the surface of the water for a short time to allow itself to dry before flying off to feed. Male mosquitoes do not bite and usually stay close to the breeding site feeding on plant and flower juices. Female mosquitoes travel further afield and firstly seek out a carbohydrate meal of plant juices to increase energy before mating with a male. The females will seek blood after mating and then embark on a cycle of feeding, resting, developing and laying eggs. The average lifespan of an adult female is two-three weeks.



3.2 Species of Interest

An understanding of the different species of mosquitoes is crucial to implementing a mosquito management plan. Some species of mosquito can transmit diseases; others can cause significant pest nuisance issues due to their biting habits. Some species do not transmit diseases or cause pest issues and are a low priority for control.

Different species breed in different habitats and an understanding of the species present can allow for targeted larval investigations and control at the breeding site. Trapping of adult mosquitoes is therefore an important aspect of the management plan allowing for more targeted control actions.

Trapping undertaken by the Department of Health over the last approximately 20 years has identified *Culex annulirostris* as the primary species of concern at the end of the wet season (March/April). *Aedes vigilax* is an abundant species in Wyndham with the highest numbers collected in the middle of the wet season (January/February). *Aedes normanensis* is another common species of concern in the region and is present all year round but is found in highest numbers in floodplains away from town sites during the wet season. All three of these species have the potential to transmit mosquito-borne diseases.

A summary of these species of interest and others found in the region is provided below.

Culex annulirostris

This species is an important vector of arboviruses; it is the principal vector of MVEV and WNV_{KUN} and an important vector of RRV and BFV. *Culex annulirostris* breeds year round in temporary and permanent freshwater, but is most abundant in the mid to late wet season and early dry season.



Breeding Habitat: Permanent/semi-permanent freshwater bodies. Prefers heavily vegetated sites

Active Season: Year round esp. mid wet season to early dry season

Dispersal Capabilities: Up to 10km

Biting Habits: Active dawn, dusk and night

Disease Vector: MVEV, WNV_{KUN}, RRV, BFV

Aedes vigilax

Aedes vigilax is a vicious biter, biting throughout the day and night. It can be responsible for nuisance problems in Wyndham, where it breeds in the tidal salt marshes surrounding the town. Eggs of *Ae. vigilax* are desiccation resistant and can survive for months on the dry mud flats. This often leads to a sharp increase in mosquito numbers for Wyndham early in the season when the first high tides or rains inundate the salt marsh allowing the eggs to hatch in large numbers.



Breeding Habitat: Coastal saltmarsh and brackish swamps

Active Season: Oct-Dec; Mar-May

Dispersal Capabilities: Up to 100km

Biting Habits: Vicious; all times

Disease Vector: RRV, BFV

Aedes normanensis

Aedes normanensis breeds in a variety of fresh water breeding sites, ranging from temporary ground pools, to large temporary swamps. Adults bite man during the day and evening, and will also bite a range of mammals and birds. The species is found throughout the year, depending on local conditions. Eggs of *Ae. normanensis* are also desiccation resistant and significant numbers of adult mosquito can rapidly emerge following wet season rainfall.



Breeding Habitat: Temporary freshwater pools along rivers/creek lines

Active Season: Nov-Jan & Mar-May

Dispersal Capabilities: 2-3km

Biting Habits: Vicious, nocturnal, crepuscular if humid

Disease Vector: RRV, BFV

Culex quinquefasciatus



Breeding Habitat: Clean or polluted water – domestic environment, artificial containers.

Active Season: Year round

Dispersal Capabilities: Limited

Biting Habits: Active in dawn, dusk and night

Disease Vector: Poor disease vector in WA

Aedes notoscriptus



Breeding Habitat: Clean water within the domestic environment; artificial containers

Active Season: Year round / wet months

Dispersal Capabilities: 0.4km

Biting Habits: Vicious, active dawn and dusk; occasionally at night and daytime, prefers shade

Disease Vector: RRV

Mansonia uniformis



Breeding Habitat: Heavily vegetated freshwater especially with Typha/water lilies

Active Season: Jul-Nov

Dispersal Capabilities: 1-3km

Biting Habits: Vicious, all times in shade

Disease Vector: MVEV, RRV, WNV_{KUN}

Aedes tremulus



Breeding Habitat: This species breeds in palm tree junctions as well as artificial containers.

Active Season: Mar-Apr

Dispersal Capabilities: 0.2-0.3km

Biting Habits: Vicious, dawn and dusk

Disease Vector: WNV_{KUN}

Anopheles annulipes



Breeding Habitat: Permanent and semi-permanent freshwater

Active Season: All year, peak in wet season

Dispersal Capabilities: Unknown

Biting Habits: Night time; occasional in day times

Disease Vector: None

4 BREEDING SITES – LAND OWNERSHIP AND RESPONSIBILITY

A number of different breeding sites within the Shire contribute to mosquito populations. Some of these areas are monitored and treated by the Shire; others are the responsibility of external agencies. The Shire is responsible for management of breeding sites on Shire properties. This includes parks and gardens, Shire facilities and Shire roads and drainage systems. Some important existing and potential breeding sites and the responsible agencies are detailed below.

The management of mosquitoes on private property is the responsibility of owners and residents. Backyard breeding of mosquitoes can contribute significantly to nuisance and disease risk in residential areas. The Shire conducts education campaigns to encourage

residents to clean up and help them identify potential backyard breeding sites. If necessary, the Shire can undertake enforcement action to require residents or owners to remove backyard-breeding sites.

Sewage Ponds

The Kununurra Sewage ponds are well maintained by the Water Corporation and no mosquito larvae have been found here in larval surveys to date. The Shire also monitors adult mosquito numbers in the area and will liaise with the Water Corporation if the ponds are found to be breeding mosquitoes.

Wyndham currently has two sets of sewage ponds. The ponds managed by the Water Corporation are well maintained and still in use. The other set of ponds is owned by the Shire and was part of the discontinued wastewater re-use scheme. The disused ponds are usually dry, but fill with water during the wet season. The ponds become a breeding site at this time and require treatment with larvicide when filled with water.

Ord Irrigation Cooperative

A study on the Ord River irrigation area in 2003 found larger numbers of adult *Culex annulirostris* within the irrigation area compared with the town site during the dry season. The breeding of this mosquito year-round in the irrigation area increases the risk of mosquito-borne disease transmission around Kununurra even during the dry season.

Ord Irrigation Co-operative (OIC) undertake maintenance of irrigation channels to prevent them from becoming mosquito breeding habitats.

Lily Creek Lagoon

Lily Creek Lagoon is a potential breeding ground in close proximity to the main residential areas of Kununurra. Mosquitoes can breed around the edges of the lagoon and in association with vegetation, particularly cumbungi. Management of cumbungi is discussed in the Lake Kununurra and Lily Creek Lagoon Vegetation Management Plan 2008 (under review) and requires input from a number of agencies. The lagoon is part of the Ramsar listed wetland Lakes Argyle and Kununurra. The Lakes are managed by the Water Corporation and the Department of Water. The Department of Environment and Conservation is responsible for management of Ramsar values. Any proposed mosquito management activities within Lily Creek Lagoon or any part of the Ramsar site will require liaison with these agencies.

Wyndham Port

The Wyndham Port is an important potential route for the introduction of exotic mosquito species. The responsibility of the port lies with Cambridge Gulf Limited (CGL). The Department of Agriculture undertake routine surveillance at the Port for exotic mosquito species and issue bi-annual vector monitoring reports.

5 ENVIRONMENTAL CONSIDERATIONS

As the most northern region of Western Australia, the Kimberley often has unpredictable weather patterns. The spectacular and varied natural environment in the Kimberley provides for a wide range of temporary, seasonal and permanent mosquito breeding sites. Some environmental variances that can greatly influence mosquito populations are:

- Tidal variations
- Rainfall
- Floods and cyclones
- Temperature
- Humidity

All of these weather factors play an important role in mosquito management and need to be considered during the implementation of the program.

Weather variables are recorded when undertaking monitoring and surveillance. They must also be taken into account before doing any chemical treatments.

6 MONITORING & SURVEILLANCE

Monitoring and surveillance is a vital part of this Plan and is used to inform any control actions. A review of the Shire's mosquito control was conducted by a consultant medical entomologist in September 2015. This review identified a number of breeding sites that require ongoing monitoring and surveillance. The recommendations in this report have been incorporated into routine monitoring and surveillance actions. A summary of all recommendations of the review is provided in Appendix One.

6.1 Larval Survey

All identified breeding sites are monitored regularly during the mosquito season or after large tides or floods to determine the larval activity. Tidally influenced areas (many sites in Wyndham) are surveyed 3-4 days after rain or tidal inundation events. Freshwater sites are surveyed 6 days after rain events.

Larval surveys are conducted at least monthly during the wet season. More extensive surveys are conducted twice per year; just after the first appreciable rains of the wet season and mid-way through the wet season in February. Larvae may be identified under a microscope or reared in emergence cages and identified as adults.

The findings of these surveys will determine if there is a need for the application of larvicide to prevent the emergence of adult mosquitoes. The threshold for larvicide treatment in freshwater sites is an average of two third or fourth instar larvae per dip. Mosquito larvicides are not effective at the late fourth or pupal stage, therefore it is critical that if a mix of 3rd and 4th instars are observed that the larvicide is applied immediately. If 4th instars and pupae are observed then it is too late to apply larvicide and the only chemical control option available at that point is to wait for the adults to emerge and conduct adult fogging. In tidal sites with thick vegetation, the presence of an average of two 3rd/4th instar larvae per dip will trigger treatment. In sites where natural predators of larvae are evident dips resulting in early instars, but very few or no third and fourth instars, may indicate that biological control is sufficient. If practical, the site should be reinspected 1 or 2 days later to determine if the biological control is effective or if the cohort has progressed through to 3rd/4th instar and requires larvicide to be applied.

6.2 Adult Trapping

Adult mosquito traps are used to monitor populations of adult mosquitoes. The mosquitoes caught in the traps are counted and identified to species. Trapping is important to monitor

mosquito abundance, as well as to identify problem species and allow targeted larval investigations and control actions.

Routine adult trapping will be undertaken monthly during the dry season and fortnightly during the wet season. Trap sites are positioned close to known breeding sites to capture the highest possible number of mosquitoes. Additional trapping may be undertaken in response to complaints and to evaluate the effectiveness of control activities.

Trap collections of more than 100 *Aedes vigilax* or 200 *Culex annulirostris* within 500m of residential areas indicates a pest problem and potential disease risk and will trigger increased public awareness activities. Trap collections of over 500 *Culex annulirostris* within 500m of residential areas would be regarded as a severe pest problem and potentially significant disease risk. This will trigger discussions with the Department of Health regarding the appropriate control response.

6.3 Sentinel Chicken Program

The Shire participates in the Sentinel Chicken Surveillance program run by the Department of Health. The program is used to provide an early warning of an increased level of mosquito-borne virus activity.

When a chicken is bitten by an infected mosquito, it develops antibodies to the virus but does not become sick. Furthermore, they do not develop high levels of the virus in their blood (thus, they cannot pass the virus back to mosquitoes or humans). Therefore, the disease cannot be spread from sentinel chickens to human populations.

There is currently one flock of chickens in Kununurra and one flock in Wyndham. Blood samples are taken from the chickens fortnightly in the wet season and monthly in the dry season. Samples are sent to the PathWest laboratory in Perth for analysis. Detection of virus in the chickens will trigger increased public awareness activities and liaison with the Department of Health regarding appropriate control actions.

6.4 Mosquito-borne Disease Notifications

Mosquito borne diseases (RRV, BFV, MVE and WNV_{KUN}) are notifiable diseases in Western Australia and are required to be reported to the Department of Health. to the Public Health Unit. The Kimberley population Health Unit then notify the Shire of cases reported within its jurisdiction. Where possible, SWEK Environmental Health Officers contact these cases to determine the location and timing of exposure as accurately as possible. The information remains completely confidential, used solely to inform mosquito management activities and guide the Department of Health and the Shire of Wyndham East Kimberley to prevent the spread of mosquito borne disease.

6.5 Complaints

Occasionally the Shire receives complaints from residents regarding mosquito nuisance. These complaints may provide information on areas where mosquito impacts are greatest. However, the tolerance of individuals to mosquitoes varies greatly and the number of complaints may not be directly related to actual mosquito populations.

Where possible all complaints should be made on the Mosquito Nuisance Complaint Form,

which includes important information to allow follow-up. All complaints received must be forwarded to an Environmental Health Officer for investigation. Where possible an adult trap will be set near to the complaint address to identify the causative species.

6.6 Exotic Species Surveillance

There is potential for introduction of exotic species via either the Wyndham Port or travellers coming from Queensland. Species such as *Aedes aegypti* or *Aedes albopictus* are a particular threat as these species carry exotic mosquito borne diseases such as dengue, yellow fever and Zika virus, and are prevalent in Indonesia and many other parts of south-east Asia.

In Wyndham, larval monitoring for exotic species is conducted at the Port by the Department of Agriculture, with reports provided to the Department of Health. In Kununurra there is currently no exotic species surveillance program, however one will be established before the 2016/17 wet season.

Any specimens that are suspected of being exotic species must be immediately referred to the WA Department of Health Medical Entomologist for confirmation and advice.

7 MOSQUITO CONTROL METHODS

In order to be effective, this Mosquito Management Plan uses an integrated approach incorporating four control methods: cultural control, physical control, biological control and chemical control.

7.1 Cultural Control

One of the most important aspects of this mosquito management plan is public education.

It is not possible, nor desirable to completely eradicate mosquitoes from the environment. Despite the control actions detailed in this Plan there will always be some mosquitoes present and risk of mosquito-borne disease within the Shire. In addition, mosquito control activities are most active around the major town sites of Wyndham and Kununurra, however many residents and tourists will be exposed to mosquito bites in more remote locations where mosquito control is not undertaken. This includes residents living in rural areas, as well as people taking part in recreational activities such as fishing and camping. For these groups the only way to reduce the risk of disease is to prevent mosquito bites by using personal protection measures.

Due to the highly transient residential population in the region, it is important that educational programs are ongoing to ensure all residents receive information. It is also essential to communicate this message to the large number of tourists that visit the region in the dry season months, particularly during the early dry season.

Public education will begin towards the end of the dry season and will be active throughout the wet season. Activities will be intensified when surveillance indicates that disease risk is high, either due to high mosquito numbers detected in adult traps, or when sentinel chicken seroconversions occur.

Education materials will be based around the Department of Health's "Fight the Bite" campaign and communication may include the following:

- Information displays at local events, particularly outdoor events;
- Letter PO Box drops;
- Display information posters on local notice boards;
- Promotion of the program through local radio stations and newspapers;
- Dissemination of warnings through local media when surveillance indicates a risk of mosquito-borne disease is likely;
- Public notices of planned chemical and physical mosquito control activities; and
- Displaying appropriate signage while in the field conducting monitoring or treatment.

7.2 Physical Control

Physical control methods are measures taken to reduce the potential for mosquito breeding and harbourage by modifying the natural or built environment.

Examples of physical control actions include:

- Maintenance of open stormwater drains to remove silt and weeds to ensure water not held for more than five days;
- Reduction of emergent vegetation in known breeding sites;
- The construction of weirs to prevent high tides from flooding upstream sections of creek beds;
- Filling in, or drainage of low lying land to reduce pooling;
- Slashing of vegetation which provides harbourage for adult mosquitoes;
- Cleaning up yards to remove containers which will collect water; and
- Ensuring septic tanks are sealed and vents fitted with mosquito proof screens.

Some physical controls, such as maintenance of drains are undertaken routinely. Other actions such as construction of weirs require planning and allocation of resources and are long-term strategies. Yard clean-ups and sealing of septic tanks are the responsibility of residents and will be the subject of education campaigns.

7.3 Biological Control

Biological control refers to the natural predation of mosquito larvae, for example by fish. Biological control occurs naturally in many water bodies and when present will reduce the need for other control methods. The introduction of fish can also be an effective, long-term control for mosquito breeding in man-made situations such as backyard ponds.

Introduction of fish to natural environments will not form part of this Plan due to the large size and ephemeral nature of many breeding sites, as well as the potential environmental impact.

7.4 Chemical Control

Chemical control of adult and larval mosquitoes involves the application of minimal amounts of chemical substances that are toxic, physically damaging or hormonally disruptive to mosquitoes to kill them or slow/ disrupt their development. Routine applications of these chemicals with the same mode of action or over application of these chemicals can result in resistance in the target mosquito population. Some of these chemicals can also have undesired impacts on non-target populations. It is important to understand that although

insecticides have a place in mosquito control, these chemicals should be used sensibly to maximise their benefits while minimising any disadvantages.

There are two methods of chemical control considered in this plan: larvicides and adulticides. When possible, it is preferable to treat the mosquitoes larvae while they are contained in an aquatic environment, rather than as flying adults.

Post treatment larval and adult mosquito monitoring is essential to assess the effectiveness of the application of insecticides against the target mosquito by comparing results with a pre-treatment survey. Any breeding site with pale looking larvae in comparison to untreated sites indicates the pellets or briquettes are still effective and re-treatment is not required.

7.4.1 Larvicides

Larvicides kill mosquito larvae and/or prevent the emergence of adult mosquitoes. Larvicides are used to treat known breeding sites in close proximity to residential areas.

Advantages:

- Mosquitoes are killed before they pose any health risk
- Products can be very target specific making it easier to manage any environmental impact
- Controlled release formulations allow for residual control
- Reducing populations at the larval stage limits ongoing breeding, making ongoing control easier

Disadvantages:

- Treatment can be limited by site access and the size of the area requiring treatment
- Pupae and late 4th instar larvae are not affected, making the timing of treatment crucial

In small breeding sites, larvicides can be applied by hand without any specialist equipment. The Shire has two Maruyama backpack sprayers that can be used to apply pellets to larger breeding sites. The following larvicides are currently used as part of the Shire's mosquito management program:

(S)-methoprene

(S)-methoprene is an insect growth regulator that is absorbed by larvae and prevents them from developing into normal pupae. This product is available in several different formulations, including the slow-release briquettes, which ensure ongoing release of the larvicide providing ongoing control for up to 150 days. Pellets are used for smaller water holding containers such as tanks and drains and are effective for 30 days.

Bti (*Bacillus thuringiensis var. israelensis*)

This product is a bio-larvicide which is ingested by larvae and destroys the gut lining. Bti will kill larvae within 24 hours, but does not have any residual effect.

Both larvicides are target specific for mosquitoes and do not impact on non-target species when applied at label rates. Therefore, calibration of application equipment is important to ensure product is being applied as close as possible to target rates. Regular calibration and maintenance of application equipment will be undertaken in accordance with manufactures

instructions and chemical labels and materials safety data sheets (MSDS). If further advice is required, the Department of Health will be contacted to provide advice.

7.4.2 Adulticides

Adulticides are those chemicals that kill mosquitoes at the adult stage. They are the only chemical control option once flying adults have emerged.

Advantages:

- Fast knockdown of biting adults in times of high disease risk
- Residual surface sprays are available which can be used as barrier sprays with longer lasting effects

Disadvantages

- Only temporary control is achieved by fogging - mosquitoes are likely to re-enter treated areas from adjacent untreated areas, meaning treatments must be repeated regularly
- No target specific formulations are available. Adulticides work like a large scale insect spray, killing all flying insects, including natural predators of mosquitoes and beneficial insects such as bees
- Highly toxic to fish and other aquatic organisms and cannot be used near wetlands
- Labour and chemical costs associated with ongoing fogging treatments can be very high

Application of adulticides will only occur during times of high disease risk when the risk to public health outweighs the risk to the environment. The decision to use adulticides is made in consultation with the WA Department of Health Medical Entomologist.

The following adulticides are currently used as part of the Shire's mosquito management program:

Twilight ULV Mosquito Adulticide Concentrate

This chemical is used in the Cougar ULV sprayer and is a phenothrin and piperonyl butoxide based insecticide concentrate that must be diluted in carrier oil for application. Application of this chemical must be carefully timed to occur when mosquitoes are most active. Application will also depend on weather conditions.

Biflex AquaMax Insecticide

This chemical is a bifenthrin insecticide that is used as a barrier treatment. It is diluted in water and sprayed on surfaces such as dense vegetation and fences to kill mosquitoes that land on the surface. Application is by a knapsack sprayer.

8 STAKEHOLDERS

8.1 Internal Stakeholders

Ideally, residential developments should be located well away from extensive mosquito breeding sites to minimise mosquito management requirements. However, this is often not achievable in the East Kimberley region due to the magnitude of the natural environment and potential breeding areas in comparison to the size of town sites. Nevertheless, the

Shire's planning department routinely refer development applications for environmental health assessment, at which time the appropriateness of proposed land use can be considered.

The Shire's Infrastructure department have responsibility for a number of areas that affect mosquito management including stormwater drains and vegetation management. Effective delivery of this plan, particularly physical control methods, will require close liaison with Infrastructure.

8.2 External Stakeholders

The Shire of Wyndham East Kimberley is a Contiguous Local Authority Group (CLAG). This means the Shire works in cooperation with the Department of Health with regard to mosquito management. As a CLAG, the Shire is eligible for a contribution from the state government of up to 50% for mosquito control chemicals. Decisions regarding appropriate application of these chemicals are therefore made in consultation with the Department of Health.

Other external stakeholders include Department of Environment and Conservation, Department of Water, the Water Corporation and Ord Irrigation Co-operative.

9 TRAINING

It is essential that personnel involved in the operational aspects of the MMP are suitably qualified, trained and/or supervised. More than one staff member should be trained in mosquito management. Skills required to carry out the requirements of the MMP safely and effectively are:

- Basic mosquito ecology
- Principles of integrated mosquito management
- Surveillance/monitoring techniques
- Collection, recording and identification of mosquito samples
- Standard operating procedures for equipment
- Safe storage, handling and application of chemicals/larvicides in accordance with product labelling and MSDS
- Use of appropriate PPE in accordance with product labelling, MSDS and environmental conditions
- Calibration techniques
- Information technologies/geographical information systems
- Budget management

The Department of Health offer an in depth mosquito management course in Mandurah approximately every two years which teaches most skills and competencies required.

10 RESOURCE REQUIREMENTS

Operating and implementing an effective mosquito management program is dependent on ongoing human and operational resources. Resource requirements will fluctuate significantly depending on the severity of the mosquito-breeding season, which is largely dependent on environmental variables.

Environmental health staff are primarily responsible for implementing this Plan. However, mosquito management is only a small part of the Shire's environmental health responsibilities and assistance is required from other staff. This can include assistance with monitoring activities, physical control activities or application of chemicals. A 4WD vehicle is also required for mosquito management work.

Through CLAG funding the Department of Health provides a 50% contribution towards chemicals; however, this amount is dependent upon the Shire's own budget allocation. It is a requirement of CLAG funding that some money is put in a mosquito management reserve fund each year. This money can be utilised in years when mosquito-borne disease risk/nuisance is greater than normal, following a request to the Department of Health.

11 ANNUAL REVIEW & REPORT

Good record keeping practices are crucial for the continuation of this Plan and retention of knowledge within the organisation. The following list includes the minimum required records to be kept on the Shire's record management system:

- Records of complaints
- RRV/BFV/MVE notifications and follow-up documentation
- Adult trapping results
- Larval survey results
- Chemical treatments
- Vector Control maps
- Chemical product labels and MSDS
- Media releases

This plan will be reviewed annually by 30 June each year with information included in the Shire's annual report. It is important to assess effectiveness of the surveillance program and the overall control program to allow for continuous improvement. An ongoing surveillance program will assess whether the mosquito populations are being reduced and if the control program is achieving reductions in pest problems or mosquito borne disease.

12 REFERENCES

Brockway C and Neville P, *Mosquito investigation within the Shire of Wyndham/East Kimberley – May 2015*, report, Government of Western Australia Department of Health, Perth, 2015.

Government of Western Australia Department of Health, *Mosquito Management Manual*, Department of Health WA, 2015.

Jardine A, Lindsay M, Heyworth J, and Weinstein P. Dry-season Mosquito Breeding Associated with Irrigation in the Northeast Kimberley Region of Western Australia : Potential Impact on Mosquito-borne Disease Transmission. *EcoHealth*. 2004; 1(4): 387-398.

North Shire Mosquito Abatement District, *Mosquito Biology*, viewed 3 May 2016, <<http://www.nsmad.com/about-mosquitoes/mosquito-biology/>>

Whelan P, *Review of mosquito control program Wyndham East Kimberley Shire*, Biting Insect Technical and Extension Services, 2016.

13 APPENDIX ONE – CONSULTANT’S RECOMMENDATIONS

In September 2015 a consultant medical entomologist from the Northern Territory was engaged to conduct a review of mosquito management within the Shire of Wyndham East Kimberley. The report generated from this review contained a number of recommendations. These recommendations and any progress made toward them are summarised below.

Section	Recommendation	Comment	Directorate	Progress
4.1	Locate all breeding sites on vector control maps	Working with Infrastructure and IT to create using existing software	Community Development	In progress – to be completed prior to 2016 wet season
4.1.1	Investigate patterns of over-watering	Investigation required	Infrastructure	Not started
	Removal of silt and vegetation from stormwater drains	Routine drain maintenance pre-wet season	Infrastructure	Ongoing
4.1.2	Larvicide treatment of temporary freshwater pools	Temporary solution	Community Development	Ongoing
	Investigate options for permanent source reduction.	Investigation required. Potential for CLAG funding for source reduction projects	Infrastructure	Not started
4.1.3	Reduction of emergent vegetation in Lake Kununurra and Lily Creek Lagoon	This action requires liaison with several external agencies – meeting to be arranged	Community Development	Not started
4.1.4	Install silt traps to Lily Creek lagoon tributaries	Investigation required. Potential for CLAG funding contribution	Community Development & Infrastructure	Not started
4.1.5	Inspect Cattle yard waste water ponds	Investigation required	Community Development	Not started
	Rectify Wyndham effluent disposal pipe	Liaison with Water Corp. required	Community Development	Not started
	Disused wastewater re-use scheme ponds (Wyndham)	Investigate options for rectification	Infrastructure	Not started
4.1.6	Monitoring irrigation channels	Land owners are responsible for maintaining irrigation channels. Any issues identified will be	Community Development	Ongoing

		brought to their attention.		
4.1.7	Monitoring waste water disposal from irrigation channels	Land owners are responsible for maintaining waste water channels. Any issues identified will be brought to their attention.	Community Development	Ongoing
4.1.8	Maintenance and rectification of roadside culverts	Review of all culverts within Wyndham and Kununurra required. Liaison with Main Roads Department required.	Community Development & Infrastructure	Not started
4.1.9	Enhancement of tidal barrier weirs and installation of gabions in Wyndham	Investigation required. Potential to apply for CLAG funding for these projects	Community Development & Infrastructure	Not started
4.1.10	Educating property owners on the importance of managing and maintaining the septic systems	Included in MMP – section 7.1	Community Development	Ongoing
4.2	Exotic vector surveillance – Kununurra town	Included in MMP – section 6.6	Community Development	Not started
4.3	Adult vector monitoring	4 traps set in Wyndham and Kununurra each month	Community Development	Ongoing
	Review trap locations	To be changed after the completion of trapping project in June 2016	Community Development	Not started
4.4	Investigate relocation of the Sentinel Chicken Site - Kununurra	Investigation required to identify alternative sites	Community Development	Not started
	Sentinel Chicken Bleeding	Included in MMP – section 6.3	Community Development	Ongoing
4.5	Adult Monitoring Control - Fogging	Included in MMP – section 7.4	Community Development & Infrastructure	Ongoing
4.6	Public awareness and communications program	Included in MMP – section 7.1	Community Development	Ongoing

12.03.04. Policy Review - CP/PMG 3780 Leasing of Council Managed Reserve - Community

DATE:	31/05/2016
AUTHOR:	Wayne Richards, Manager Community Services
RESPONSIBLE OFFICER:	Louise Gee, Director Community Development
FILE NO:	CP.07.28
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION

That Council endorses the reviewed CP/PMG 3780 Leasing of Council Managed Reserve Land Community for public advertising for a period of 28 days.

Cr K Wright foreshadowed a motion to move the recommendation but delete Item 4 (Termination) in the policy for the reason that a community group could lose everything on at the whim of Council.

COUNCIL DECISION

Minute No: 11363

Moved: Cr N Perry

Seconded: Cr B Robinson

That the motion be put.

Carried 7/1
For: Cr J Parker, Cr K Wright, Cr B Robinson, Cr S Rushby,
Cr S Cooke, Cr E Bolto, Cr N Perry
Against: Cr D Spackman

COUNCIL DECISION

Minute No: 11364

Moved: Cr B Robinson

Seconded: Cr S Cooke

That Council endorses the reviewed CP/PMG 3780 Leasing of Council Managed Reserve Land Community for public advertising for a period of 28 days.

Carried 5/3

For: Cr J Parker, Cr N Perry, Cr E Bolto, Cr S Cooke, Cr B Robinson

Against: Cr K Wright, Cr S Rushby, Cr D Spackman

PURPOSE

For Council to consider the draft reviewed CP/PMG 3780 Leasing of Council Managed Reserve Land - Community for endorsement to publically advertise.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices.

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

Council's Community Leases Policy was last reviewed in June 2015 and adopted at the 23 June 2015 Ordinary Council Meeting. Since this resolution, the Policy has been used to develop a Lease template that has been used as the template for all community lease negotiations.

The purpose of the Policy is to provide guidelines for the development and management of Community Leases within the Shire.

As stated within the Policy, the objectives are to:

- Ensure Community leases maximise benefit to the community of the Shire of Wyndham East Kimberley by supporting community organisations in the provision of services, facilities and events.
- Ensure the economic and environmental impact of community leases on the Shire and the community is considered.
- Encourage clarity and consistency in the Shire's community leases and associated processes.

- Promote equity across all Shire community leases without favour or prejudice to individual organisations.
- Ensure assets leased to community organisations are well maintained to maximise sustainability, promote safety and maximise community benefit.
- Minimise risk to the Shire, financial or litigious, resulting from Community leases.
- Promote collocation and multipurpose development, where practicable, and strategic development of community facilities based on future requirements of the land and community needs.
- Ensure the value of community leases and Shire contribution to the community through community leases is recognised.

STATUTORY IMPLICATIONS

Local Government Act 1995

3.58. Disposing of property

(1) *In this section —*
dispose includes to sell, lease, or otherwise dispose of, whether absolutely or not;

property includes the whole or any part of the interest of a local government in property, but does not include money.

(2) *Except as stated in this section, a local government can only dispose of property to —*

- (a) *the highest bidder at public auction; or*
- (b) *the person who at public tender called by the local government makes what is, in the opinion of the local government, the most acceptable tender, whether or not it is the highest tender.*

(3) *A local government can dispose of property other than under subsection (2) if, before agreeing to dispose of the property —*

- (a) *it gives local public notice of the proposed disposition —*
 - (i) *describing the property concerned; and*
 - (ii) *giving details of the proposed disposition; and*
 - (iii) *inviting submissions to be made to the local government before a date to be specified in the notice, being a date not less than 2 weeks after the notice is first given;*

And

- (b) *it considers any submissions made to it before the date specified in the notice and, if its decision is made by the council or a committee, the decision and the reasons for it are recorded in the minutes of the meeting at which the decision was made.*

(4) *The details of a proposed disposition that are required by subsection (3)(a)(ii) include —*

- (a) *the names of all other parties concerned; and*

- (b) *the consideration to be received by the local government for the disposition; and*
- (c) *the market value of the disposition —*
- (i) *as ascertained by a valuation carried out not more than 6 months before the proposed disposition; or*
 - (ii) *as declared by a resolution of the local government on the basis of a valuation carried out more than 6 months before the proposed disposition that the local government believes to be a true indication of the value at the time of the proposed disposition.*

(5) *This section does not apply to —*

- (a) *a disposition of an interest in land under the Land Administration Act 1997 section 189 or 190; or*
- (b) *a disposition of property in the course of carrying on a trading undertaking as defined in section 3.59; or*
- (c) *anything that the local government provides to a particular person, for a fee or otherwise, in the performance of a function that it has under any written law; or*
- (d) *any other disposition that is excluded by regulations from the application of this section.*

POLICY IMPLICATIONS

The adoption of this reviewed Policy will substitute for the existing CP/PMG 3780 Leasing of Council Managed Reserve Land - Community

FINANCIAL IMPLICATIONS

There are no financial implications associated with this item.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved service

Strategy 1.4.1: Ensure legislative compliance and follow best practice principles in planning and service delivery

RISK IMPLICATIONS

Risk: Failure to comply with legislative requirements leading to damage of reputation or financial loss.

Controls: Review policies and procedures in accordance with the review schedule.

COMMUNITY ENGAGEMENT

This reviewed Policy will be advertised for a period of 28 days. Feedback received will be considered, and the Policy will be brought back to Council for adoption.

The draft Policy will also be provided to all existing community leasees (including tenants at will) for their information and comment.

COMMENTS

There are two proposed changes to the Policy. These are based on recent discussions which identified that, under the existing policy, potential developments that are in the interest of the community may be limited or prevented by Community Leases.

These changes are:

- Policy Objective 2 will include social impacts as a consideration and will now read: "Ensure the economic, *social* and environmental impact of community leases on the Shire and the community is considered.
- The inclusion of term 4 - TERMINATION: *The Council will reserve the right to terminate the lease if it is deemed by the Council that an alternate use of the land may deliver a significant community benefit.*

The absence of such a clause means that there is the possibility that future development opportunities that provide major community benefit could be prevented for up to 21 years by a community lease. The inclusion of this clause gives Council the discretion to determine whether a future development is of such significant benefit that a community lease may be terminated and the terms under which this termination takes place.

The inclusion of this clause in the Policy has not been taken lightly. It is recognised that the clause creates an increased level of uncertainty over land tenure and in turn, reduces the incentive for a community organisation to develop on their lease site.

ATTACHMENTS - Item 12.03.04

Attachment 1 - Draft Reviewed CP/PMG 3780 Leasing of Council managed Reserve Land - Community



POLICY NO	CP/PMG-3780	
POLICY	Leasing of Council Managed Reserve Land - Community	
RESPONSIBLE DIRECTORATE	Community Development	
RESPONSIBLE OFFICER	Manager Community Services	
COUNCIL ADOPTION	Date: 15/05/2012	Resolution No:
REVIEWED/MODIFIED	Date: 23/06/2015	Resolution No: 10990
	Date:	Resolution No:
REVIEW DATE	Date: June 2017	
LEGISLATION	Local Government Act 1995 Local Government (Functions and General) Regulations 1996 Land Administration Act 1997	
RELATED POLICIES	CP/PMG-3781 - Leasing of Council Managed/Owned Land - Commercial	
RELATED ORGANISATIONAL DIRECTIVES	N/A	

PURPOSE:

A community lease is an agreement between the Shire and an external organisation to manage a reserve or facility on behalf of the Shire and for the community. This agreement supports the organisation in conducting their activities/services, and in doing so, provides benefit to the wider community. In many cases this arrangement provides a service to the community that would otherwise not be available or would require significant Shire input.

The Shire of Wyndham East Kimberley seeks to support community groups in increasing capacity and improving facilities within the Shire that result in strengthening of the community helping to build vibrant, inclusive and healthy communities.

The objectives of this policy are to:

- Ensure Community leases maximise benefit to the community of the Shire of Wyndham East Kimberley by supporting community organisations in the provision of services, facilities and events.
- Ensure the economic, social and environmental impact of community leases on the Shire and the community is considered.
- Encourage clarity and consistency in the Shire's community leases and associated processes.
- Promote equity across all Shire community leases without favour or prejudice to individual organisations.
- Ensure assets leased to community organisations are well maintained to maximise sustainability, promote safety and maximise community benefit.
- Minimise risk to the Shire, financial or litigious, resulting from Community leases.

- Promote collocation and multipurpose development, where practicable, and strategic development of community facilities based on future requirements of the land and community needs.
- Ensure the value of community leases and Shire contribution to the community through community leases is recognised.

DEFINITIONS:

Community Group is an entity that carries on activities for a public purpose, or another entity whose primary object is not directed at making a profit.

Lease is a grant of interest in land.

Licence is a deed of agreement allowing for occupation of a parcel of land on a non-exclusive use basis. A licence is not an interest in land. As a matter of law, it simply authorises what would otherwise be a trespass. Licences do not provide the security of tenure offered under a lease agreement and can be cancelled without notice on provision of suitable grounds to do so.

POLICY STATEMENTS:

This policy provides the opportunity for the lessee to provide service(s) to the Community of the Shire of Wyndham East Kimberley. In some cases these services may not otherwise be provided or, would require funding from the Shire.

As community benefit is a key objective of this policy, Community leases should include mechanisms and terms that actively encourage benefit to the community. Lessees can promote community benefits through:

- Operating as per their permitted use and constitution
- Encouraging membership and participation
- Ensuring accessibility where appropriate.

Standard terms of Shire of Wyndham East Kimberley Community Leases are:

1. Permitted Use

Permitted use of a lease should be consistent with the purpose of (and management order for) the reserve land and the zoning of the land.

Incidental and ancillary use may be permitted to allow the community group to generate some profit and increase capacity, subject to the profit supporting the community use, and to allow for increased community use of the land as appropriate.

2. Lease Term

The standard lease term will be 10 years.

A longer lease term may be granted at the discretion of Council if the lessee can demonstrate the need for this extended term, as well as the financial sustainability to meet this need, through the lodgement of a business plan.

3. Lease Rent

Commencement rental will be \$500 per annum, excluding GST.

Rent review period for community leases will be every 3 years, unless otherwise determined by Council.

4. TERMINATION

The Council will reserve the right to terminate the lease if it is decided by the Council that an alternate use of the land may deliver a significant community benefit.

5. Development

Authorisation for any proposed development on leased land should be sought from the Shire prior to the submission of formal planning and building permit applications. The basis of such 'pre-approval' is to allow the Shire to determine the community need(s) based on long term strategic relevance and planning, which will help to avoid duplication and identify opportunities for collocation and multipurpose developments. Business plans prepared by community groups will assist in identifying proposed future development and opportunities for collocation.

At the conclusion of a lease, any buildings or infrastructure not removed from the lease site will become the property of the Shire, for the disposal or retention at the Shire's discretion and associated costs may be recovered from the lessee.

6. Maintenance Requirements

The lessee will be responsible for all maintenance of buildings, infrastructure or fixtures on the lease site.

7. Commercial Activity

It is recognised that in certain circumstances it is appropriate for the leased community facility to be utilised to generate profit, where that profit is used to support the lessee.

Council shall determine when profit-generating uses are acceptable having regard for the following:

- The use is ancillary and/or complementary to the main use
- The use is supported by the Reserve purpose
- The use provides an additional service not otherwise provided
- The community benefit outweighs the competitive advantage
- The use does not contravene any written law
- The use is not considered a nuisance or an unacceptable negative impact
- If the use is competing with a commercial enterprise.

Generally acceptable uses include:

1. Room or venue hire (for a limited time) for workshops, presentations, and functions generally; and
2. Food and beverage sales to members, and also to spectators during sporting events where planning, health and liquor licensing approvals have been obtained.

Any use outside what is generally acceptable will require consideration by Council, and if approved may affect determination of the annual lease rent.

8. Business Plans

The Shire at its discretion may request the submission of a business plan with any application to lease Shire managed land.

The development of a long term business plan is a key aspect in the setting of strategic direction and objectives for a group or activity and the associated planning, timeframes and resources required to achieve the strategic goals. It can also assist the sustainability and development of a group or activity.

A business plan in relation to a lease proposal should, as a minimum, outline:

- Long term plans or strategic direction over the next 10 years or more
- Detail with respect to infrastructure (buildings and associated works) needs
- Long term objectives with regard to current and potential future land use, and
- Long term financial objectives – to promote financial sustainability.

Business plans may assist in identifying opportunities for collocation and multipurpose development, and will be required in instances where there is a strategic future requirement for the land or a longer lease term is sought.

9. General

- 9.1. Collocation arrangements will be actively encouraged to ensure maximum community utilisation and benefit is obtained from limited community facilities.
- 9.2. Leases will only be granted over areas required for exclusive use. Any areas that can be used jointly or by the general public i.e. for access, parking, ablutions etc., will only be licenced.
- 9.3. Lessees are required to comply with all laws and statutory requirements which are imposed throughout the term of the lease.
- 9.4. Cost of the lease preparation (including advertising costs, valuations, legal fees), stamping and registration are to be met by the Lessee.
- 9.5. Any utility charges, rates and taxes levied against the land are to be paid by the Lessee.
- 9.6. It is strongly advised that the Lessee take out and maintain contents insurance for the contents within the leased premises.
- 9.7. The Lessee will hold public liability insurance to a minimum of \$20 million indemnifying the Shire of Wyndham East Kimberley from any loss resulting from the Lessees activities conducted within the leased premises.
- 9.8. Sub-leasing in principal is not supported unless it is required to enable multipurpose use of facilities or collocation. Sub-leasing agreements are not to be entered into without prior permission from the Shire and Minister for Lands.
- 9.9. Final Ministerial Approval will be required for all Crown land leases.
- 9.10. Registration of the lease will apply where required.

- 9.11. The Lessee will be required to complete a report at the request of the Shire detailing club and building details.
- 9.12. The Lessee may be approved by the Lessor to remain in possession of the leased premises following the expiry of the lease. In such circumstances the lessee will be deemed to be a tenant at will on a month to month basis.
- 9.13. Should a lease expire, a holding over clause will apply. Where there is a period between the expiry of a lease and the commencement of a new lease, the commencement date of the subsequent lease will be the date of agreement to the final draft lease by the Shire of Wyndham East Kimberley and the lessee.
- 9.14. The Shire as the Lessor will insure all buildings and other improvements with the Lessee to reimburse the cost of this insurance to the Shire.

EXPLANATORY NOTES:

This policy proposes to outline standard lease provisions and guiding principles for the lease of Reserves vested in the Shire of Wyndham East Kimberley to bodies exempt from the requirements of *Section 3.58 of the Local Government Act 1995 by Regulation 30 (2) (b) of the Local Government (Functions and General) Regulations 1996*, being charitable, benevolent, religious, cultural, educational, sporting or other like nature bodies, whose members are not entitled or permitted to receive any pecuniary profit from the bodies' transactions.

All leases are subject to the final approval of the Minister for Lands.

Under the *Land Administration Act 1997*, the Shire has been granted the care, control and management of numerous parcels of Reserve land which is set aside for various recreational and community purposes, along with the power to lease. As such, the Shire leases this Reserve land to various community groups, clubs, and recreational bodies for the purpose of supporting community use and providing community benefit.

Leases provide exclusivity and security of tenure. Leases are in most cases viewed favourably, if not essential, by some funding providers for capital works grants. The security of tenure encourages Lessees to develop and maintain facilities and lease sites for the benefit of their members, an ultimately the wider community.

The exclusivity of a lease does have disadvantages. Leases generally do not encourage collocation or shared facility use and can discourage the development of multipurpose facilities. Such partnership and shared facilities promote more efficient use of space and facilities maximising community asset utilisation. In certain situations therefore, it may be more appropriate for an arrangement for a non-exclusive use of the land or buildings through a Licence. This would then allow and encourage greater use and access by a number of clubs/community groups and the general public, as practicable.

It is noted that all community leases that are located on a foreshore must have a 10 metre buffer. In such cases it is appropriate for the Shire to issue a License maintaining access for pedestrians and for passive recreational purposes.

RISK:

Risk: Failure to comply with legislative requirements leading to damage of reputation and/or financial loss.

Control: Review policies and procedures in accordance with review schedule.

N Octoman declares an Impartiality Interest as she is a member of the Ord River Sports Club.

Cr Cooke declared an Impartiality Interest as she is a member of the Order River Sports Club.

Cr Perry declared an Impartiality Interest as her relatives are lawyers who have assisted in lease negotiations.

12.03.05. Request for Lease - Ord River Sports Club

DATE:	31/05/2016
AUTHOR:	Wayne Richards, Manager Community Services
RESPONSIBLE OFFICER:	Louise Gee, Director Community Development
ASSESSMENT NO:	A1160
FILE NO:	CP.07.3
DISCLOSURE OF INTERESTS:	Nil

VOTING REQUIREMENT

Absolute Majority

NOTE: President to call for a show of hands in favour (1/3 of members) to consider the revoking of the Council decision relating to Minute No. 10865 24 March 2015 Ordinary Council Meeting.

Cr Robinson, Cr Perry and Cr Cooke revoked Minute No 10865 from OMC dated 24 March 2015.

OFFICER'S RECOMMENDATION 1

<p>That Council:</p> <ol style="list-style-type: none">1. Revoke Minute No 10865 of the 24 March 2015 Ordinary Council Meeting: <i>“That Council directs the Acting Chief Executive Officer to:</i><ol style="list-style-type: none">1. Include in the lease terms that the lease rental fee should be set at \$500.00 plus GST for the first 12 months of the lease; and that the subsequent lease rental fee will be in accordance with an independent valuation.2. Include in the Lease terms that the lease rental will be reviewed after a 12 month period and then subsequently every 3 years.”
--

COUNCIL DECISION

Minute No: 11365

Moved: Cr B Robinson

Seconded: Cr S Cooke

That Council:

1. Revoke Minute No 10865 of the 24 March 2015 Ordinary Council Meeting:

“That Council directs the Acting Chief Executive Officer to:

1. Include in the lease terms that the lease rental fee should be set at \$500.00 plus GST for the first 12 months of the lease; and that the subsequent lease rental fee will be in accordance with an independent valuation.

2. Include in the Lease terms that the lease rental will be reviewed after a 12 month period and then subsequently every 3 years.”

Carried 6/2

For: Cr J Parker, Cr S Rushby, Cr S Cooke, Cr E Bolto, Cr B Robinson, Cr N Perry

Against: Cr K Wright, Cr D Spackman

VOTING REQUIREMENT

Simple Majority

OFFICER'S RECOMMENDATION 2

That Council:

- 1. Request the Chief Executive Officer to write to the Ord River Sports Club Inc. in response to the Club's email dated 16 April 2016 detailing that in accordance with Council Policy CP-3560 Leasing of Council Managed Reserve Land - Community:
 - a. The Ord River Sports Club Inc. must complete the following itemised roof maintenance actions as outlined in Attachment 3 - 1.1.1, 1.2.1, 1.2.2, 1.2.3, 1.3.1, 1.4.1, 1.4.2, 2.1.1, 2.4.1, 2.4.2, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.5.1, 3.5.2, 3.5.3, 4.1.1, 4.1.2, 4.2.1 to ensure there is no water ingress prior to signing the proposed lease.**
 - b. The Shire of Wyndham East Kimberley will complete the following itemised roof structural actions as outlined in Attachment 3 - 2.2.1, 2.3.1. Damaged ceiling tiles (items 3.1.3, 3.2.3, 3.3.3, 3.4.2, 4.1.3, 4.2.2) will be replaced on receiving confirmation from Ord River Sports Club Inc. of their completion of outstanding roof maintenance actions.**
 - c. The Shire will not accept responsibility for the building structure, or ongoing maintenance costs within the proposed lease.**
 - d. Rent for the proposed lease will be set at \$500.00 plus GST per annum, indexed for CPI (Perth) and reviewed every three years.**
 - e. Rates concession options for the term of the lease will not be included in the lease.**
 - f. The Shire will not accept responsibility for the Car Park area or access roads within the lease.**
 - g. The Lease is to include a clause reserving the Lessor's right to terminate the lease if this termination is deemed by Council to be of significant community benefit.****
- 2. Subject to the above inclusions, compliance with all terms within the draft lease, and approval from Department of Lands, authorise the Chief Executive Officer and Shire President to execute a lease with the Ord River Sports Club Inc.**

Cr Robinson foreshadowed a motion:

That recommendation 2, point 1 (d) be amended to read.

Rent for the proposed lease will be based on a valuation of fair market rent with a CPI rent review conducted annually, and a market review to be undertaken every five years at the cost of the Lessee, with a CPI rent review to be conducted all other years for the term of the lease.

COUNCIL DECISION

Minute No: 11366

Moved: Cr S Cooke

Seconded: Cr B Robinson

That Council:

- 1. Request the Chief Executive Officer to write to the Ord River Sports Club Inc. in response to the Club's email dated 16 April 2016 detailing that in accordance with Council Policy CP-3560 Leasing of Council Managed Reserve Land - Community:
 - a. The Ord River Sports Club Inc. must complete the following itemised roof maintenance actions as outlined in Attachment 3 - 1.1.1, 1.2.1, 1.2.2, 1.2.3, 1.3.1, 1.4.1, 1.4.2, 2.1.1, 2.4.1, 2.4.2, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.5.1, 3.5.2, 3.5.3, 4.1.1, 4.1.2, 4.2.1 to ensure there is no water ingress prior to signing the proposed lease.**
 - b. The Shire of Wyndham East Kimberley will complete the following itemised roof structural actions as outlined in Attachment 3 - 2.2.1, 2.3.1. Damaged ceiling tiles (items 3.1.3, 3.2.3, 3.3.3, 3.4.2, 4.1.3, 4.2.2) will be replaced on receiving confirmation from Ord River Sports Club Inc. of their completion of outstanding roof maintenance actions.**
 - c. The Shire will not accept responsibility for the building structure, or ongoing maintenance costs within the proposed lease.**
 - d. Rent for the proposed lease will be set at \$500.00 plus GST per annum, indexed for CPI (Perth) and reviewed every three years.**
 - e. Rates concession options for the term of the lease will not be included in the lease.**
 - f. The Shire will not accept responsibility for the Car Park area or access roads within the lease.**
 - g. The Lease is to include a clause reserving the Lessor's right to terminate the lease if this termination is deemed by Council to be of significant community benefit.****
- 2. Subject to the above inclusions, compliance with all terms within the draft lease, and approval from Department of Lands, authorise the Chief Executive Officer and Shire President to execute a lease with the Ord River Sports Club Inc.**

Lost 2/6

For: Cr J Parker, Cr N Perry

**Against: Cr K Wright, Cr S Rushby, Cr D Spackman, Cr E Bolto,
Cr B Robinson, Cr S Cooke**

Cr D Spackman moved an amendment to the motion to remove point g. re termination of lease.

COUNCIL DECISION

Minute No: 11367

Moved: Cr D Spackman

Seconded: Cr K Wright

That Council:

1. **Request the Chief Executive Officer to write to the Ord River Sports Club Inc. in response to the Club's email dated 16 April 2016 detailing that in accordance with Council Policy CP-3560 Leasing of Council Managed Reserve Land - Community:**
 - a. **The Ord River Sports Club Inc. must complete the following itemised roof maintenance actions as outlined in Attachment 3 - 1.1.1, 1.2.1, 1.2.2, 1.2.3, 1.3.1, 1.4.1, 1.4.2, 2.1.1, 2.4.1, 2.4.2, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.5.1, 3.5.2, 3.5.3, 4.1.1, 4.1.2, 4.2.1 to ensure there is no water ingress prior to signing the proposed lease.**
 - b. **The Shire of Wyndham East Kimberley will complete the following itemised roof structural actions as outlined in Attachment 3 - 2.2.1, 2.3.1. Damaged ceiling tiles (items 3.1.3, 3.2.3, 3.3.3, 3.4.2, 4.1.3, 4.2.2) will be replaced on receiving confirmation from Ord River Sports Club Inc. of their completion of outstanding roof maintenance actions.**
 - c. **The Shire will not accept responsibility for the building structure, or ongoing maintenance costs within the proposed lease.**
 - d. **Rent for the proposed lease will be set at \$500.00 plus GST per annum, indexed for CPI (Perth) and reviewed every three years.**
 - e. **Rates concession options for the term of the lease will not be included in the lease.**
 - f. **The Shire will not accept responsibility for the Car Park area or access roads within the lease.**
2. **Subject to the above inclusions, compliance with all terms within the draft lease, and approval from Department of Lands, authorise the Chief Executive Officer and Shire President to execute a lease with the Ord River Sports Club Inc.**

Lost 3/5

For: Cr K Wright, Cr D Spackman, Cr S Rushby

Against: Cr J Parker, Cr E Bolto, Cr S Cooke, Cr N Perry, Cr B Robinson

COUNCIL DECISION

Minute No: 11368

Moved: Cr B Robinson

Seconded: Cr S Cooke

That Council:

- 1. Request the Chief Executive Officer to write to the Ord River Sports Club Inc. in response to the Club's email dated 16 April 2016 detailing that in accordance with Council Policy CP-3560 Leasing of Council Managed Reserve Land - Community:
 - a. The Ord River Sports Club Inc. must complete the following itemised roof maintenance actions as outlined in Attachment 3 - 1.1.1, 1.2.1, 1.2.2, 1.2.3, 1.3.1, 1.4.1, 1.4.2, 2.1.1, 2.4.1, 2.4.2, 3.1.1, 3.1.2, 3.2.1, 3.2.2, 3.3.1, 3.3.2, 3.4.1, 3.5.1, 3.5.2, 3.5.3, 4.1.1, 4.1.2, 4.2.1 to ensure there is no water ingress prior to signing the proposed lease.**
 - b. The Shire of Wyndham East Kimberley will complete the following itemised roof structural actions as outlined in Attachment 3 - 2.2.1, 2.3.1. Damaged ceiling tiles (items 3.1.3, 3.2.3, 3.3.3, 3.4.2, 4.1.3, 4.2.2) will be replaced on receiving confirmation from Ord River Sports Club Inc. of their completion of outstanding roof maintenance actions.**
 - c. The Shire will not accept responsibility for the building structure, or ongoing maintenance costs within the proposed lease.**
 - d. Rent for the proposed lease will be based on a valuation of fair market rent with a CPI rent review conducted annually, and a market review to be undertaken every five years at the cost of the Lessee, with a CPI rent review to be conducted all other years for the term of the lease.**
 - e. Rates concession options for the term of the lease will not be included in the lease.**
 - f. The Shire will not accept responsibility for the Car Park area or access roads within the lease.**
 - g. The Lease is to include a clause reserving the Lessor's right to terminate the lease if this termination is deemed by Council to be of significant community benefit.****
- 2. Subject to the above inclusions, compliance with all terms within the draft lease, and approval from Department of Lands, authorise the Chief Executive Officer and Shire President to execute a lease with the Ord River Sports Club Inc.**

Lost 3/5

For: Cr S Cooke, Cr E Bolto, Cr B Robinson

Against: Cr J Parker, Cr K Wright, Cr S Rushby, Cr D Spackman, Cr N Perry

The CEO recommended that the item be brought back to a Briefing Session before returning to the next Ordinary Council Meeting.

PURPOSE

For Council to consider the Ord River Sports Club Inc. (ORSC) response to the draft lease provided.

NATURE OF COUNCIL'S ROLE IN THE MATTER

Leader - plan and provide direction through policy and practices.

BACKGROUND/ PREVIOUS CONSIDERATIONS BY COUNCIL/ COMMITTEE

Lease negotiations with the ORSC have been ongoing for a number of years. The most recent ORSC lease expired on 25 April 2009 and since this date the Club has operated as a tenant at will. The history of the negotiations between the Shire and the Club for this new lease is long and complex with a number of issues preventing or slowing this process.

Lease negotiations resumed in January 2015 after a lengthy period of stagnation. The Shire's draft Community lease template was provided to the ORSC on 16 April 2015. The ORSC was informed that this template was still being developed and therefore was subject to change and modification by the Shire. In July 2015 the ORSC responded with a range of queries. These queries were amicably discussed through a number of meetings and emails.

The reviewed draft lease was forwarded to the ORSC on 17 December 2015. The terms of the draft lease are in accordance with Council Policy CP/PMG 3780 Leasing of Council Managed Reserve - Community (Attachment 1).

On 15 April 2016 the Club provided written comment on the draft lease (Attachment 2). This response lists three outstanding issues as barriers to finalising the lease:

- Repairs of the roof: The Shire is to ensure that there are no leaks from the ORSC roof prior to the commencement of the lease
- Responsibility for the car park and access roads: The Shire is to accept responsibility for the maintenance of the car park and access roads. It should be noted that within the reviewed draft lease document provided by ORSC there was an amended clause identified through track changes that placed responsibility for all building maintenance on the Shire.
- Rent and rates concessions: The Shire is to charge \$500.00 per annum fixed for five years and then indexed for CPI. In addition the ORSC requested that Rates Concession options will apply for the term of the lease agreement.

Legal advice was sought regarding this response, this legal advice was received Monday 18 April 2016 and is included as a confidential attachment (Confidential Attachment 3).

This matter was brought to the 10 May 2016 Council briefing, the first scheduled briefing following its receipt , and is now presented to the first available Ordinary Council Meeting for consideration.

It should also be noted that on 12 May 2016 the Shire received advice from its insurers that while they are continuing to insure the building on an 'Indemnity Cover' basis (subject to the relevant policy terms/conditions), given the roof is currently not fully waterproof, coverage currently excludes any damage by stormwater and/or water ingress.

STATUTORY IMPLICATIONS

Town Planning Scheme No. 7 – Kununurra and Environs

The land, being portion of Reserve 33112, is Scheme Reserve for the purpose of Parks and Recreation under Town Planning Scheme No. 7 – Kununurra and Environs.

The objective of the Parks and Recreation reserve is '*to identify and protect land utilised or intending to be utilised for local recreational needs*'.

Clause 2.2.1 of TPS states that where an application for Planning Approval is made with respect to land within a Scheme Reserve, the Council shall have regard to the ultimate purposes intended for the Reserve.

Under the development standards on Table 2 of the Town Planning Scheme No. 7. As a Hotel/Tavern land use, the ORSC is required to provide one bay for every 6m² of bar and public area. Based on calculations for the ORSC Public Building approval, the interior public area at the Club is 330m². Therefore there would be a requirement for 55 car park spaces.

If the outdoor public area is included, this increases to 730m² requiring 110 spaces however the Public Building Approval is capped at 400 persons (equivalent of 400m²) based on the number of toilets available. A 400m² venue would require 61 spaces.

There are 65 designated car parks at the ORSC in its current configuration.

In the *Draft Town Planning Scheme No. 9, Schedule 4 - Development*, standards include "Club Premises". Under this definition a Club would be required to provide 1 bay for every 4 persons capable of being accommodated. For example, the Ord River Sports Club Public Building Approval permits a maximum of 400 persons the required number of car parks under draft TPS 9 is calculated at 100.

This information is provided to indicate the importance, and obligation of the ORSC to provide parking.

Land Administration Act 1997

Reserve 33112 is reserved under the *Land Administration Act 1997* (LAA) for the purpose of Sporting Club and Associated Activities.

The Shire holds the management order for this reserve with power to lease for a maximum term of 21 years, subject to consent of the Minister for Lands.

Local Government Act 1995

Under section 3.58 of the Local Government Act 1995 (LGA), the leasing of land is included as a form of disposal of property and is required to be undertaken in accordance with this section of the LGA.

However, there are exemptions from the requirements outlined in regulation 30 of the *Local Government (Functions & General) Regulations 1996*, which states that a disposition of land is an exempt disposition if –

- (i) the land is disposed of to a body, whether incorporated or not -
- (ii) the objects of which are of a charitable, benevolent, religious, cultural, educational, recreational, sporting or other like nature; and
- (iii) the members of which are not entitled or permitted to receive any pecuniary profit from the body's transactions;”

As such, the proposed lease to the Ord River Sports Club Inc. is considered to be an exempt disposition.

POLICY IMPLICATIONS

The draft lease complies with CP/PMG 3780 Leasing of Council Managed Reserve Land - Community.

The three requests listed by the Ord River Sports Club do not comply with this Policy.

Roof Repairs/Car Park/Access Road: Council's Policy CP/PMG 3780 Leasing of Council Managed Reserve Land - Community states

“5. MAINTENANCE REQUIREMENTS

The lessee is responsible for any maintenance for buildings and infrastructure on the Land.

Responsibility for maintenance of any buildings and/or infrastructure which Council wishes to be retained at the expiry of the lease will be negotiated with the lessee, taking into consideration the existing condition of the property and the term of the lease.”

Rent/Rates Concession: Council's Policy CP/PMG-3780 Leasing of Council Managed Reserve Land - Community states the following:-

“3. Lease Rent

Commencement rental will be \$500 per annum, excluding GST.

Rent review period for community leases will be every 3 years, unless otherwise determined by Council.”

The request by the Ord River Sports Club Inc. for their yearly rental to be fixed for \$500 per year for the first 5 years is not in accordance with Council's Policy CP/PMG-3780 Leasing of Council Managed Reserve Land - Community. This request also does not meet two of the objectives outlined in this Policy, as follows:-

- Encourage clarity and consistency in the Shire's community leases and associated processes
- Promote equity across all Shire community leases without favour or prejudice to individual organisations.

The Ord River Sports Club Inc. in accordance with CP/FIN-3209 Rates Concessions Policy (Rateable Land), like all other "not for profit" community groups, may be granted a concession by Council. The percentage of the concession is discretionary. Removal of the right of Council to not grant a concession, removes the Council's discretionary powers provided by section 6.47 of the Local Government Act 1995 and the provisions of Council's Policy CP/FIN-3209 Rates Concessions (Rateable Land).

FINANCIAL IMPLICATIONS

The proposed lease rental under the draft lease is \$500.00 plus GST per annum indexed for CPI (Perth). This is an increase from the current rental of \$100.00 per annum.

Roof Repairs: To date the Shire has spent \$17,501 plus GST on the ORSC roof.

The remaining works required are detailed within the May 2016 ORSC Roof Report (Attachment 3) however as this report was received 25 May 2016, Officers have not yet been able to obtain quotes for the remaining structural works.

Car Park/Access Road: The car park/access road and garden area is approximately 5,200m² with a total car park area of 3,200m². As an estimate of possible future costs to the Shire of accepting this responsibility, a car park of 3,200m² would cost approximately \$260,000 to reconstruct, and a further \$42,000 every 20 years.

Rent/Rates Concession: Fixing the rental at \$500 (excluding GST) for the first five (5) years will result in a reduction of income of \$1,160 over the 21 year period (assuming a 2.5% CPI) to the Shire through a reduced rental. The estimated rates applicable to this lease based on 2015/16 rates are \$9,676.04.

STRATEGIC IMPLICATIONS

Strategic Community Plan 2012-2022

Goal 1: Strong leadership and governance that underpins a more strategic approach to community engagement, regional development and organisational sustainability

Objective 1.4: Business innovation, efficiency and improved service

Strategy 1.4.1: Ensure legislative compliance and follow best practice principles in planning and service delivery

RISK IMPLICATIONS

Future financial costs to the Shire, both specific to the Ord River Sports Club Lease and the precedent set for other Community Leases.

Until the roof repair work is completed, the ORSC building will remain uninsured for any water ingress damage.

COMMUNITY ENGAGEMENT

There has been ongoing communication with the Ord River Sports Club in relation to this item.

COMMENTS

The Shire is supportive of the Ord River Sports Club and recognises the community benefit offered by the Club, in particular over the last 12 months. As stated in the Community Lease Policy, community leases support *“the organisation in conducting their activities/services, and in doing so, provides benefit to the wider community. In many cases this arrangement provides a service to the community that would otherwise not be available or would require significant Shire input.”*

The terms proposed by the Ord River Sports Club Inc. are outside Council's Community Lease Policy, and place additional financial responsibility and therefore risk on the Shire. In doing so this either creates an inequity with other community leases (i.e. the Shire is providing financial support to one organisation and not others), or the financial risk is multiplied with each organisation that receives the same terms. There are currently 16 community organisations either with a community lease, or in the process of negotiating a community lease and with many of these leases likely to be for 21 year terms, the financial and resource impact on the Shire would be significant.

To summarise the specific requests made by the ORSC:

Roof Repairs:

There are two main disagreements in relation to the roof repairs.

1. Whether the structural works carried out by the Shire have been completed. The final roof report received 25 May 2016 confirms that all work undertaken by the Shire as per the March 2015 Council Resolution, have been completed. The report has however identified additional structural issues, please refer to Attachment 4 items 2.2.1 and 2.3.1. The report also identifies the requirement to replace a number of ceiling tiles. It is recommended that the Shire carry out actions 2.2.1 and 2.3.1, and upon advice from the ORSC that the remaining work has been completed, replace the damaged ceiling tiles.
2. Whether the Shire is responsible for all roof maintenance or just the structural component of this. It is believed that the legal advice provided in March 2015

clarifies this: *“SWEK would be responsible for performing any structural repairs at the premises such as work to repair the roof. However, ORSC would be liable to maintain the premises and repair non-structural defects.”*

The ORSC have requested that the roof be rectified so that there is no water ingress. It is considered that the Shire is only responsible for structural components, the summary table (Attachment 4), identifies the remaining works and the proposed responsible organisation. It should be noted that within the terms of the draft lease, the ORSC must hold insurance. Given it has been advised that full insurance will not be provided until the roof is water proof these works must be completed prior to the execution of the lease.

Car Parking and Access Roads:

The provision of car parking is a condition of development consent, with the number of car parking spaces being reflective of the nature of the development, number of employees, number of patrons, etc. Car parking is therefore integral to the functioning of the Club, and is an asset that services the Club and its members.

It is recommended that the responsibilities for maintenance of the car park, access roads and buildings remain as per the draft lease in accordance with Council’s Policy CP/PMG 3780 Leasing of Council Managed Reserve Land - Community.

Rent/Rates Concessions

It is believed that the Club has demonstrated the community and sporting focus that was desired. Based on this, it is reasonable that the Council consider the removal of the requirement to review the rental based on an independent valuation after a 12 month period. The inclusion of a clause in the lease regarding the need for an independent valuation after a 12 month period, which may result in an increased rental, introduces uncertainty for the lessee, and clearly does not articulate future lessee obligations regarding rental amounts..

Regarding fixing the rent for a five year period, it is recommended that the fee rent be set in accordance with CP/PMG Leasing of Council Managed Reserve – Community. This rate would be \$500.00 (excluding GST) per annum indexed for CPI annually.

Regarding the request for Rates Concession Options for the term of the lease agreement, it is recommended that the Club should be treated without any favour, and Council be able to utilise its discretionary powers in regard to the percentage of any future concession in accordance with CP/FIN-3209 Rates Concessions Policy (Rateable Land). Therefore rate concession options should not be included in the terms of the new lease agreement.

ATTACHMENTS - Item 12.03.5

- Attachment 1 - CP/PMG 3780 Leasing of Council Managed Reserve - Community
- Attachment 2 - Ord River Sports Club response to Draft Lease 16 April 2016
- Attachment 3 - May 2016 ORSC Roof Report
- Attachment 4 - Summary of required works based on May 2016 ORSC Roof Report
- Confidential Attachment 3 - Legal advice received regarding the ORSC response



POLICY NO	CP/PMG-3780	
POLICY	Leasing of Council Managed Reserve Land - Community	
RESPONSIBLE DIRECTORATE	Community Development	
RESPONSIBLE OFFICER	Manager Community Services	
COUNCIL ADOPTION	Date: 15/05/2012	Resolution No:
REVIEWED/MODIFIED	Date: 23/06/2015	Resolution No: 10990
	Date:	Resolution No:
REVIEW DATE	Date: June 2017	
LEGISLATION	<i>Local Government Act 1995</i> <i>Local Government (Functions and General) Regulations 1996</i> <i>Land Administration Act 1997</i>	
RELATED POLICIES	CP/PMG-3781 - Leasing of Council Managed/Owned Land - Commercial	
RELATED ORGANISATIONAL DIRECTIVES	N/A	

PURPOSE:

A community lease is an agreement between the Shire and an external organisation to manage a reserve or facility on behalf of the Shire and for the community. This agreement supports the organisation in conducting their activities/services, and in doing so, provides benefit to the wider community. In many cases this arrangement provides a service to the community that would otherwise not be available or would require significant Shire input.

The Shire of Wyndham East Kimberley seeks to support community groups in increasing capacity and improving facilities within the Shire that result in strengthening of the community helping to build vibrant, inclusive and healthy communities.

The objectives of this policy are to:

- Ensure Community leases maximise benefit to the community of the Shire of Wyndham East Kimberley by supporting community organisations in the provision of services, facilities and events.
- Ensure the economic and environmental impact of community leases on the Shire and the community is considered.
- Encourage clarity and consistency in the Shire's community leases and associated processes.
- Promote equity across all Shire community leases without favour or prejudice to individual organisations.
- Ensure assets leased to community organisations are well maintained to maximise sustainability, promote safety and maximise community benefit.
- Minimise risk to the Shire, financial or litigious, resulting from Community leases.

- Promote collocation and multipurpose development, where practicable, and strategic development of community facilities based on future requirements of the land and community needs.
- Ensure the value of community leases and Shire contribution to the community through community leases is recognised.

DEFINITIONS:

Community Group is an entity that carries on activities for a public purpose, or another entity whose primary object is not directed at making a profit.

Lease is a grant of interest in land.

Licence is a deed of agreement allowing for occupation of a parcel of land on a non-exclusive use basis. A licence is not an interest in land. As a matter of law, it simply authorises what would otherwise be a trespass. Licences do not provide the security of tenure offered under a lease agreement and can be cancelled without notice on provision of suitable grounds to do so.

POLICY STATEMENTS:

This policy provides the opportunity for the lessee to provide service(s) to the Community of the Shire of Wyndham East Kimberley. In some cases these services may not otherwise be provided or, would require funding from the Shire.

As community benefit is a key objective of this policy, Community leases should include mechanisms and terms that actively encourage benefit to the community. Lessees can promote community benefits through:

- Operating as per their permitted use and constitution
- Encouraging membership and participation
- Ensuring accessibility where appropriate.

Standard terms of Shire of Wyndham East Kimberley Community Leases are:

1. Permitted Use

Permitted use of a lease should be consistent with the purpose of (and management order for) the reserve land and the zoning of the land.

Incidental and ancillary use may be permitted to allow the community group to generate some profit and increase capacity, subject to the profit supporting the community use, and to allow for increased community use of the land as appropriate.

2. Lease Term

The standard lease term will be 10 years.

A longer lease term may be granted at the discretion of Council if the lessee can demonstrate the need for this extended term, as well as the financial sustainability to meet this need, through the lodgement of a business plan.

3. Lease Rent

Commencement rental will be \$500 per annum, excluding GST.

Rent review period for community leases will be every 3 years, unless otherwise determined by Council.

4. Development

Authorisation for any proposed development on leased land should be sought from the Shire prior to the submission of formal planning and building permit applications. The basis of such 'pre-approval' is to allow the Shire to determine the community need(s) based on long term strategic relevance and planning, which will help to avoid duplication and identify opportunities for collocation and multipurpose developments. Business plans prepared by community groups will assist in identifying proposed future development and opportunities for collocation.

At the conclusion of a lease, any buildings or infrastructure not removed from the lease site will become the property of the Shire, for the disposal or retention at the Shire's discretion and associated costs may be recovered from the lessee.

5. Maintenance Requirements

The lessee will be responsible for all maintenance of buildings, infrastructure or fixtures on the lease site.

6. Commercial Activity

It is recognised that in certain circumstances it is appropriate for the leased community facility to be utilised to generate profit, where that profit is used to support the lessee.

Council shall determine when profit-generating uses are acceptable having regard for the following:

- The use is ancillary and/or complementary to the main use
- The use is supported by the Reserve purpose
- The use provides an additional service not otherwise provided
- The community benefit outweighs the competitive advantage
- The use does not contravene any written law
- The use is not considered a nuisance or an unacceptable negative impact
- If the use is competing with a commercial enterprise.

Generally acceptable uses include:

1. Room or venue hire (for a limited time) for workshops, presentations, and functions generally; and
2. Food and beverage sales to members, and also to spectators during sporting events where planning, health and liquor licensing approvals have been obtained.

Any use outside what is generally acceptable will require consideration by Council, and if approved may affect determination of the annual lease rent.

7. Business Plans

The Shire at its discretion may request the submission of a business plan with any application to lease Shire managed land.

The development of a long term business plan is a key aspect in the setting of strategic direction and objectives for a group or activity and the associated planning, timeframes and resources required to achieve the strategic goals. It can also assist the sustainability and development of a group or activity.

A business plan in relation to a lease proposal should, as a minimum, outline:

- Long term plans or strategic direction over the next 10 years or more
- Detail with respect to infrastructure (buildings and associated works) needs
- Long term objectives with regard to current and potential future land use, and
- Long term financial objectives – to promote financial sustainability.

Business plans may assist in identifying opportunities for collocation and multipurpose development, and will be required in instances where there is a strategic future requirement for the land or a longer lease term is sought.

8. General

- 8.1. Collocation arrangements will be actively encouraged to ensure maximum community utilisation and benefit is obtained from limited community facilities.
- 8.2. Leases will only be granted over areas required for exclusive use. Any areas that can be used jointly or by the general public i.e. for access, parking, ablutions etc., will only be licenced.
- 8.3. Lessees are required to comply with all laws and statutory requirements which are imposed throughout the term of the lease.
- 8.4. Cost of the lease preparation (including advertising costs, valuations, legal fees), stamping and registration are to be met by the Lessee.
- 8.5. Any utility charges, rates and taxes levied against the land are to be paid by the Lessee.
- 8.6. It is strongly advised that the Lessee take out and maintain contents insurance for the contents within the leased premises.
- 8.7. The Lessee will hold public liability insurance to a minimum of \$20 million indemnifying the Shire of Wyndham East Kimberley from any loss resulting from the Lessees activities conducted within the leased premises.
- 8.8. Sub-leasing in principal is not supported unless it is required to enable multipurpose use of facilities or collocation. Sub-leasing agreements are not to be entered into without prior permission from the Shire and Minister for Lands.
- 8.9. Final Ministerial Approval will be required for all Crown land leases.
- 8.10. Registration of the lease will apply where required.
- 8.11. The Lessee will be required to complete a report at the request of the Shire detailing club and building details.

- 8.12. The Lessee may be approved by the Lessor to remain in possession of the leased premises following the expiry of the lease. In such circumstances the lessee will be deemed to be a tenant at will on a month to month basis.
- 8.13. Should a lease expire, a holding over clause will apply. Where there is a period between the expiry of a lease and the commencement of a new lease, the commencement date of the subsequent lease will be the date of agreement to the final draft lease by the Shire of Wyndham East Kimberley and the lessee.
- 8.14. The Shire as the Lessor will insure all buildings and other improvements with the Lessee to reimburse the cost of this insurance to the Shire.

EXPLANATORY NOTES:

This policy proposes to outline standard lease provisions and guiding principles for the lease of Reserves vested in the Shire of Wyndham East Kimberley to bodies exempt from the requirements of *Section 3.58 of the Local Government Act 1995 by Regulation 30 (2) (b) of the Local Government (Functions and General) Regulations 1996*, being charitable, benevolent, religious, cultural, educational, sporting or other like nature bodies, whose members are not entitled or permitted to receive any pecuniary profit from the bodies' transactions.

All leases are subject to the final approval of the Minister for Lands.

Under the *Land Administration Act 1997*, the Shire has been granted the care, control and management of numerous parcels of Reserve land which is set aside for various recreational and community purposes, along with the power to lease. As such, the Shire leases this Reserve land to various community groups, clubs, and recreational bodies for the purpose of supporting community use and providing community benefit.

Leases provide exclusivity and security of tenure. Leases are in most cases viewed favourably, if not essential, by some funding providers for capital works grants. The security of tenure encourages Lessees to develop and maintain facilities and lease sites for the benefit of their members, an ultimately the wider community.

The exclusivity of a lease does have disadvantages. Leases generally do not encourage collocation or shared facility use and can discourage the development of multipurpose facilities. Such partnership and shared facilities promote more efficient use of space and facilities maximising community asset utilisation. In certain situations therefore, it may be more appropriate for an arrangement for a non-exclusive use of the land or buildings through a Licence. This would then allow and encourage greater use and access by a number of clubs/community groups and the general public, as practicable.

It is noted that all community leases that are located on a foreshore must have a 10 metre buffer. In such cases it is appropriate for the Shire to issue a License maintaining access for pedestrians and for passive recreational purposes.

RISK:

Risk: Failure to comply with legislative requirements leading to damage of reputation and/or financial loss.

Control: Review policies and procedures in accordance with review schedule.

From: [Louise Gee](#)
To: [Wayne Richards](#)
Subject: FW: ORD RIVER SPORTS CLUB Inc. - Our final reviewed version of the 21 Year Lease.
Date: Tuesday, April 26, 2016 4:21:00 PM
Attachments: [Ord River Lease Submitted 15th April 16.docx](#)

Regards

Louise Gee
Director Community Development

SHIRE of WYNDHAM | EAST KIMBERLEY

20 Coolibah Drive, PO BOX 614 Kununurra WA 6743 | T: (08) 9168 4100 | M: 0408261882 | F: (08) 9168 1798 | www.swek.wa.gov.au

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 Please consider the environment before printing this email.

From: Ord River Sports Club [mailto:ordriversportsclub@bigpond.com]
Sent: Friday, 15 April 2016 3:59 PM
To: Louise Gee; ceo
Cc: 'Mark Kent'; 'Tim Morgan'; Greg Chamberlain; Jemma Waters; Jen Ninnette; ORSC -OFFICE
Subject: ORD RIVER SPORTS CLUB Inc. - Our final reviewed version of the 21 Year Lease.

Louise / Carl

Please find attached our final review of the 21 Year Lease document for the Lot and space where Ord River Sports Club Inc. has been located since 1969.

We have 3 main sticking points, which we believe the shire can accept as reasonable request and acceptance of responsibility:

Issue 1:

The Roof repairs

The repairs have been unsuccessful, and for the limited wet season that we have endured, have substantial water ingress inside the building. The damage has been limited mainly to the Storage room space (tiles completely destroyed, and running water from the roof space when raining.), there is still significant quantity of tile damage throughout the public access space - mainly water stains, which will need replacing.

If this is rectified properly, so that there is NO water ingest into the building via the roof, as per clause 17.1, will be treated as an acceptance of the terms specified.

The Reason

We are unable to reinsure the asset in its current state.

In this lease Schedule 1: Item 13 we are given responsibility and ownership of the asset again (we built it). We acknowledge and accept this, and want this to be the case. We very much want to have the asset value on our books, and thus free up our financial constraints and restrictions currently in place.

Issue 2:

The Car park and access roads.

These are assets within the Lease space, which we would like the shire to be responsible for.

We are a Non For Profit organisation, with a long history of supporting the community and sports within our town.

Town roads and car parks are assets that bring no actual value to the land or leasee, yet can be utilized by others at anytime, with no financial benefit to our organisation.

The reason

The town of Kununurra and surrounding facilities and activities utilize this asset.

As per clause 10. and Schedule 2 clause 7 Maintenance, this would include the Road Reserve (verge) as the responsibility of the shire.

Finally Concern

The RENT.

As a show of faith and trust we ask the rent be fixed for the first 5 years at \$500 and then the applicable calculations in clause 5. be applied.

We would like it written into the document, Rate Concession options will apply for the term of the lease agreement.

Reason

We are a Non For Profit community asset for the community.

We are cheap to join for the all community members, and as operational costs grow with Horizon Power, Water Corporation, Shire Rates, Suppliers and applicable licenses and permits, we don't want to price the membership and cost beyond that of our communities capabilities.

We give back alot to the members, community and sporting groups, in sponsorship, free meeting space to sporting groups, and provide the little extras which are not found in the rest of the town.

If these terms are accepted, I have been authorised by the board of Ord River Sports Club Inc. to agree to sign off the Final document : Lease - Reserve (Lot 2313 on Plan 189192)
SHIRE OF WYNDHAM EAST KIMBERLEY ("Lessor") AND **ORD RIVER SPORTS CLUB INC**
("Lessee")

We look forward to finalizing this agreement and ending this 7 year stalemate.

Regards,

Greg Chamberlain

President



Ord River Sports Club Inc.

PO BOX 54

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15-021

24 May 2016

Ms Jill Jilley
Shire of Wyndham East Kimberley
PO Box 614
KUNUNURRA WA 6743

Dear Jill

ord river sports club – roof structural condition report

Pritchard Francis was commissioned by the Shire of Wyndham East Kimberley to undertake an inspection of the visible structural elements of the existing Ord River Sports Club Roof. The inspection was conducted to assess the overall condition of the roof in order to outline maintenance issues and recommendations for maintenance and structural works.

The inspection was completed by Alan Byrne from Pritchard Francis on 11 May 2016 and consisted of visual assessment of accessible structural elements. We note this report is a structural condition assessment only and does not include analysis or certification of the existing structure.

This report should be read in conjunction with previous reports issued by Pritchard Francis on the 10 February 2015 and the 2 November 2015. Please contact our office to obtain a copy of these reports if required.

This report is separated into sections based on the location of the items. As required, recommendations are presented following each observation. Please refer to the annotated plan for location of each of the items of note referenced in each of the sections below.

1. Original Building External Roof

- 1.1 The original building roof sheeting is attached to the support structure by means of roofing tek screws. The rubber washers at numerous locations are showing significant signs of weathering which may result in water ingress at these locations. See Photos 1-4. **Recommendation:** All existing roofing tek screws showing signs of weathering are to be removed, replaced and adequately sealed.
- 1.2 There are numerous items of mechanical plant and ventilation installed on the original roof. Generally the roof appears to be adequately sealed with adequate roof drainage around the majority of these fixtures. See Photos 5-6. However, in a number of locations there is inadequate sealing and inadequate drainage around the fixtures which has resulted in water ponding and likely water ingress. See Photos 7-18. **Recommendation:** All sealed areas are to be resealed and monitored to ensure adequate water tightness. All areas where water ponding is evident are to be provided with alternative paths for water to flow to the box gutters and off the roof structure. Areas where flashing has been installed are to ensure the flashing is installed in such a manner as to avoid and water ponding. Refer to the Lysaght Architectural Detailing Manual for Roof and Wall Flashing for further guidance. A copy of this guide is attached at the end of this document.
- 1.3 There are some instances of holes in the roof sheeting that require rectification. See Photo 19. **Recommendation:** Any holes found in the roof sheeting are to be adequately sealed to ensure no further water ingress can occur. All roof sheeting should be monitored for any further signs of corrosion.



- 1.4 The box gutters are showing some significant signs of weathering. See Photo 1 and Photos 20-23. At the time of inspection it was unclear if this was a source of water ingress. Due to the weathered nature of the gutter it was also unclear if water is ponding in the gutter. **Recommendation:** The box gutters should be tested for water ingress and water ponding. We recommend the gutters be filled and monitored for signs of water ingress. If there are any signs of ingress these areas should be resealed and monitored to ensure adequate water tightness. Box gutters are to be periodically monitored to ensure they are kept clear of debris.

2. Function Centre Extension External Roof

- 2.1 The function centre extension roof flashing is attached to the roof sheeting by means of roofing tek screws. The rubber washers at these locations are showing significant signs of weathering which may result in water ingress at these locations. See Photos 24-26. **Recommendation:** All existing roofing tek screws are to be removed, replaced and adequately sealed.
- 2.2 The roof flashing on the eastern side of the roof has been inadequately installed and is not correctly lapping with the roof sheeting. Although this does not appear to be causing any issues presently it may become a maintenance issue in the future. See Photo 27. **Recommendation:** Install the roof flashing to ensure it covers the sheeting lap which will ensure that any future issues that may arise are visible and easily maintained.
- 2.3 The roof flashing on the western side of the roof has been inadequately installed and is falling back towards the parapet wall and not onto the roof sheeting. As a result of this there are signs of water ponding on the flashing and possible water ingress. See Photos 28-29. **Recommendation:** Install the roof flashing to ensure it takes all water away from the parapet wall and onto the roof sheeting to be discharged through the box gutter.
- 2.4 The roof sheeting is showing some signs of weathering and rust. This appears to be a result of some conduit installed on the roof restricting the drainage locally. See Photos 28-29. **Recommendation:** The conduit should be mounted to the parapet wall. The roof sheeting should be monitored for any signs of water ingress. If any water ingress occurs the sheeting should be replaced or adequately flashed over.

3. Original Building Internal Roof Space

- 3.1 The ceiling tiles in the male toilet are showing some signs of water ingress. This area corresponds to the location of a roofing vent above. The vent cap above is not currently installed correctly and does not adequately cover the vent opening. See Photo 30. **Recommendation:** Rectify roof vent cap installation. Area is to be monitored for any signs of further water ingress. Replace ceiling tiles as required.
- 3.2 The ceiling above the pool tables in the main bar is showing significant signs of water ingress. Upon inspection there was a significant amount of water sitting on the insulation below the roof sheeting. This area corresponds to the location of a rotary roof vent and a flashed area above. See Photos 7-9. It should be noted that rotary roof vents are a likely source of water ingress from wind driven rain. **Recommendation:** Re-seal the area around the rotary roof vent. Area is to be monitored for any signs of further water ponding or water ingress. Replace ceiling tiles as required.
- 3.3 The ceiling tiles in the south eastern corner of the main bar are showing some signs of water ingress. See Photo 31. **Recommendation:** Re-seal the area between the parapet wall and the box gutter above. Area is to be monitored for any signs of further water ingress. Replace ceiling tiles as required.
- 3.4 There are signs of water ingress in the keg and liquor store area. This corresponds to the location of the weathered roofing tek screws above and some areas where water is ponding on the roof structure. See Photos 1-4 and Photos 32-34. It has been previously noted that condensate from refrigeration lines to the chiller units has been a source of moisture in the ceiling space. **Recommendation:** Rectify roof tek screws as noted above. Ensure all water on the roof can flow to the box gutter and off the roof structure. Area is to be monitored for any signs of further water ingress. Ensure there is no moisture in the ceiling space as a result of the refrigeration lines. Replace ceiling tiles as required.
- 3.5 The old kitchen area has had some vents removed and the sheeting has been re-clad. This installation is currently inadequate and causing a significant amount of water ingress. See Photos 15-17 and Photos 35-36.



Recommendation: All areas where water ponding is evident are to be provided with alternative paths for water to flow to the box gutters and off the roof structure. Areas where flashing has been installed are to ensure the flashing is installed in such a manner as to avoid and water ponding. Refer to the Lysaght Architectural Detailing Manual for Roof and Wall Flashing for further guidance. A copy of this guide is attached at the end of this document. Area is to be monitored for any signs of further water ponding and water ingress.

4. Function Centre Extension Internal Roof Space

- 4.1 There were signs of some water ingress central to the western parapet location which has been sealed. The location corresponds to the inadequately installed roof flashing above. As outlined in item 2.3 the roof flashing has been installed such that water is ponding on the flashing and not flowing onto the roof sheeting to the box gutter. See Photos 28-29. **Recommendation:** Rectify roof gutter as noted above. Sealed area is to be monitored for any signs of water ingress. If there is any sign of further water ingress the area is to be re-sealed appropriately. Replace ceiling tiles as required.
- 4.2 The ceiling tiles along the Southern parapet wall location are showing some signs of water ingress. This area corresponds to the location of the weathered roofing tek screws above. See Photos 24-26. **Recommendation:** Rectify roof tek screws as noted above. Area is to be monitored for any signs of further water ingress. Replace ceiling tiles as required.

The above recommendations should reduce the frequency and intensity of any water ingress issues encountered. However, it should be noted that the overall roof structure has some inherent age and design issues. The construction method of a flat roof with a box gutter and parapet walls is not generally suitable for areas with frequent occurrences of heavy rainfall. The roof structure will require ongoing monitoring, maintenance and rectification works to ensure its adequate performance over the short to medium term.

Should you wish to discuss any part of this report, or if we can be of any further assistance on this project please feel free to contact the undersigned.

Yours sincerely



Alan Byrne
PROJECT ENGINEER

Enc



appendices

Appendix One:	Photos
Appendix Two:	Ord River Sports Club Roof Plan Mark Up
Appendix Three:	Lysaght Architectural Detailing Manual Roof Wall Flashing April 14 pdf



appendix one: photos





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15

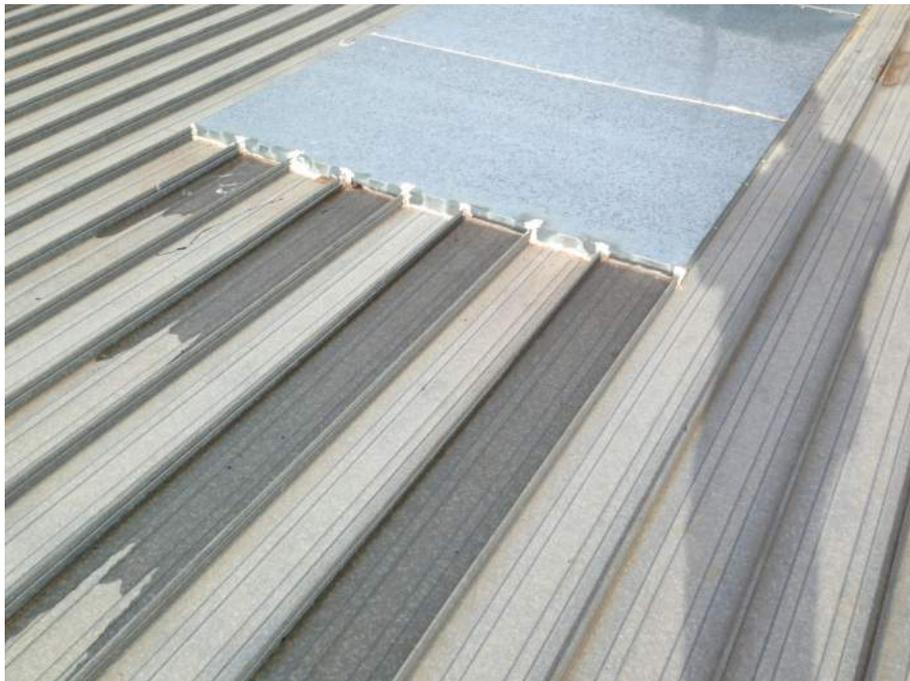


Photo 16



Photo 17



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22



Photo 23



Photo 24



Photo 25



Photo 26



Photo 27

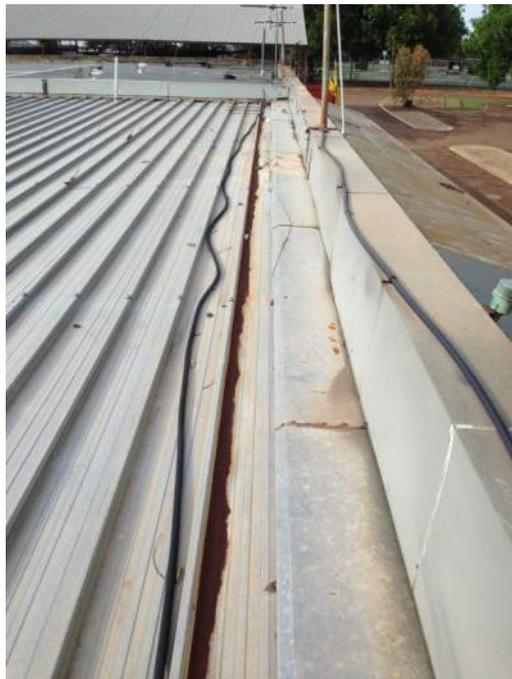


Photo 28



Photo 29



Photo 30



Photo 31



Photo 32



Photo 33

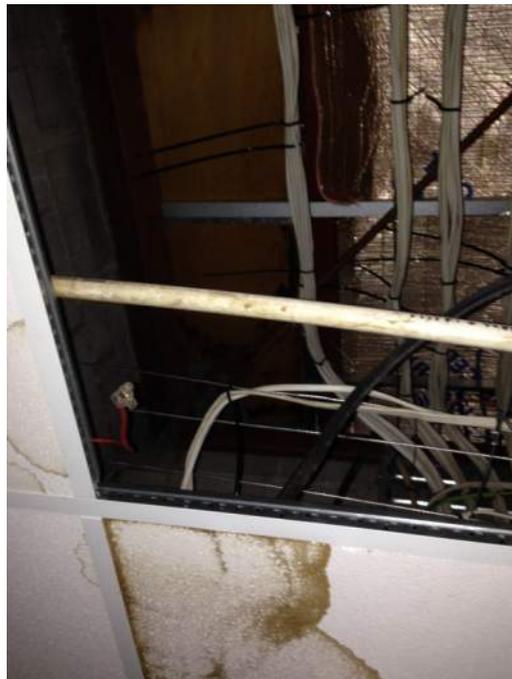


Photo 34



Photo 35



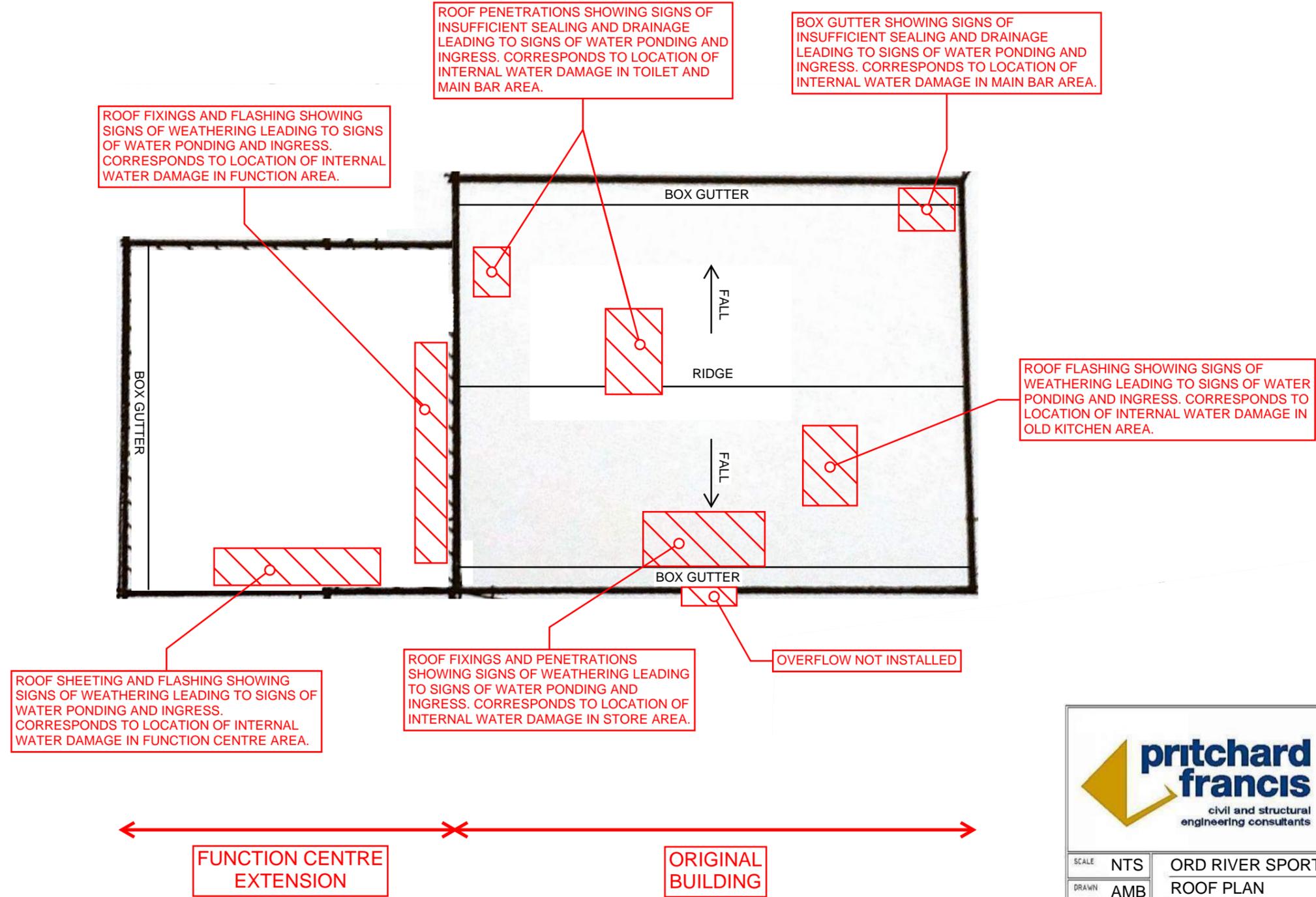
Photo 36

appendix two:

ord river sports club roof plan mark-up
insurances



OVAL



ROOF SHEETING AND FLASHING SHOWING SIGNS OF WEATHERING LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN FUNCTION CENTRE AREA.

ROOF FIXINGS AND FLASHING SHOWING SIGNS OF WEATHERING LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN FUNCTION AREA.

ROOF PENETRATIONS SHOWING SIGNS OF INSUFFICIENT SEALING AND DRAINAGE LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN TOILET AND MAIN BAR AREA.

BOX GUTTER SHOWING SIGNS OF INSUFFICIENT SEALING AND DRAINAGE LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN MAIN BAR AREA.

ROOF FLASHING SHOWING SIGNS OF WEATHERING LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN OLD KITCHEN AREA.

ROOF FIXINGS AND PENETRATIONS SHOWING SIGNS OF WEATHERING LEADING TO SIGNS OF WATER PONDING AND INGRESS. CORRESPONDS TO LOCATION OF INTERNAL WATER DAMAGE IN STORE AREA.

OVERFLOW NOT INSTALLED

FUNCTION CENTRE EXTENSION

ORIGINAL BUILDING

pritchard francis
civil and structural engineering consultants

Level 1, 430 Roberts Road
PO Box 2150
Subiaco WA 6904
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
admin@pfeng.com.au
ACN: 008 891 094

SCALE	NTS	ORD RIVER SPORTS CLUB
DRAWN	AMB	ROOF PLAN
DATE	MAY16	
JOB No	15-021	INDICATIVE PLAN SHOWING WATER DRAINAGE, PONDING AND INGRESS LOCATIONS
DRG No.	SK1	Page 263 of 788

appendix three:

lysaght architectural detailing manual roof
wall flashing april14 pdf



FLASHING GUIDE

FOR ARCHITECTS AND DETAILING
PROFESSIONALS



Table of Contents

1. Introduction and Scope	3
2. Design Preliminaries	4
2.1 Product selection	4
2.2 The purpose of flashing	4
2.3 Materials and finishes	5
2.4 Compatibility	5
2.5 Support spacings	6
2.6 Maximum lengths of roofing	6
2.7 Low roof pitches	6
2.8 Wind forces on roofs	6
2.9 Codes and performance tests	6
2.10 Specifications - roofing profiles	7
2.11 Specifications - walling profiles	8
3. Roof flashings	9
3.1 Design	9
3.2 Roof flashings	10
3.3 Flashing laps	11
3.4 Apron flashing	11
3.5 Longitudinal flashings	11
3.6 Transverse flashings	12
3.7 Using notching tools	13
3.8 Flashing at change of pitch	14
3.9 Capped bent roofs	14
3.10 Gutter apron	15
3.11 Types of penetration flashing design	16
3.12 Flashing large roof penetrations	17
3.13 Flashing small roof penetrations	19
3.14 Expansion	20
3.15 Standard roof flashings	21
3.16 Non standard roof flashings, cappings	24
3.17 Box gutters	25
3.18 Barge gutters and capping	26
4. Typical wall flashings	27
4.1 Cladding orientation	27
4.2 Walling profile running horizontally	27
4.3 Types of flashings	28
4.4 Optional wall trims	29
4.5 Mid-wall connections	30
4.6 Internal wall connections	30
4.7 External corner connections	31
4.8 Flashing for horizontal cladding	31
4.9 Flashing for horizontal corrugate cladding	32
4.10 Flashings for vertical cladding	32
4.11 Toe-Mould Type Flashing	33
4.12 Window flashing types	33
4.13 Window flashings for metal cladding	33
4.14 Flush window flashings	34
4.15 Recessed window flashings	36
4.16 Butt window flashings	37

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1. Introduction and Scope

- How to design and detail steel clad roofs and walls
- Clear, concise installation tips and methods for architects and draftsmen
- Using flashings to create an architectural feature
- Industry 'best practice' explained

Correct detailing of LYSAGHT roof and wall flashing has more than cosmetic importance - it is essential in ensuring the wet weather performance of the cladding.

Correct flashing and detailing will improve the overall appearance of the finished job.

The advice given in this manual is consistent with the requirements of the Building Code of Australia and is aimed at ensuring that correct practice is specified into building construction.

In many instances, alternative methods are examined to provide a clear understanding of the implications arising from these alternatives.

And finally, the examples shown are typical of the work to be carried out and may not apply to specific situations or specific LYSAGHT cladding products. In all cases, a qualified tradesman should be engaged to ensure the advice given here is applicable to your intended use.

We hope that the information supplied provides clear, concise direction in the correct design and detailing of roof and wall flashing for architects and draftsmen.

The manual is set out in two parts, design and flashing.

For overall roof and wall design, refer to the LYSAGHT Roofing & Walling Installation Manual. If these products are to be used in cyclonic areas as defined in AS 1170.2:2011, you must also refer to the Lysaght Cyclonic Area Design Manual.

Both these publications are available at:
www.lysaght.com



2 Design preliminaries

2.1 Product selection

When you incorporate steel cladding into your building LYSAGHT offers a wide range of profiles from which to choose. Whilst roofing and walling obviously have to keep out the weather, they also have significant effects on the looks, cost and durability of a building.

If you are unsure about any product feature, visit www.lysaght.com, call our information line or seek advice from the relevant specialists.

Lysaght has been supplying the Australian building industry with premium products for over 150 years, and our technical literature provides the engineering data to design buildings using our products.

In particular, architects and builders should consult chapters 2 to 6 of the LYSAGHT Roofing & Walling Installation Manual. We urge the reader to consult this document for overall design and fixing advice, although selected parts of that information are repeated here.

The appropriate design will depend on your particular needs and circumstances. You should get advice from the relevant qualified specialists where required.

2.2 Purpose of flashing

The purpose of a flashing is to make the building weather-resistant and to prevent water from entering the building by diverting it.

Flashings and cappings are strips of metal formed to weatherproof the edges of roofing and walling. For the purposes of this chapter, only the term flashing is used. The following sections should be considered as a guide only. For a comprehensive account of flashing guidelines, refer to HB39-1997.

Similar methods of flashing are used for different cladding-profiles. You can adapt the principles to suit your application.

In all cases it is important to have ample cover provided by the flashing and proper turn-up of the cladding underneath.

Be careful when moving between supports. Do not walk in the pan immediately adjacent to flashings or translucent sheeting. Walk at least one pan away.

Lysaght has a range of standard flashings. We can also supply custom flashings to your requirements – ask your local service centre for details.

Flashings are required to provide weather-resistance for the various junctions on a roof or wall structure. Flashings are an important part of the cladding design, and have a significant impact on the aesthetic appearance of the building.

Qualified tradesmen or other suitable expertise should be sought when designing, cutting and fastening flashing to a building.

Ponding of water and build-up of debris should be prevented and all flashings should be designed to prevent this from happening. Flashings must be designed to provide weather-resistance for the roof or wall cladding, independent of the use of sealants or other materials to provide such weather-resistance.

Unpainted galvanised steel is incompatible with most inert materials and is subject to inert catchment corrosion.

2.3 Materials and finishes

Flashings, ridge cappings, and accessories should be made from the same material as the material used to clad the roof or walls. If different materials are intended or specified, such materials should be compatible for both contact and run-off. Our most widely used cladding profiles are listed in Tables 2.10.1 and 2.11.1. They are available in COLORBOND® pre-painted steel, or in unpainted ZINCALUME® aluminium/zinc alloy-coated steel.



Typical material specifications

- COLORBOND® is pre-painted steel for exterior roofing and walling. It is the most widely used. The painting complies with AS/NZS 2728:2013 and the steel base is an aluminium/zinc alloy-coated steel complying with AS 1397:2001. Minimum yield strengths are G550 (550MPa), or G300 (300MPa) depending on the profile. Minimum coating mass is AM100 (100g/m²).
- COLORBOND® ULTRA is pre-painted steel for severe coastal or industrial environments (generally within about 100-200 metres of the source). The painting complies with AS/NZS 2728:2013 and the steel base is an aluminium/zinc alloy-coated steel complying with AS 1397:2001. Minimum yield strength is G550 (550MPa). Minimum coating mass is AM150 (150g/m²)
- Stainless steel standard grade designation is AISI/ASTM Type 430; UNS No. S43000

Not available in metallic finishes as a standard item. Subject to enquiry.

The COLORBOND® pre-painted steel complies with AS/NZS2728:2013.

Check with your local BlueScope Lysaght office for availability of profiles, materials, finishes, colours, accessories; and for suitability of the product.

Tables 2.10.1 and 2.11.1 list general information for profile selection. Refer to our publications on specific products for detailed specifications. There are also publications on ZINCALUME® steel and COLORBOND® pre-painted steel from our information line (Page 1).

2.4 Compatibility

Contact with, or runoff from, some materials can damage coated steel products. Buildings can also be susceptible to condensation on inside surfaces. The materials include certain metals, treated timbers and chemicals.

- Don't allow any contact of coated steel products with incompatible materials.
- Don't allow discharge of rainwater from incompatible materials onto coated steel products.
- Ensure that supporting members are compatible with the coated steel products or, alternatively, appropriately coated.

Incompatible materials include: lead, copper, monel metal, bare steel, stainless steel (except with COLORBOND® stainless cladding), carbon (in pencils and some rubbers), green or some chemically-treated timber (like CCA or tanalith treatments), materials subject to cycles of dryness and wetness or which have excessive moisture content (such as improperly-seasoned timber), wet and dry concrete, soils, vegetable matter, cleaning agents (e.g. brick cleaning) and any material which will inhibit normal exposure to the atmosphere.

When moisture is present and two dissimilar metals are in contact, accelerated galvanic corrosion can affect one of the surfaces. This type of corrosion can also occur when water flows over dissimilar metals.

Properly designed flashings help to keep the cladding dry and help to divert moisture and debris away from joints. To avoid ponding, all flashings should have a minimum fall of 1.5°.

Roofers and designers should consider compatibility issues when selecting materials in a roof or wall system. Furthermore placing solar collectors, air-conditioning units

or walkways on top of roof cladding need to consider discharge from such systems. Severe corrosion may occur if materials are not combined correctly.

Lead flashing is not recommended, however it will usually be retained when re-roofing, because it is usually cemented into the structure. In these cases:

- the top surface of the lead flashing must be painted with a good quality exterior paint system (to limit contamination with lead compounds in water running off the flashing); and
- there must be a barrier between the lead flashing and the cladding: either a plastic strip (such as polyethylene damp course), or paint.

Flashings should conform to AS/NZS 2179.1:1994, and be compatible with the cladding (Section 2.10, LYSAGHT Roofing & Walling Installation Manual).

Materials for flashings are available in ZINCALUME® or COLORBOND® finishes.

2.5 Support spacings

The maximum recommended support spacings are shown in Tables 2.13.1 and 2.14.1 of the LYSAGHT Roofing and Walling Installation Manual. They are based on data in accordance with AS 1562.1:1992 Design and installation of sheet roof and wall cladding: Metal, and AS 4040.1:1992 Methods of testing sheet roof and wall cladding—Resistance to concentrated loads.

The spacings in the tables are recommended to produce adequate performance of claddings under concentrated loading (incidental for maintenance).

For support spacings in wind conditions, refer to our publications on specific products for wind pressure data.

In all cases, cladding is fixed to a support of 1.0mm minimum base metal thickness (BMT) and minimum yield stress of 550MPa. If you want to use metal battens thinner than 1.0mm, seek advice from our information line.

2.6 Maximum lengths of roofing

The valleys (or pans) of roofing have to carry water to the gutters. If the valleys overflow in heavy rain, water can flow into the roof through the side-laps and flashings.

Factors affecting waterproof and drainage capacity of the laps of a profile include:

- the width and depth of the valleys or pans;
- the pitch of the roof—rain flows faster on a steeper pitch;
- rainfall intensity for the geographical area;
- the length of the roof from ridge to gutter; and
- penetrations that cause nearby valleys to carry extra rain diverted from valleys obstructed by the penetration (Figure 2.14.1).

The maximum recommended roof lengths for drainage for each profile are given in Table 2.14.1 of the LYSAGHT Roofing and Walling Installation Manual.

2.7 Low roof pitches

Unless there is adequate positive fall in a roof, there is danger of ponding, which can lead to a reduced service life, particularly in coastal areas.

At low slopes, say around 1 in 50 (1°) slope, all roof supports must be in the one plane because slight variations can result in zero or negative fall. This may occur even after completion of the building as the result of settlement, timber warping or shrinking, or extra loadings (like air conditioners).

Minimum recommended roof slopes are listed in Table 2.12.1 of the LYSAGHT Roofing and Walling Installation Manual. As a guide, wherever possible, you should design for a minimum slope of 1 in 30 (2°). Roof slopes lower than the recommended minimum may be available subject to enquiry and will be dependent upon the roof application and building details.

2.8 Wind forces on roofs

Winds create considerable forces on both the topside and the underside of roof cladding, and you must consider these forces in the design and fixing of any roof. The forces are:

- **inward forces** tending to collapse the roof cladding inwards, caused by wind acting directly on the windward side; and
- **outward forces** tending to lift the roof cladding from its framing, and the entire roof structure from the rest of the building. Outward forces can be caused both by uplift from negative wind pressures, outside the building; and by positive wind pressure inside the building.

Generally the greatest wind forces imposed on roofs are due to the outward forces. Because the dead weight of roofing materials is relatively small, the outward forces must be resisted by the roof fasteners.

It is very important that the battens and roof framing are adequately fixed to the rafters and walls, and that claddings and flashings also be fixed to withstand these pressures.

2.9 Codes and performance tests

AS 1562.1:1992 specifies the design and installation of sheet metal roof and wall cladding. Our roofing profiles satisfy all the requirements of this standard, including the ability of the roof to resist outward forces and concentrated loads. The testing is performed according to AS 4040.1:1992 and AS 4040.2:1992.

Flashings and cappings, although not tested separately, must comply to the fixing requirements of the cladding to deliver equal performance.

2.10 Specifications - roofing

Table 2.10.1

Specifications of roofing & walling profiles

	Maximum recommended spacing of supports													
						ROOFS					Eaves Overhang ³			
	BMT	Mass ¹	Cover width	Rib depth	Roof pitch minimum ²	Single	End	Internal	Unstiffened	Stiffened	Single	End	Internal	Overhang
mm	kg/m ²	mm	mm	degrees	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
 CUSTOM ORB	0.42	4.3	762	16	5° (1 in 12)	700	900	1200	200	300	1800	2500	2700	200
	0.48	4.9	762	16	5° (1 in 12)	800	1300	1700	250	350	1800	2700	2700	250
 CUSTOM BLUE ORB	0.60	6.1	762	17	5° (1 in 12)	1600	1600	1800	200	300	2400	3000	3300	200
	0.80	8.0	762	17	5° (1 in 12)	1800	1800	2600	400	600	2400	3200	3600	400
 CUSTOM ORB ACCENT 21	0.40	4.4*	762	21	3° (1 in 20)	750	950	1350	150	400	1800	2400	2400	150
	0.48	5.2*	762	21	3° (1 in 20)	950	1500	1900	200	450	1800	2700	2700	200
 CUSTOM ORB ACCENT 35	0.48	5.5*	724	35	2° (1 in 30)	1300	1600	2400	200	600	2100	2700	2700	200
 FLATDEK ⁵	0.42	6.0	250	45	2° (1 in 30)	2000	2600	3000	-	-	-	-	-	-
 FLATDEK II ⁴	0.42	5.2	620	45	2° (1 in 30)	2400	2800	3200	-	-	-	-	-	-
 INTEGRITY 820	0.42	4.6	820	48	2° (1 in 30)	2100	2300	2800	150	300	2600	3400	3600	150
	0.48	5.2	820	48	1° (1 in 50)	2500	2550	3050	200	350	2700	3600	3600	200
 KLIP-LOK 406	0.48	5.6	406	41	1° (1 in 50)	1500	1800	2100	200	600	-	-	-	-
 KLIP-LOK 700 HI-STRENGTH	0.42	4.7	700	43	2° (1 in 30)	1650	1750	2200	150	450	2600	3200	3850	150
	0.48	5.3	700	43	1° (1 in 50)	2050	2350	2800	200	500	3000	3450	3900	200
	0.60	6.6	700	43	1° (1 in 50)	2350	3000	3600	250	550	3300	3600	3900	250
 KLIP-LOK CLASSIC 700	0.42	4.7	700	41	2° (1 in 30)	-	1800	2200	200	500	-	2150	3250	300
	0.48	5.3	700	41	1° (1 in 50)	-	2100	3050	250	600	-	2500	3550	400
 LONGLINE 305 (not tapered)	0.70	9.7	305	48	1° (1 in 50)	1800	2000	2500	150	450	-	2700	2700	450
 SPANDEK	0.42	4.7	700	24	3° (1 in 20) ⁵	1300	1800	2400	300	600	2500	3000	3300	300
	0.48	5.3	700	24	3° (1 in 20) ⁵	2000	2200	3000	400	700	3000	3000	3300	400
 SPANRIB	0.42	4.6	820	48	2° (1 in 30)	2100	2300	2800	150	300	2600	3400	3600	150
	0.48	5.2	820	48	1° (1 in 50)	2500	2550	3050	200	350	2700	3600	3600	200
 TRIMDEK	0.42	4.3	762	29	2° (1 in 30)	1100	1300	1900	150	300	2400	3000	3000	150
	0.48	4.9	762	29	2° (1 in 30)	1600	1850	2600	200	350	2700	3000	3000	200

¹ Masses are for unpainted ZINCALUME steel, unless otherwise marked (*), * which are indicative masses only.

² See Section 2.5, LYSAGHT Roofing & Walling Installation Manual.

³ See Section 10.6 for explanation of 'stiffened'.

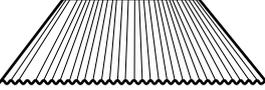
⁴ FLATDEK & FLATDEK II are Home Improvement profiles.

Please refer to their individual brochures for more installation details.

⁵ Slope of 2° (1 in 30) is available subject to enquiry. Please refer to Section 2.5, LYSAGHT Roofing & Walling Installation Manual.

2.11 Specifications - walling

Table 2.11.1
Specifications of profiles for walling only

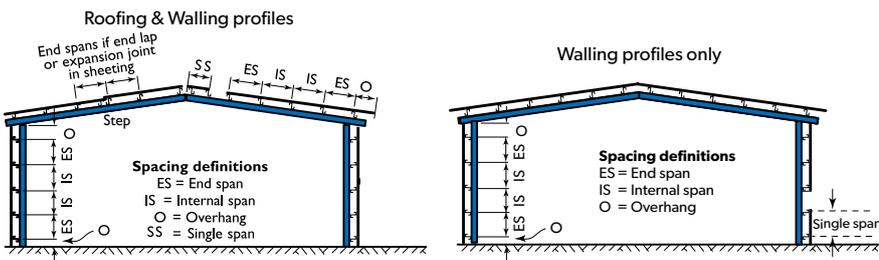
	BMT mm	Mass ¹ kg/m ²	Width overall approx. mm	Cover width mm	Rib depth mm	Maximum recommended spacing of wall supports			
						Single mm	End mm	Internal mm	Overhang mm
 EASY-CLAD	0.42	4.5	330	300	19	-	1500	1500	100
 MINI ORB ⁴	0.42	4.0	841	820	6	1200	1500	1500	100
	0.48	4.5	841	820	6	1500	1500	1500	125
 MULTICLAD	0.35	3.3	880	840	12	1400	1800	1800	150
	0.42	3.9	880	840	12	1700	1800	1800	150
 PANELRIB ³	0.35	3.2	915	850	4	1100	1200	1200	150
	0.42	3.7	915	850	4	1200	1200	1200	150
 TRIMWALL ²	0.35	3.6	816	762	29	2100	2900	3000	150
 WALLCLAD	0.35	3.6	838	762	16	2100	2400	2400	150

¹ Masses are for unpainted ZINCALUME steel.

² With 5 fasteners per sheet, per support

³ With 4 fasteners per sheet, per support

⁴ With 6 fasteners per sheet, per support



3. Roof Flashing

3.1 Design

All roof cladding located at the join (except gutters), require a flashing fastened on both sides of the join.

Flashings near the edges of roofs or walls can be subjected to suction or negative wind loads that can be greater than other positive imposed loads. Therefore the wind design load can be approach double that of the main roof area, and as a result additional fixings are required to fasten flashings.

The design wind load of each structure determines the number and the spacing of flashing fasteners as well as locate wind zones on the building. A minimum number of fixings are required to avoid flexing fatigue cracking of metal cladding under changing loads. This also prevents noise or flapping.

Lysaght recommends screws instead of rivets for fastening flashings. The larger diameter of a screw shaft gives a greater shear capacity, and the larger head (or a washer) can be used to reduce the likelihood of pull out of the fastener.

The penetration of rain into the roof or wall through the flashings is largely caused by the air pressure differential between the outside and inside of the roof or wall.

Gusting wind can cause a significant pressure differential which can fluctuate greatly. This in turn can cause a pumping action where water can be sucked into the join which the flashing is protecting.

Solutions to this problem include an anti-capillary offset fold, a gap of up to 5mm, or a suitable sealant. All flashing edges require one of these measures to avoid capillary action where flashings are subject to wind action when in contact with the roof or wall cladding.

Flashings, other than standard ridding, are produced to specific order and are designed and manufactured from flat sheet or coil. If these flashings are required to match the colour of the profiled cladding sheets it is necessary for the pre-painted flat sheet or coil to be made by the same manufacturer using the same process in order to avoid differential colour matching or fading.

Preferred maximum length of flashing is 6m, with expansion joints provided after a maximum of two lengths of flashing (12m) have been fixed together, as any lap secured by rivets or screws effectively becomes one length.

Flashings are restricted in length in the same manner as are roof and wall cladding sheets and are subject to the same requirements and expansion provisions.

A minimum distance of 2-5mm from the edges of all flashings must be provided away from an adjacent horizontal surface. This helps avoid the retention of moisture and deterioration at the cut edge of flashings. When a cut edge is very close to some materials (concrete, plaster or some rubbers) this spacing is particularly important.

A minimum clearance (CL) of 25mm and a maximum clearance of 50mm should be provided at the end of wall cladding. The cladding should not extend down to any apron flashing.



Figure 3.1
Barge

C = Minimum cover
Cl = Clearance

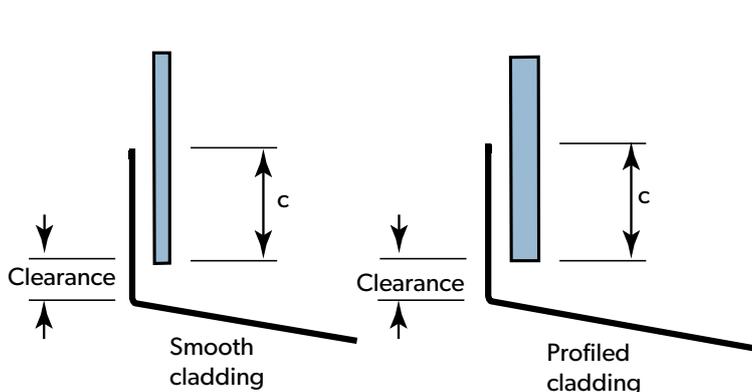


Figure 3.1.2
Vertical apron

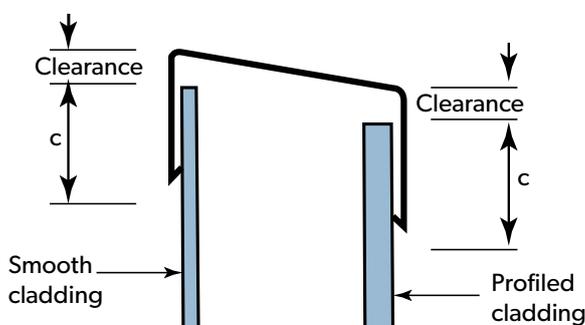


Figure 3.1.3
Parapet

These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

3.2 Roof flashings

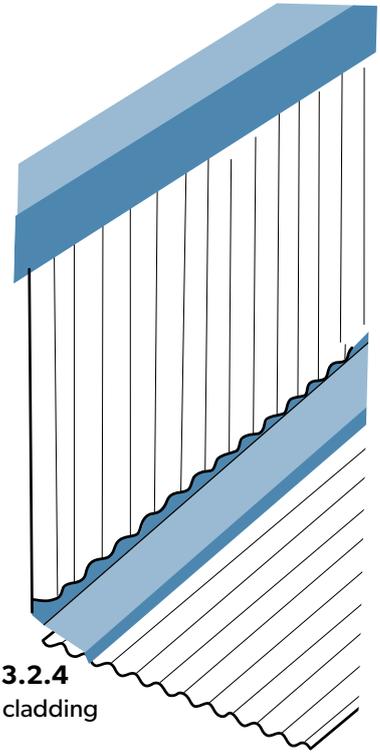
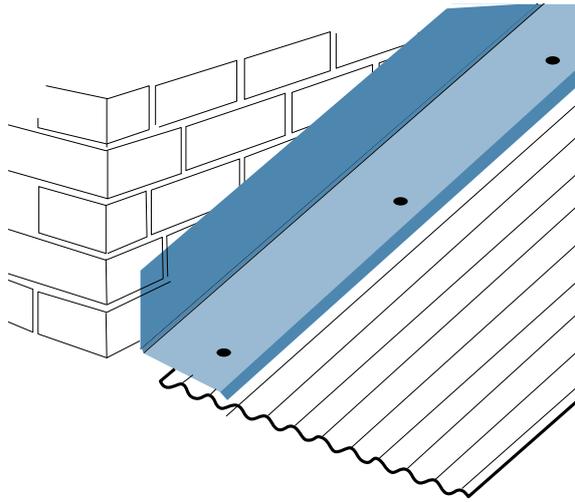
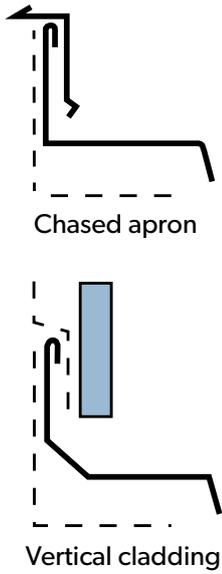


Figure 3.2.1
Chased apron

Figure 3.2.4
Vertical cladding

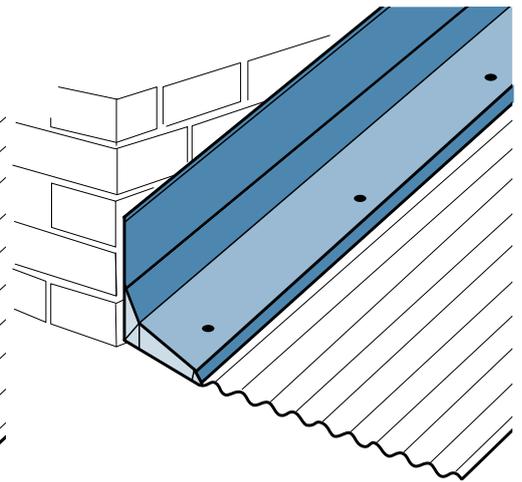
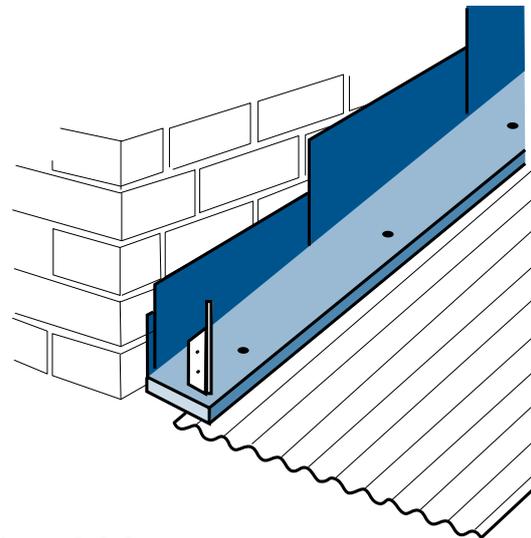
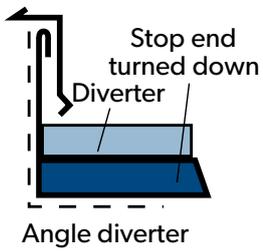


Figure 3.2.2
Angle diverter

Figure 3.2.5
Angled apron 110°

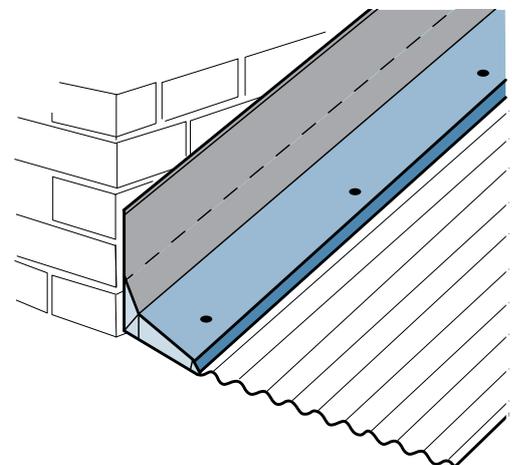
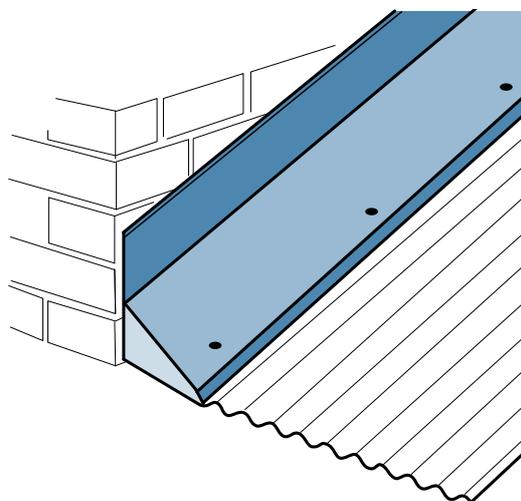
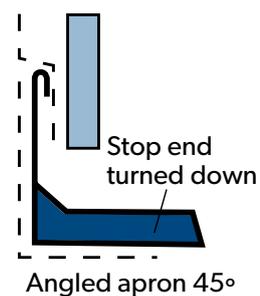
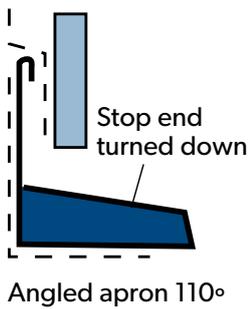
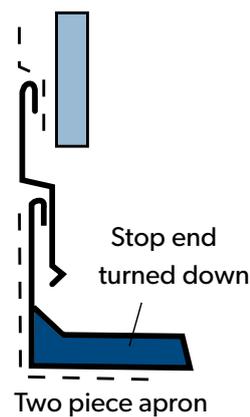


Figure 3.2.3
Angled apron 45°

Figure 3.2.6
Two piece apron



These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

3.3 Flashing laps

A lap is the part of a flashing that covers (or overlaps) any part of the similarly shaped component, and these can be described as an end lap, overlap or underlap.

Laps should comply with the following criteria:

- an overlap must run over (not under);
- an overlap must run downhill (the direction of the water flow);
- water must flow over a lap (not into a lap);
- a lap must be self-draining (not relying on sealant);
- an overlap must be across the gradient or at a shallow angle;
- a lap must be mechanically (hard) fixed;
- a sealed lap must have a minimum of width of 25mm;

3.4 Apron flashing

Do not fit cladding tight onto the horizontal surface of an apron flashing. This would collect dirt and debris and it will retain moisture. A minimum clearance of 25mm is required.

3.5 Longitudinal flashings

Longitudinal flashings run parallel to the pans or valleys, and are made to suit the cladding profile (Figure 3.5.1). They should have an edge turned-down to dip into the pan or valley.

Flashing Cover

The minimum recommended cover of longitudinal flashings over cladding should be as follows: (as taken from HB39-1997)

Pierce fixed roof sheet	150mm min.
Concealed fixed roof sheet	Into full pan (2/3 pan covered)

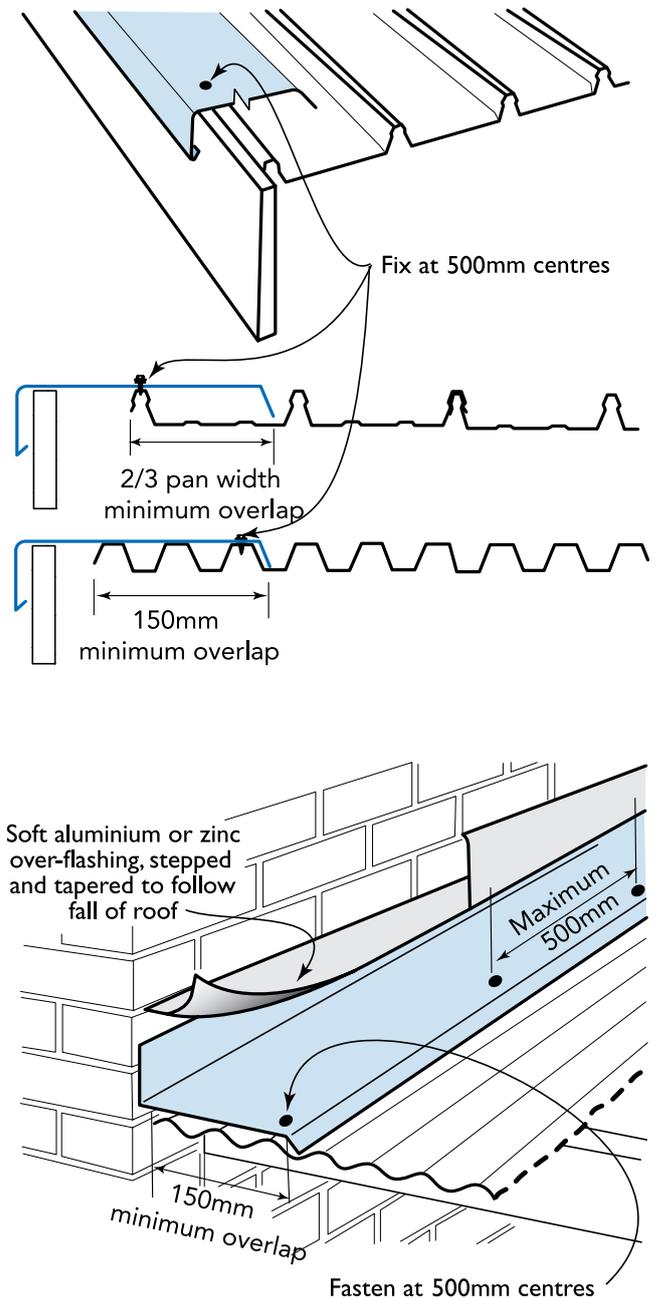


Figure 3.5.1
Typical longitudinal flashings

3.6 Transverse flashings

Transverse flashings run across the pans or valleys (Figure 3.6.1). They usually have a stiffening lip, along the lower edge, which is turned-down to dip into the pan or valley. To maximise weatherproofing, the bent lip is profiled to fit.

The turn-down for transverse flashings for the shallow corrugated profiles can be fashioned to fit the profile by either notching or scribing to match the corrugations, or lightly dressed into the valleys. The type of fashioning (if any) depends upon profile shape and the type of material used to flash. Fashioning is preferred for low-slope roofs.

The turn-down for transverse flashings for wide panned cladding is always notched or scribed to fit over the ribs.

Flashing Cover

Lysaght produces a range of standard flashings (hip, barge, apron). To increase weather-resistance, Lysaght recommends you maximise the overlap between flashings and claddings. Refer to Table 8.1.2 in HB-39 for greater detail.

Fixing of Flashings

Longitudinal flashings shall be fastened at maximum 500mm centres. Transverse flashings shall be fastened in accordance with HB39-1997, as detailed below.

Profile	
Recommended Fixing Spacing (min.)	
CUSTOM ORB/CUSTOM BLUE ORB	Every 4th rib
CUSTOM ORB ACCENT 21	Every 4th rib
CUSTOM ORB ACCENT 35	Every 2nd rib
KLIP-LOK 406	Every rib
KLIP-LOK 700 HIGH STRENGTH	Every rib
KLIP-LOK CLASSIC 700	Every rib
LONGLINE 305	Every rib
SPANDEK	Every 3rd rib
SPANRIB	Every rib
TRIMDEK	Every rib

The above fastener spacing relates to the stitching of flashings to sheeting. It does not constitute the minimum number of fasteners required to fix the sheeting to purlins.

Notching tools

Hand-operated notching tools cut one notch at a time. Each tool matches only one cladding profile. There are two types of tool; their use depends on whether or not the edge of the flashing has first been bent down.

Table 3.6.1
Notching tools

Type of tool	Edge turned down before notching	Available for
Horizontal notching tools	No	Availability subject to inquiry KLIP-LOK 406
Vertical notching tools (also called speed notchers)	Yes	KLIP-LOK 700 HI-STRENGTH KLIP-LOK CLASSIC 700 SPANDEK, TRIMDEK Others subject to inquiry.

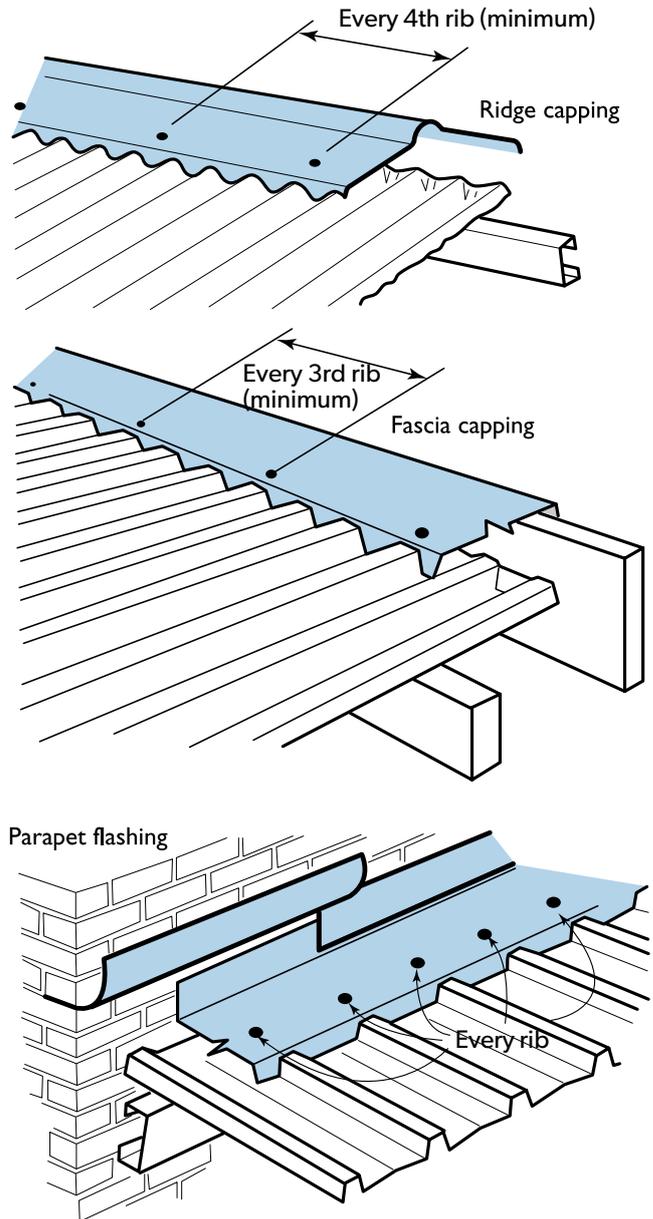


Figure 3.6.1
Typical transverse flashings



Flashings provide the essential weatherproofing at the edges, and they sharpen the image of the finished job.

3.7 Using notching tools

After the cladding is fixed and the turn-ups finished, proceed as follows.

- Place a flashing with the notch-edge resting on the ribs.
- Locate your notching tool over a rib with the notching head against the flashing.
 - VERTICAL TOOL: The body locates along the rib.
 - HORIZONTAL TOOL: the lugs on the underside locates on top of the rib.
- Raise the handle to open the tool and:
 - VERTICAL TOOL: lift the flashing into the mouth of the tool;
 - HORIZONTAL TOOL: slide the mouth of the tool over the edge of the flashing as far as it will go.
- Push down on the handle to perform the notching.
- Repeat for all ribs, checking in each case that the flashing is correctly positioned.
- If you are using a horizontal tool, bend down the tongues between the notches over a suitable straight edge (such as a piece of timber).

Notching with tinsnips

If notching tools are not available, flashings can be notched to the rib profile with tinsnips (Figure 3.7.2). The procedure is sometimes known as scribing. After the cladding is fixed and the turn-ups finished, proceed as follows.

- Place the flashing with the turned-down edge resting on the ribs.
- Mark out the notching using a template positioned over each rib.
- Cut the notches with tinsnips.

This procedure is also used for hip cappings.

Fasteners for transverse flashings

You must properly fix both flashings and the ends of all sheets.

Where the cladding is pierce-fixed through crests, and the position of the purlin allows it, the fasteners used to fix the sheets, may also fix the flashings.

On all other installations, pierce-fix your flashing to the ribs or crests of the sheets.

Joining flashings

The overlaps of transverse flashings should be sealed with a recommended sealant and fastened. Before finally positioning and fixing the lap, turn over the top piece and apply a 3mm bead of sealant across the flashing, about 12mm from the end.

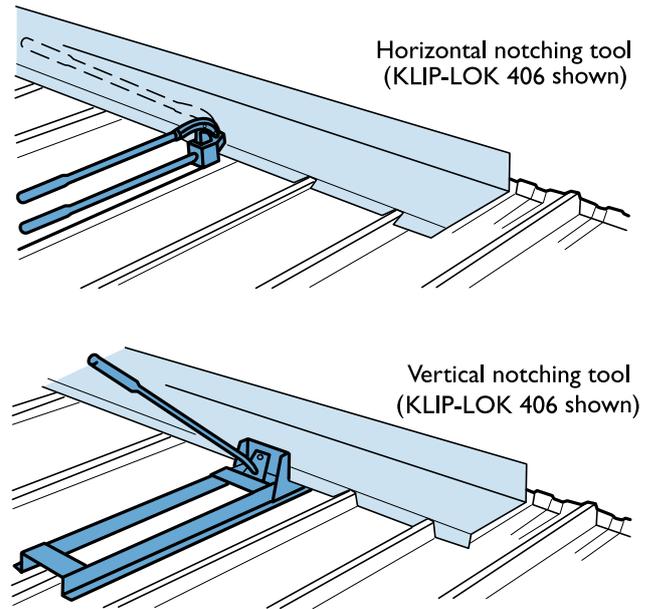


Figure 3.7.1
Using notching tools

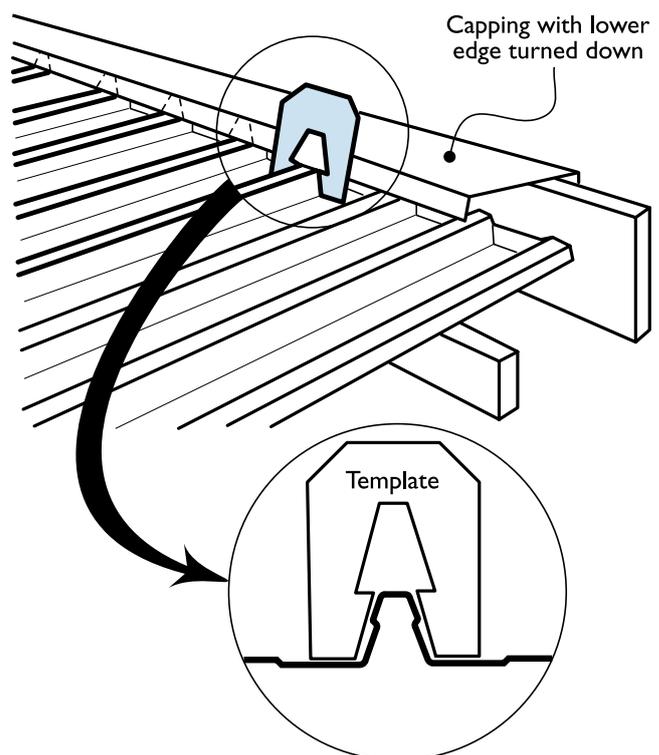
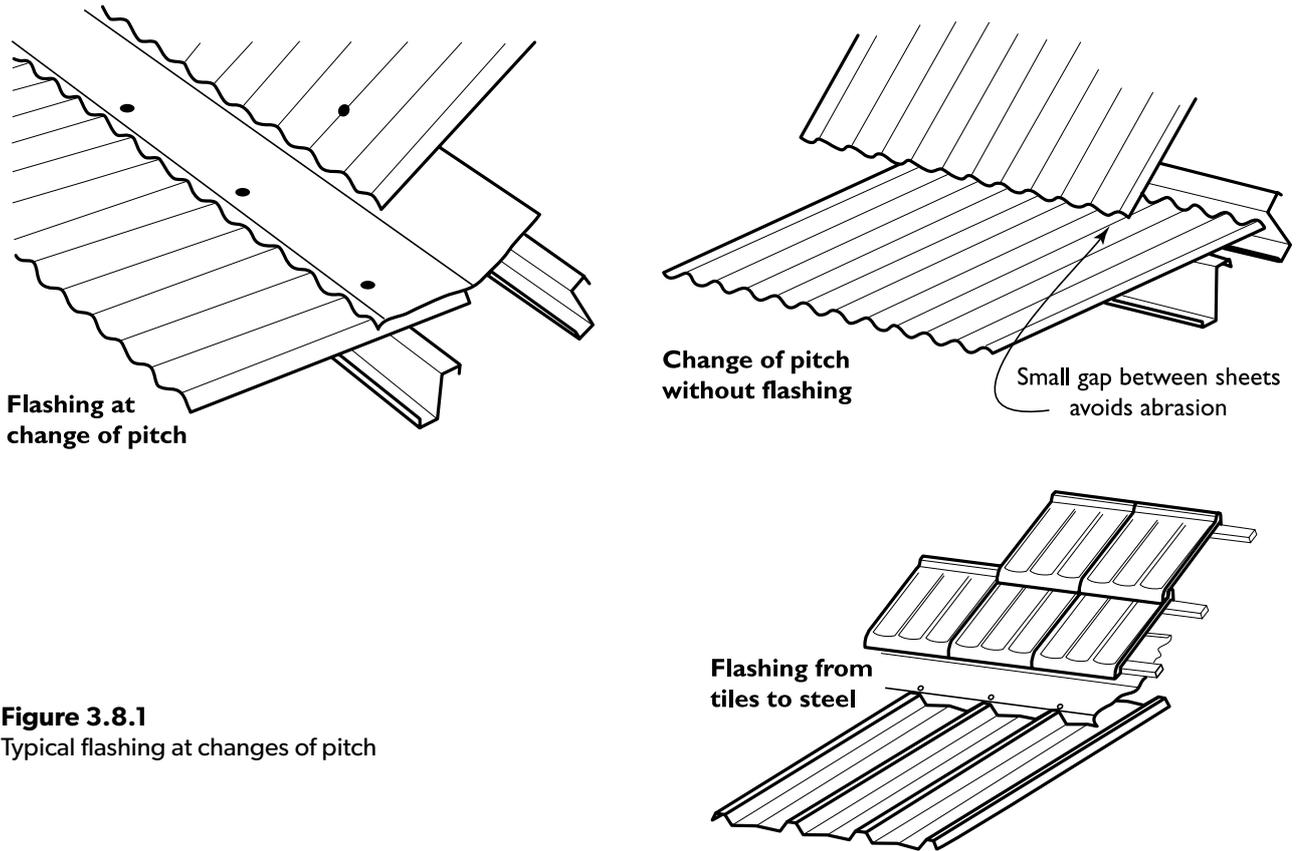


Figure 3.7.2
Using a template to mark out for notching with tinsnips

3.8 Flashing at change of pitch



Flashing at change of pitch

Change of pitch without flashing

Small gap between sheets avoids abrasion

Flashing from tiles to steel

Figure 3.8.1
Typical flashing at changes of pitch

3.9 Capped bent ribbed roofs

Tray cladding can be used in continuous lengths from eave to eave by cutting the ribs and bending the pans at the ridgeline. The same process is used on Mansard roofs. Caps are fitted over the cut ribs, which open up when the pans are bent. Fitting the rib caps can be time-consuming and care must be taken with sealing to avoid any possibility of leakage.

The ribs must be cut squarely, with a metal cutting blade in a power saw, set to the depth of the rib minus 2mm.

In some states pressed steel caps may be available to suit KLIP-LOK ribs, though the range of angles is limited. Caps can be handmade to suit any angle from flat sheet.

KLIP-LOK is most frequently used for capped bent ribbed roofs, but LONGLINE 305, TRIMDEK or even SPANDEK can be used. For these four profiles the rib caps can be made from pieces of rib profile cut from a short length of cladding. A neutral-cure silicon sealant should be used.

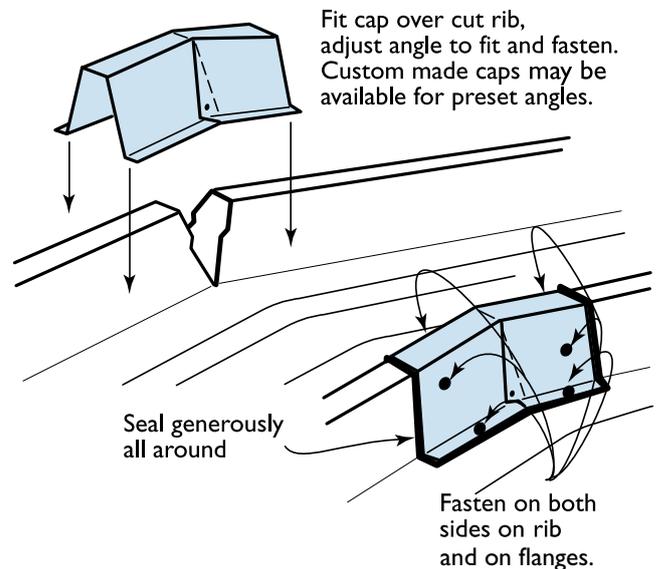


Figure 3.9.1
Capped bent ribbed roof

3.10 Gutter apron

Where the ends of roof cladding are exposed to environmental contaminants such (industrial pollutants, sea salt) provide an over flashing which discharges into the gutter. (see Figure 3.10.1 & 3.10.2)

Benefits of gutter apron:

- Protects to the underside of the roof cladding/ underlay.
- Provides support for the roofing underlay which can be damaged by wind and solar radiation.
- There is an air gap between the spouting and the fascia where PVC spouting is used, caused by the thickness of brackets. In areas exposed to sea air, a gutter apron can minimise the risk of corrosion of the unwashed area.
- Can be used if there is no spouting or it has a low front.
- Protection against wind-blown embers.
- Contaminants can be driven up the ribs of the cladding if exposed in a severe environment. Metal flashings or profiled foam fillers can be used to prevent or reduce this.

The over flashing should extend 50mm into the gutter and the underlay finishes on the down-side of the flashing. Extend the underlay into the gutter by a minimum of 20mm if there is no over flashing into the gutter.

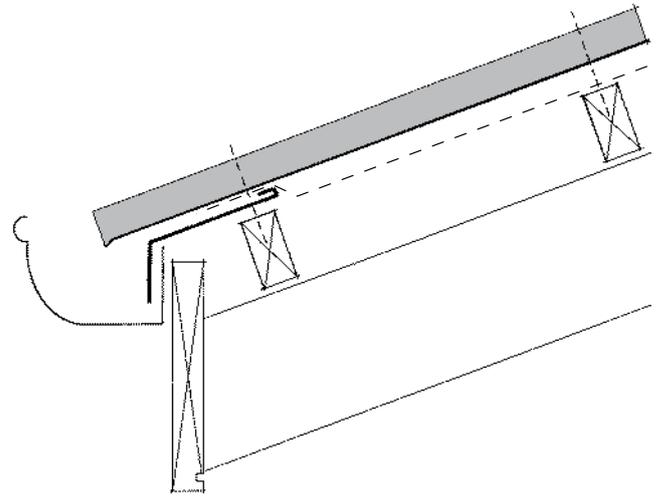


Figure 3.10.1
Gutter apron: Quad†

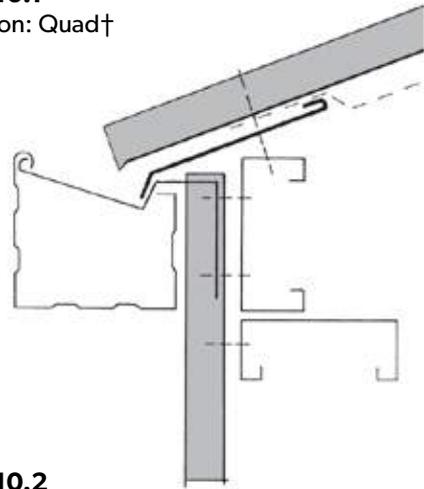


Figure 3.10.2
Gutter apron: TRIMLINE/SHEERLINE†

3.11 Types of penetration flashing design

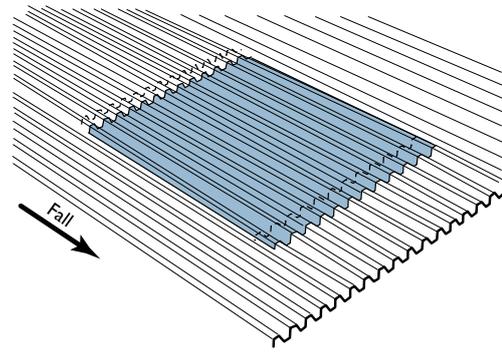
Penetration flashings can be divided into four different types.

Type A

Under flashings drain at the plane of the roof pan.

Soaker (under) flashings

- Suitable for any pitch;
- Most preferred detail;
- Curb side in line with the rib;
- Leave clearance of 10mm (minimum) all around;
- minimum of 100mm for all upstands;
- Drill holes for rivets before sealing;
- minimum 25mm for sealed laps;
- Order slightly longer cladding sheets to allow for lapping;



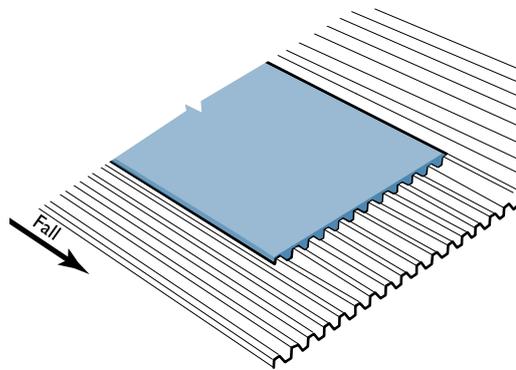
Type A Under soaker

Type B

Overflashings drain at the plane of the rib of the roof.

These are also known as back flashings.

- Simple to use
- Suitable for use to first purlin from the ridge if > 300mm wide.
- Not suitable for widths over 1.100m
- regarded as unattractive by some
- Suitable for use with sprung or over-roof design.



Type B Over watershed

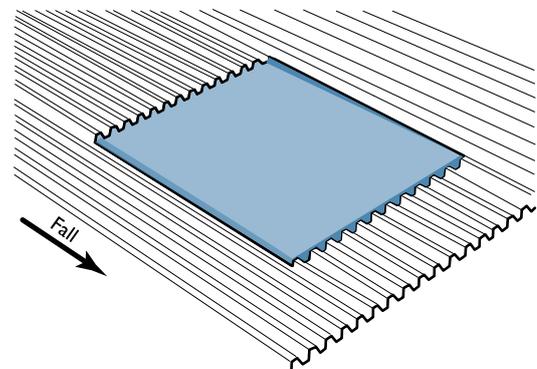
Type C

Tapered flashings that drain at the plane of the roof pan at the top, and over the ribs at the bottom.

Also known as transition or 'under/over' flashings.

Tapered or transition flashings

- Provides greater water run-off capacity
- Suitable for all roofs > 5°.
- Can be used for a retrofit
- Support required

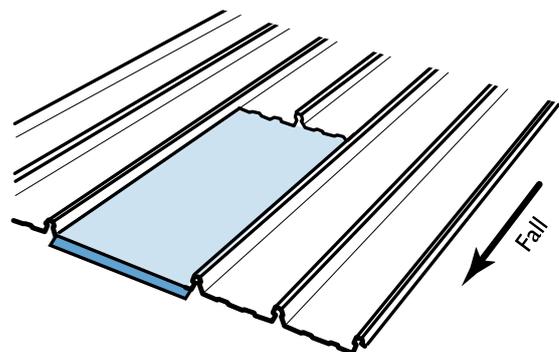


Type C Under/over tapered

Type D

Soaker flashings that drain at the plane of the roof pan at the gutter

- Simple
- Provides greater water run-off capacity
- Suitable for all roofs > 5°
- Can be used for a retrofit
- Support required
- Limited to 1.1m wide and 2.4m long



Type D Tray



These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

3.12 Flashing large roof penetrations

Penetrations through ribbed cladding block the valleys (or pans), and thus affect the free flow of rainwater down a roof. All flashings have to weatherproof the cladding – but on the uphill side of large penetrations, they also have to channel rainwater sideways into valleys that run unobstructed to the eaves.

Four methods are described here. In all methods the ends of cut ribs may be closed off with caps on the outside of the rib, or with plugs inside the ribs. Plugs must be used on side-laps to allow the anti-capillary cavity to drain.

Note: For masonry construction, Building Code Australia (BCA) requires the use of Damp Proof Course (DPC) to ensure weather-proofing. For acceptable methods see BCA section on weather-proofing masonry.

Support framing

Wherever one or more of the sheet ribs are cut, you must provide framing to support the cut ends of the roof cladding each side of the penetration.

Existing flashing

If you have to re-use lead flashings that are built into the structure, special protection is needed.

Method 1: Head gutter and apron flashings

This is often the simplest method, and commonly used for existing protrusions (Figure 3.12.1).

Method 2: Flat tray and sleeve

To avoid fitting and sealing end caps to all the sheet ribs on the low side of the penetration, an apron flashing can be fitted to the sleeve and sealed to the tray each side.

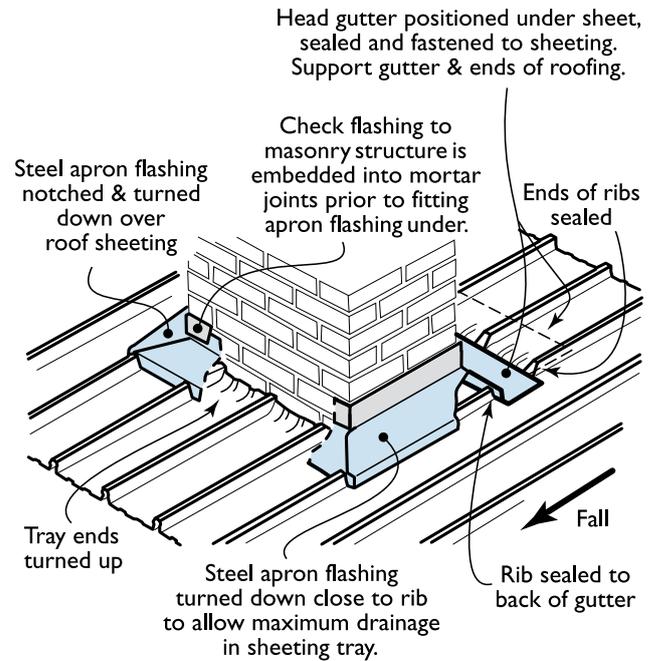
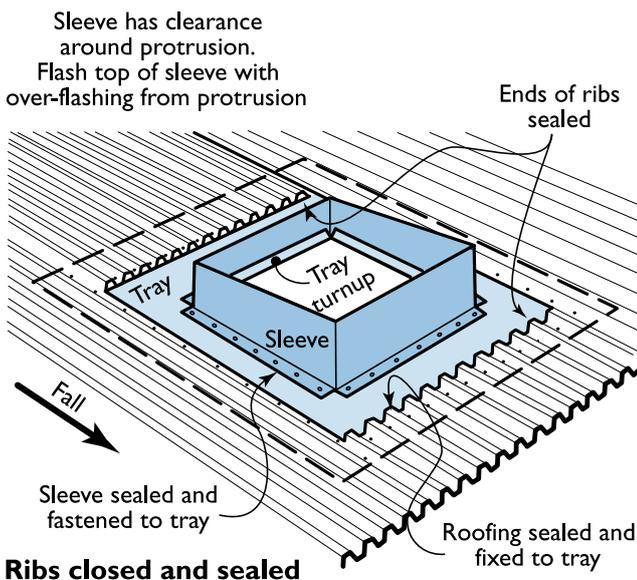
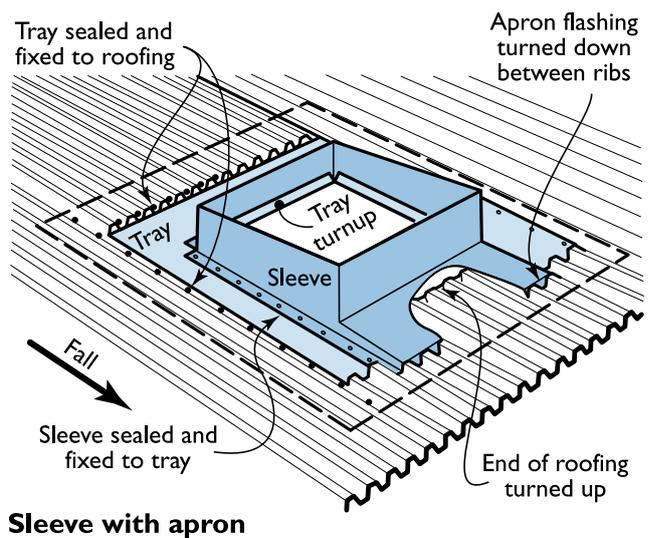


Figure 3.12.1
Flashing method 1: Head gutter



Ribs closed and sealed

Figure 3.12.2
Flashing method 2: Flat tray and sleeve



Sleeve with apron

Method 3: Tray gutter for steeper roofs

If the roof pitch is more than, say 1 in 12 (5°), you cut the roof cladding sufficiently high above the penetration to allow a tray gutter to raise rainwater over the top of the sheet ribs and divert it around the penetration (Figure 3.12.3).

Cut side of roofing rib to match slope of tray.
Sides of tray turned up behind cut rib then sealed and fixed to rib.

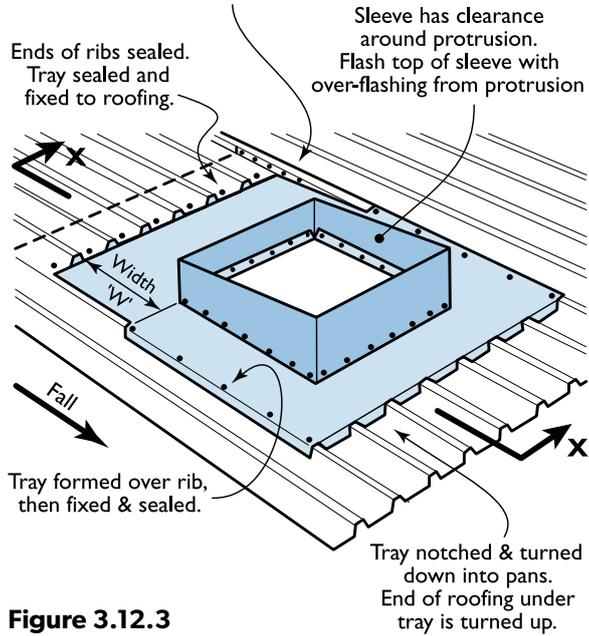
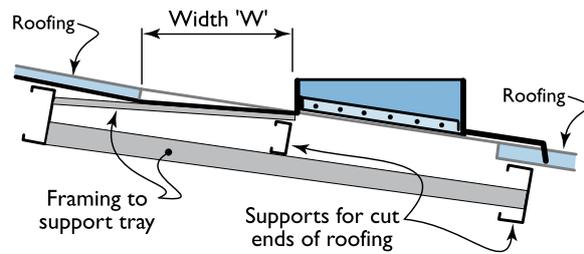


Figure 3.12.3
Flashing method 3:
Tray gutter for steeper roofs



SECTION X-X

The base of the tray over width 'W' slopes slightly towards the protrusion. The width 'W' varies with this slope, the roof pitch and the rib height. Thus:

$$W = \frac{\text{Rib height}}{\sin(\text{roof pitch} - \text{slope of tray})}$$

For example: if the tray slopes 1 in 50 (1) and the roof pitch is 1 in 12 (5).

RIB DEPTH	WIDTH 'W' (minimum)
25 mm	360 mm
29 mm	420 mm
41 mm	590 mm

Method 4: Penetration close to ridge capping

If a roof penetration is close to a ridge capping (or flashing above the penetration), you can fit a simple flat tray, on top of the roofing, so that it extends from under the capping down to a sleeve around the penetration.

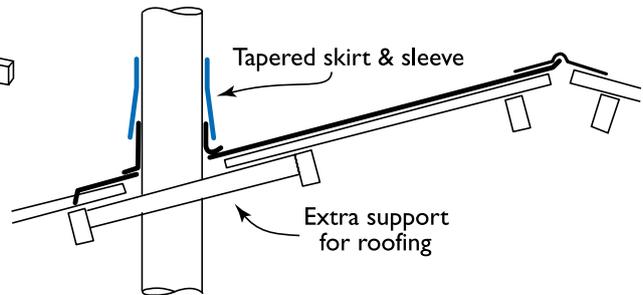
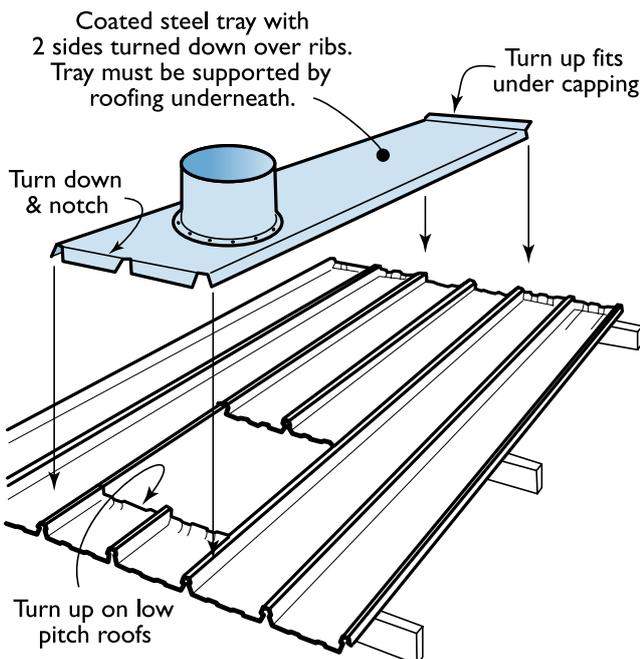


Figure 3.12.4
Flashing method 4:
Penetrations close to ridge capping

3.13 Flashing small roof penetrations

A flanged cylindrical sleeve is a fairly simple method of flashing around small penetrations (such as pipe penetrations) which fit between the ribs of a roof sheet, or penetrate only a single rib.

Two methods are described here. Wherever roofing is cut, you must consider providing extra support for the roofing above and below the penetration. Where one or more of the sheet ribs are cut, you must provide framing to support at the cut ends of the roof cladding each side of the penetration.

Method 1: Tapered metal skirt and sleeve

This method uses parts custom-fabricated from metal. There is no positive seal between inside the building and the outside atmosphere (Figure 3.13.1).

Method 2: Sleeve

This is often the simplest method (Figure 3.13.2). Flexible flanged sleeves can be bought for flashing around penetrations of at least 350mm diameter. They overcome the problem of capping and sealing the open ends of cut ribs. A sleeve is commonly used, though silicone sealant has a wider operating temperature range and is available in a wider range of colours.

The flange around the base of the sleeve can be contoured by hand to match the cladding profile before it is sealed and fixed to the cladding.

Be careful not to dam any valleys or pans so that rainwater can drain freely from the high side of the roof penetration. Moisture held in such areas can cause deterioration of the sheet coating, reduced life expectancy or poor appearance.

Where damming of any valley or tray is unavoidable, due to the size of the pipe penetration, treat the installation as a large penetration.

Copper penetrations

All copper pipe penetrations through ZINCALUME® or COLORBOND® steel cladding must be physically and electrically isolated from the cladding. This can be done by using a sleeve of PVC polyethylene or similar plastic that is also ultra-violet stable.

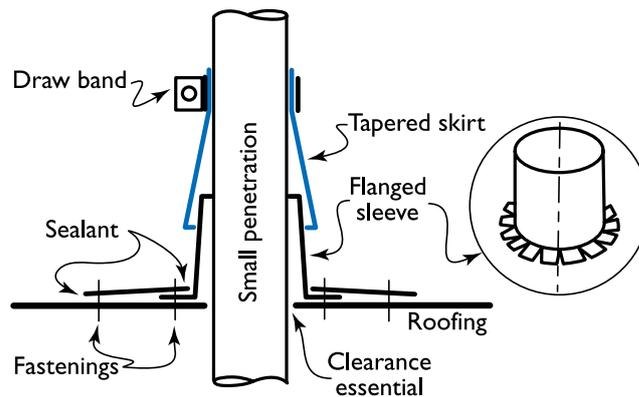
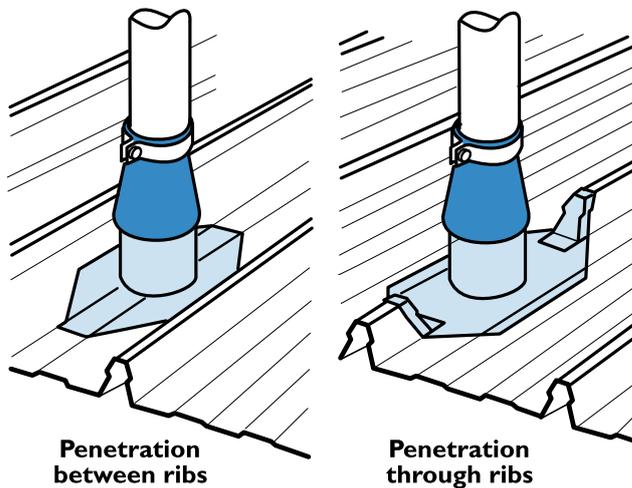


Figure 3.13.1
Small penetration with metal skirt and sleeve

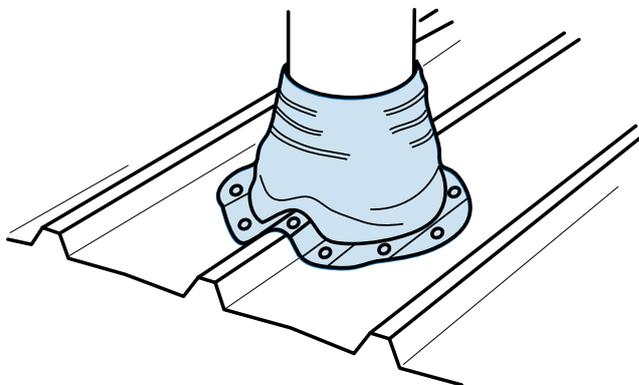


Figure 3.13.2
Small penetration with sleeve (Dektite® sleeve illustrated)

3.14 Expansion

Background on thermal expansion

All metals expand and contract with changes in temperature. Although steel is by far the least affected of all the metals commonly used for roof and wall cladding, the changes in length experienced in very long runs of roofing are significant.

On a clear hot summer day, with no wind, the steel temperature in roof cladding can reach approximately 50°C in COLORBOND® SURFMIST®, 60°C in plain ZINCALUME® and more than 80°C in COLORBOND® NIGHT SKY®.

Examples of the thermal changes in lengths of steel cladding that would result from various temperature changes in the steel are shown in Table 3.14.1.

The actual expansion or contraction between the end of a sheet and the last support would only be a fraction of the figures shown because the movement in the length of fixed cladding would normally take place from the centre towards each end of the sheet. The movement at each end is thus only half the total expansion or contraction.

Transverse thermal expansion poses no problems in ribbed cladding because each rib absorbs some transverse movement.

Expansion joints

Thermal expansion effects are mitigated by slight bending of fastener shanks, thermal movement of the building structure, and slight flexing of the purlins (where they are not restrained by cleats or bridging). However, for very long runs of roofing, you should include an expansion joint to overcome linear thermal expansion.

Table 3.14.2 shows the maximum distance between the top and bottom rows of fasteners on a pierce-fixed sheet. For LONGLINE in distances of greater than 35m, please contact your Lysaght branch for advice. If the total length of two sheets pierce-fixed through the lap, or a single sheet exceeds this distance, then an expansion joint is needed. There should be no more than one pierce-fixed end-lap between expansion joints.

An expansion joint involves overlapping the ends of the upper sheets over the ends of the lower sheets—but with a clearance between them (about 15mm). A typical overlap is 250mm (this overlap is not the same as the overhang in Table 3.7.1 which does not apply to expansion joints). The clearance is usually created by having all the purlins for the roofing on the high side of the joint, higher than the roofing on the low side of the joint. An extra purlin is needed at the joint. A baffle flashing provides weatherproofing. See Figure 3.14.1.

Where there is a risk of high winds, or the ribs result in a large opening, you may need protection, such as extra flashing or the inclusion of closed-cell foam infill strips.

Table 3.14.1
Thermal expansion and contraction of steel cladding

Sheet length (mm)	Expansion or contraction (mm)		
	10 C° change	50 C° change	75 C° change
5000	0.6	3	4.5
10000	1.2	6	9
15000	1.8	9	13.5
20000	2.4	12	18
25000	3	15	22.5
30000	3.6	18	27

Table 3.14.2
Maximum distance between top & bottom rows of fasteners on a sheet, before expansion joint is needed

Fixing system	Maximum distance between top and bottom rows of fasteners (m)
Pierce-fixed through crests	24
Walling pierce-fixed in valleys/pans	15

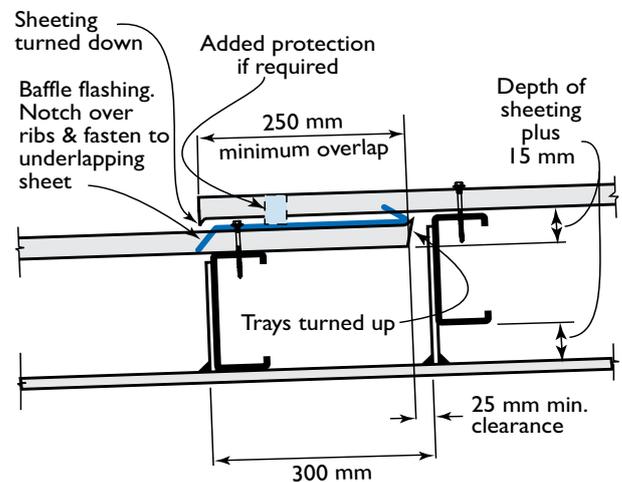


Figure 3.14.1
Expansion joint detail

3.15 Standard roof flashings

LYSAGHT Standard flashings by region

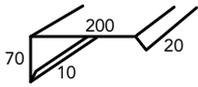
Although some flashings are common to all regions, the climactic conditions can cause variations in the local product requirements. Please check with your local Lysaght sales representative for the product offer in your area.

Other flashings are available as special orders.

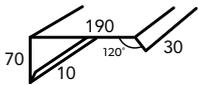
New South Wales

Barge capping

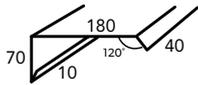
CUSTOM ORB, BLUE ORB & ACCENT 21



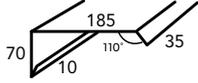
TRIMDEK & SPANDEK



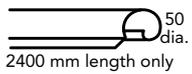
KLIPIKOK



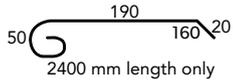
CUSTOM ORB ACCENT 35



Barge roll



Barge roll capping



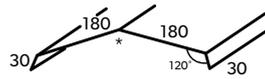
Spear point



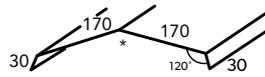
Ridge capping

*Nominate roof pitch

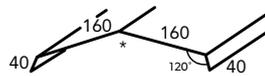
CUSTOM ORB, BLUE ORB & ACCENT 21



TRIMDEK & SPANDEK



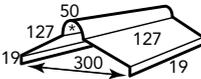
KLIPIKOK



CUSTOM ORB ACCENT 35

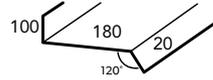


CUSTOM ORB, BLUE ORB & ACCENT 21

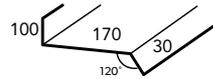


Apron flashing

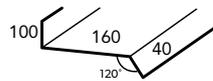
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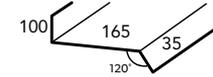
TRIMDEK & SPANDEK



KLIPIKOK & SPANRIB

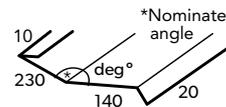


CUSTOM ORB ACCENT 35

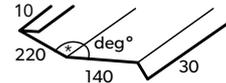


Tile flashing

CUSTOM ORB, BLUE ORB & ACCENT 21



TRIMDEK & SPANDEK



KLIPIKOK & SPANRIB



CUSTOM ORB ACCENT 35



Valley flashing

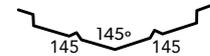
Valley flashing



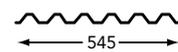
Ribbed valley



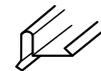
Structural valley



Valley support



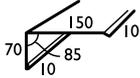
Barge gutter



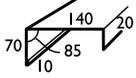
Victoria

Side capping

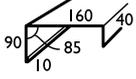
CUSTOM ORB (Universal capping)
Code: UC



TRIMDEK & SPANDEK
Code: STC



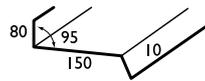
KLIP-LOK
Code: BKC



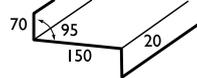
Baffle flashing

(Parapet upstand side flashing)

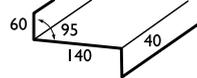
CUSTOM ORB (Universal)
Code: UBF



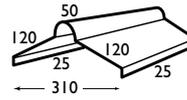
TRIMDEK & SPANDEK
Code: STBF



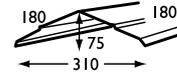
KLIP-LOK
Code: BKBFB



Ridge capping

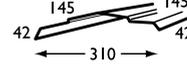


V-ridge



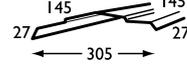
KLIP-LOK

Code: BK



TRIMDEK & SPANDEK

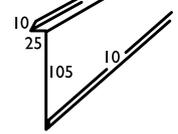
Code: ST



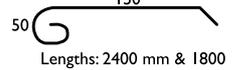
Valley gutter



Counter flashing



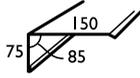
Barge roll



Tasmania

Barge capping

CUSTOM ORB, TRIMDEK &
SPANDEK

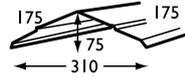


KLIP-LOK
Barge capping

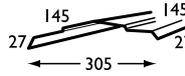


Ridge capping

CUSTOM ORB
V-top ridge capping

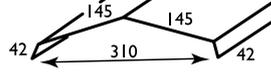


V-Top ridge capping

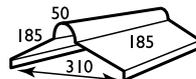


Ridge capping

KLIP-LOK
V-top ridge capping



CUSTOM ORB & TRIMDEK
Roll-top ridge capping extra scribing break



Valley flashing

Valley gutter



Miscellaneous flashing

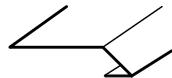
Under flashing



Queensland

Single-sided ant capping

0.4 mm & 1800 mm long
50 x 38 mm 150 x 30 mm
75 x 38 mm 200 x 38 mm
113 x 38 mm 225 x 38 mm



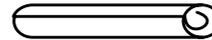
Horizontal ant capping

0.4 x 50 x 1800 mm
0.4 x 75 x 1800 mm



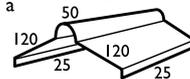
Round vent stays

1800 mm long



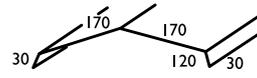
Roll-top ridge capping

0.4 mm x 310 mm Custom cut to length
Qth Qld have 450 mm girth roll top ridge
(nd matching three break)



Ridge capping - three break

CUSTOM ORB & TRIMDEK
Standard 20 pitch
Custom cut up to 8000 mm
0.4 mm x 400
0.55 x 400



Valley gutter - three break

Custom cut up to 1800 mm
0.4 x 400 mm
0.55 x 400 mm



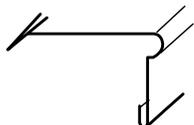
Tile valley gutter

0.35 mm x 465 x 2400 mm



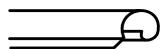
Roll-top barge capping

0.4 x 400 Custom cut up
to 8000 mm



Gable roll

0.55 x 50 x 1800 mm
0.55 x 50 x 2400 mm



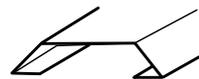
Barge gutter

Code: BG



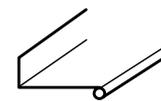
Double-sided ant capping

0.4 mm & 1800 mm long
38 x 117 x 38 38 x 200 x 38
38 x 113 x 38 38 x 225 x 38
38 x 150 x 38



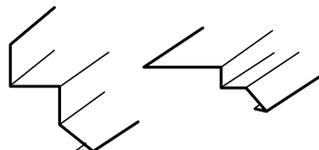
Window flashings/ Door heads

1800 mm long
50 x 38 mm
75 x 38 mm W.S.
113 x 75 mm Q.H.C.



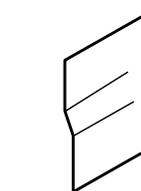
Bribie Island ant capping

Vertical/horizontal ant capping
0.4 x 50 x 1800 mm
0.4 x 75 x 1800 mm



Drip strip

0.4 mm x 50 x 1800 mm

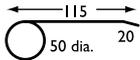


Western Australia

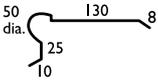
Bargemould/corner capping

Custom cutting: 2-3 days

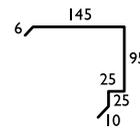
Type A edgeroll, 1800 mm long



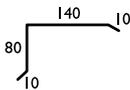
Type C edgeroll, up to 6000 mm long



Type E bargemould 1800 & 2400 mm long & custom cut available

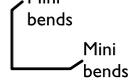


Type R bargemould 1800 & 2400 mm long

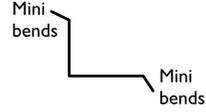


Corner flashings

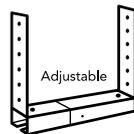
All custom cut
External Mini bends
75 x 75
100 x 100



Internal
150 x 100
150 x 150



Adjustable box gutter brackets



Size 1: 250-400 mm
Size 2: 400-650 mm
Size 3: 700-1000 mm

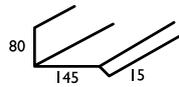
Spandek gutter boards

550 or 770mm wide

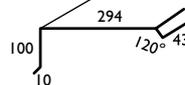


Barge capping & parapet flashing

All custom cut
CUSTOM ORB & SPANDEK



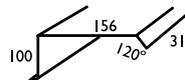
KLIP-LOK Barge



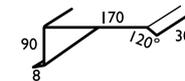
KLIP-LOK Parapet



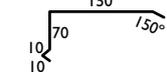
SPANDEK Barge



TRIMDEK Barge

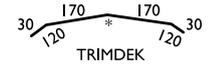


CUSTOM ORB Parapet

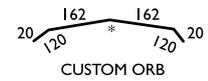


Ridge capping

All custom cut



Code: RC2



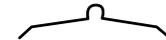
395 mm girth



Suits up to 25 pitch. 395 mm girth available up to 8000 long. Other widths (girths) available with max. length 4000.

Roll ridge to suit fibreglass & plastic curving sections

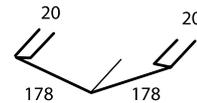
Material: 0.55 BMT



* Nominate roof pitch

Valley gutter

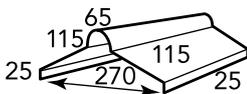
1800 & 2400 mm long
0.4 mm BMT ZINCALUME or COLORBOND
395 mm girth



South Australia & Northern Territory

Roll top ridge capping

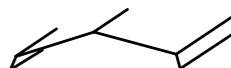
(Scribing break extra on nett price)
300 mm girth
350 mm girth



Ridge capping

SPANDEK & TRIMDEK

KLIP-LOK

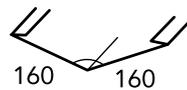


Spandek gutter boards

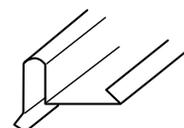


Valley gutter

350 mm girth x continuous length
400 mm girth x continuous length
450 mm girth x continuous length



Barge gutter

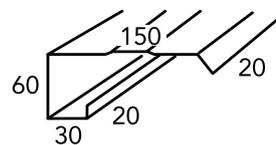


Barge capping

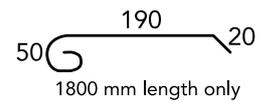
CUSTOM ORB

SPANDEK & TRIMDEK

KLIP-LOK



Barge roll



1800 mm length only

3.16 Non standard roof flashings, cappings and gutters

This page shows some non-standard profiles. Please ask your local Lysaght branch for other options.

Girth range (mm)	
100	600
200	750
300	900
400	1000
500	1200

Preliminary

Check with your local Lysaght Service Centre for:

1. Available girth range
2. Available colours
3. Profiles not shown
4. Maximum lengths
5. Lead times
6. How to handle tapered flashings

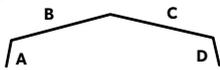
Order requirements

On a sketch show

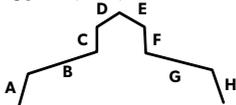
1. Profile type
2. Colour (or ZINCALUME® steel, or GALVABOND® if not COLORBOND® steel)
3. Side on which colour is to be (use letters shown below)
4. Dimensions (use letters shown below)
5. Angles on all bends that are not 90 degrees
6. Quantity and lengths

Profile types

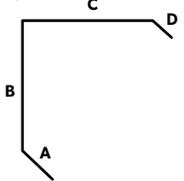
Type 1 (CF1)



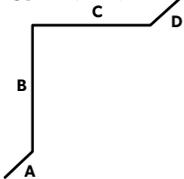
Type 2 (CF2)



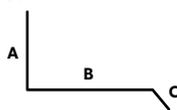
Type 3 (CF3)



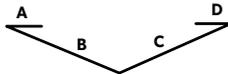
Type 4 (CF4)



Type 5 (CF5)



Type 6 (CF11)



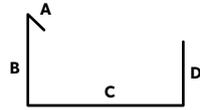
Type 7 (CF12)



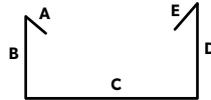
Type 8 (CF13)



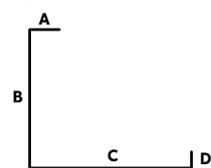
Type 9 (CF14)



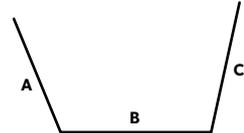
Type 10 (CF15)



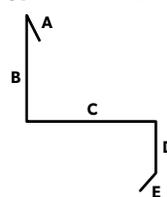
Type 11 (CF31)



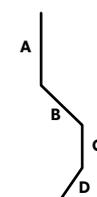
Type 12 (CF32)



Type 13 (CF33)



Type 14 (CF35)



Availability of materials

State	BMT (mm)	State	BMT (mm)
NSW	0.55 ZINCALUME, GALVABOND, COLORBOND 1.0, 1.2, 1.6 GALVABOND	Vic & Tas	0.55 ZINCALUME, GALVABOND, COLORBOND 0.80, 1.00 ZINCALUME, GALVABOND
WA	0.40, 0.55 ZINCALUME, COLORBOND 0.8, 1.0, 1.2 ZINCALUME, GALVABOND 1.6 GALVABOND	Qld	0.40 ZINCALUME, GALVABOND, COLORBOND (Up to 400mm girth) 0.55 ZINCALUME, GALVABOND, COLORBOND 1.0 ZINCALUME, GALVABOND 1.2, 1.6 GALVABOND 0.80 ZINCALUME
NT & SA	0.40, 0.55, 0.80, 1.00 ZINCALUME 0.55 COLORBOND 0.4, 0.55, 0.8, 1.0, 1.2, 1.6 GALVABOND		

3.17 Box gutters

Lysaght standard design

Box gutters are designed to suit large water carrying capacity requirements, usually on commercial buildings.

In effect, a box gutter operates like an open drain. Designing for a box gutter requires adequate support for the gutter be provided, both at the sides and below, to provide for the anticipated weight of the water collected.

As with all gutters, adequate fall must be provided as well as a rainhead or other large capacity drainage system.

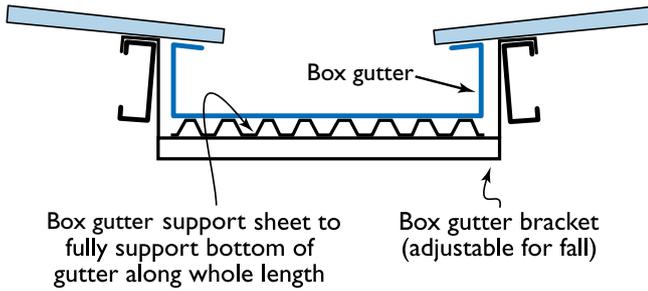


Figure 3.17.1
Box gutter

3.18 Barge Gutters and cappings

Barge gutters are designed to provide an option for the rainwater carrying capacity for the sides of buildings.

This detail is the most common way to flash the side of a steel clad roof.

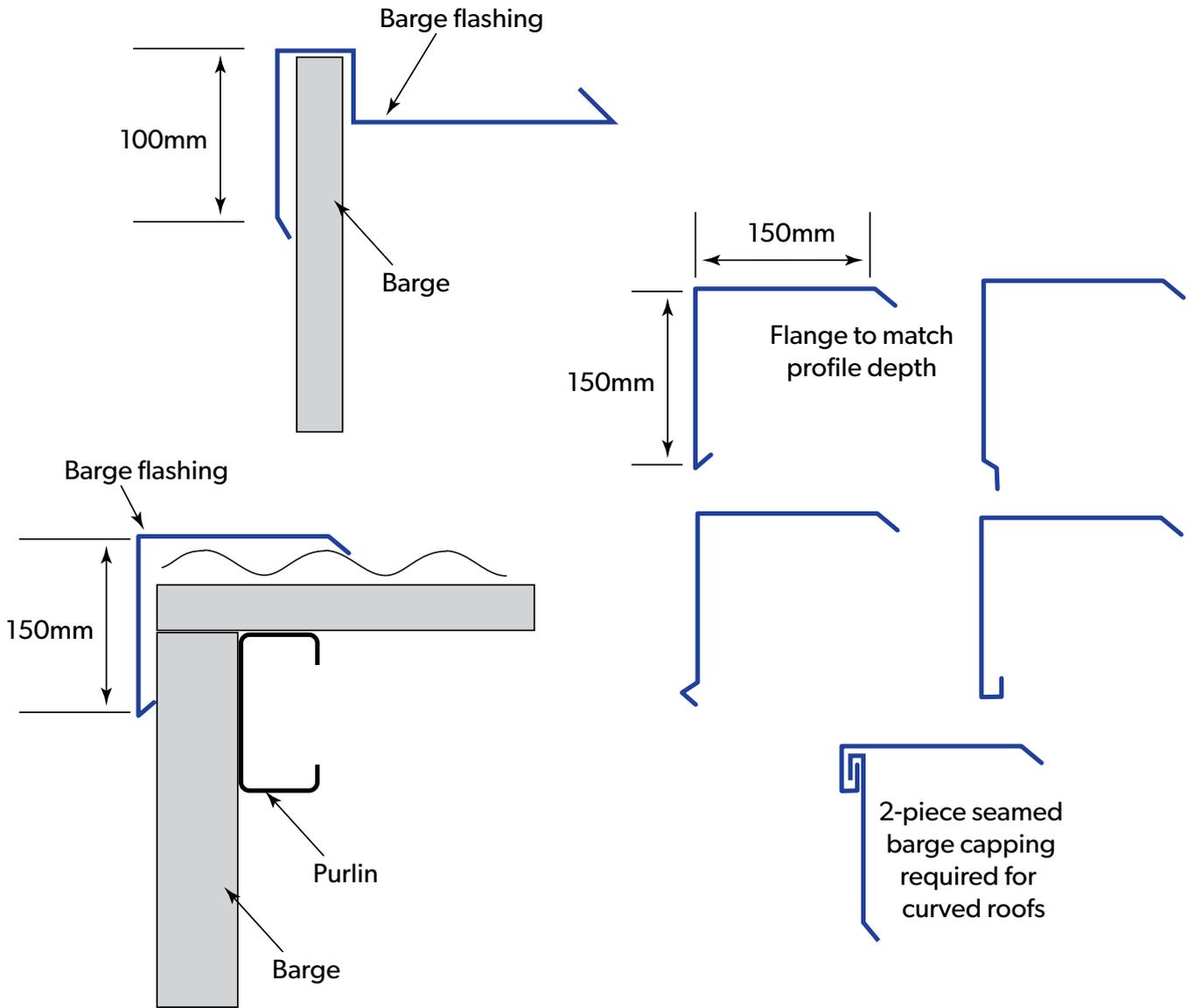


Figure 3.18.1
Barge gutters and cappings

4. Typical wall flashings

4.1 Cladding orientation

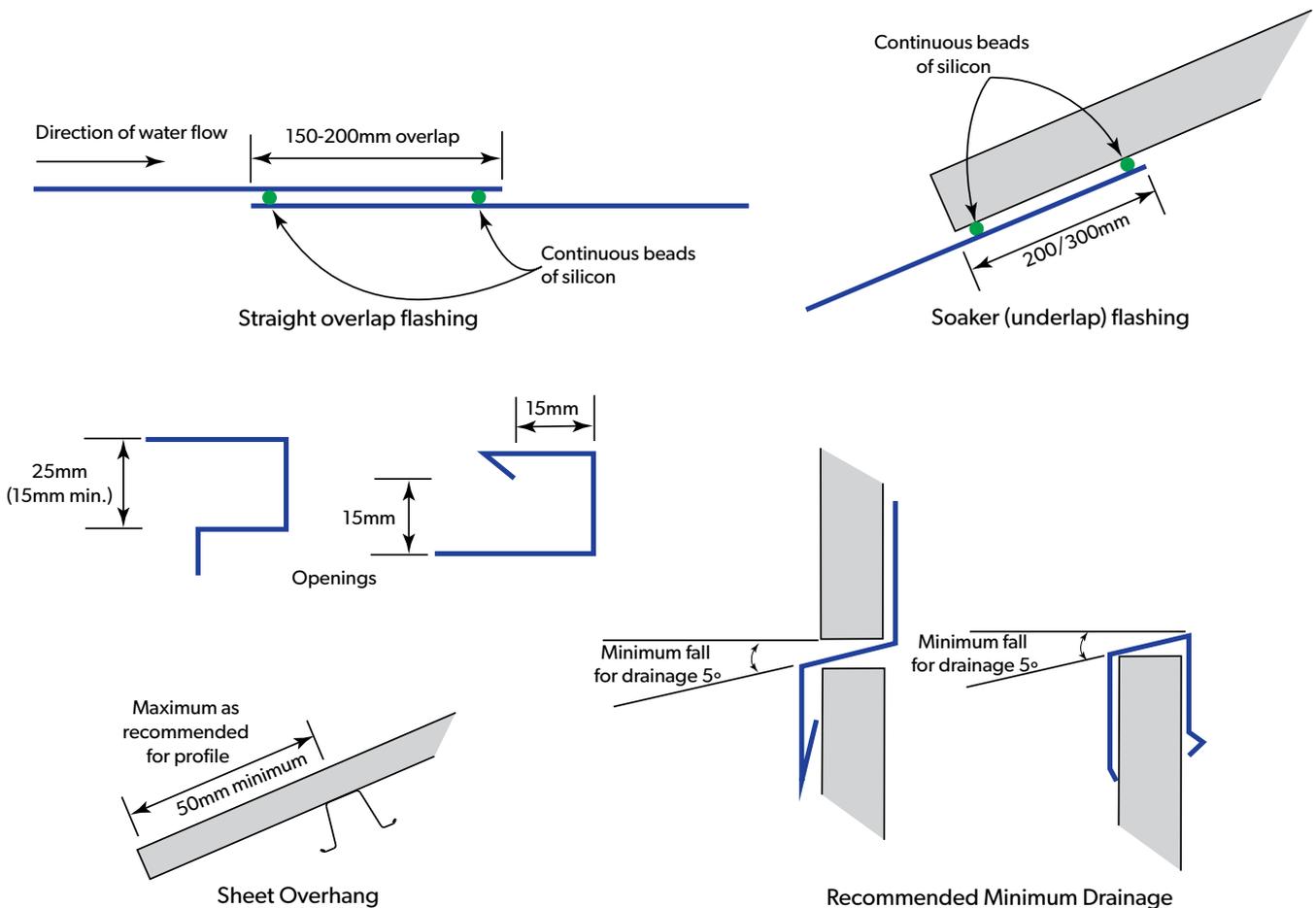
Cladding is usually installed with the profile running vertically or horizontally, though sheets have been laid diagonally—the choice is aesthetic.

Wind can drive rain hard against wall flashings, so it is important that you pay attention to the detailing of flashings around windows, doors, re-entrant and external corners, to ensure you get a watertight building. You also want a neat appearance.

We make wall flashings for some wall claddings (like EASYCLAD and MINI ORB) which are sometimes called trims. Where these are not suitable, custom-made flashings can be easily produced following the general principles described in this section.

4.2 Walling profile running horizontally

- It is usual to lay the first sheet at the bottom of a wall and work upwards towards the eaves. You want the window and door flashings to fit properly into the valleys, so you should locate the first sheet relative to the heads and sills of doors and windows. Thus, you first have to decide where the cladding will eventually be located at the heads of doorways and at the heads and sills of windows before you place the first sheet.
- Where possible, select the vertical size of windows so that the flashings at both heads and sills will coincide neatly with the pitch of your profile
- Be sure that the crests of the profile align with each other on adjacent walls, either side of a corner—this ensures that horizontal flashings fit properly into all valleys.
- Where valleys create a void at flashings, use closed-cell foam plastic infill
- Where wind-driven rain can be expected, turn back the edges of flashing to restrict water movement past the flashing.



Flashing is fixed using self drilling screws or rivets. Fixing as close as possible to the edge reduces distortion. Wind exposed areas near the edge of the building may require additional fixing.

Figure 4.1.1
Types of flashing laps

4.3 Types of flashings

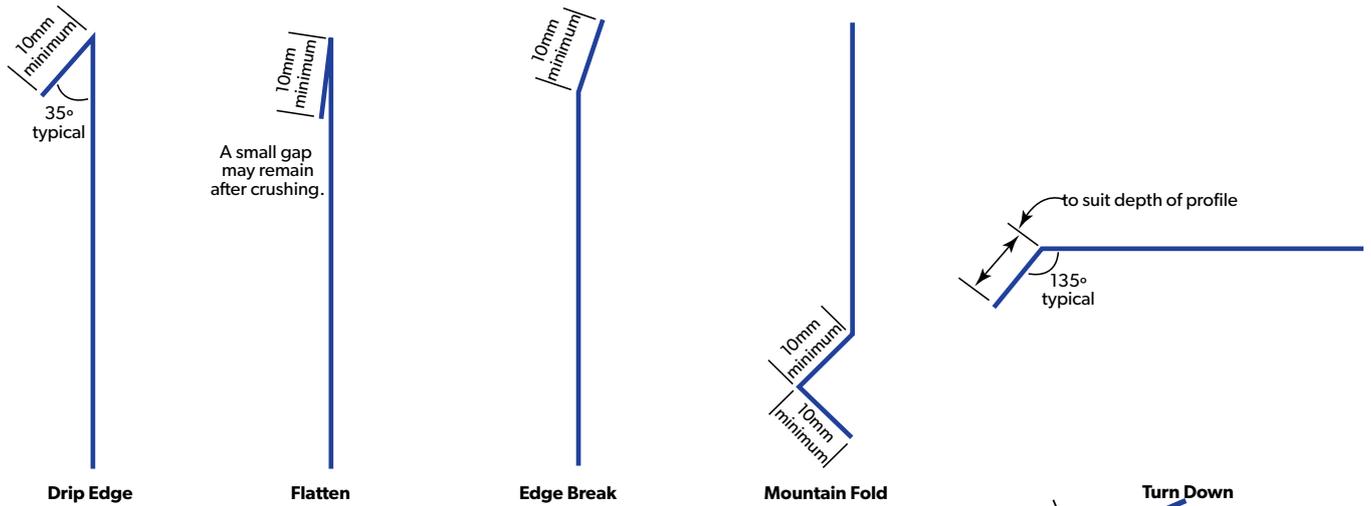


Figure 4.1.1
Edge types

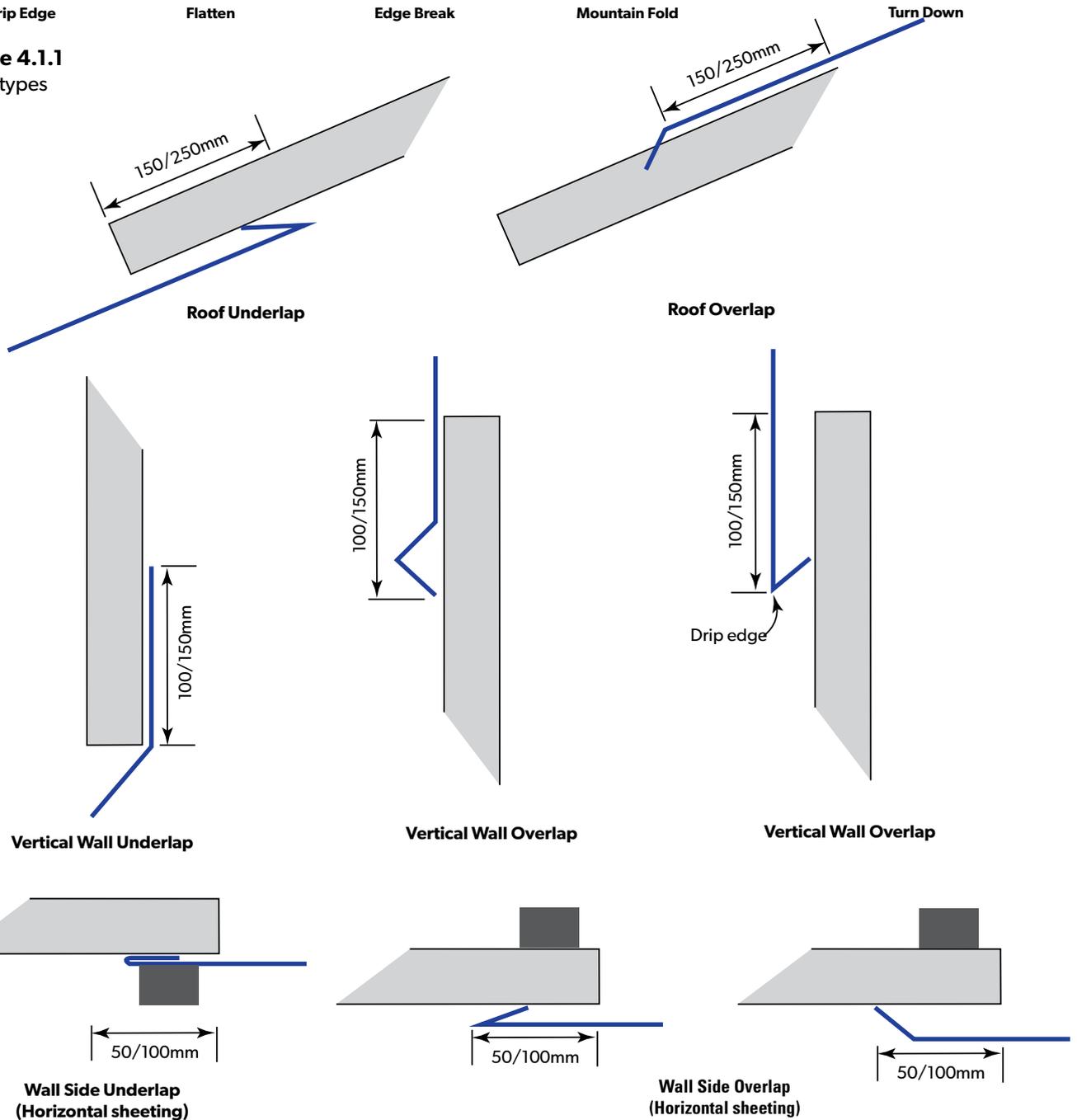
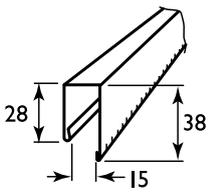
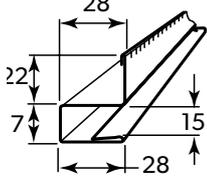
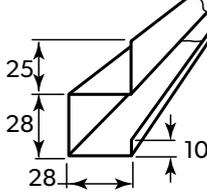
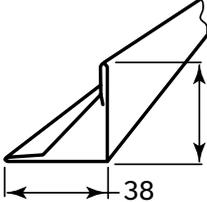
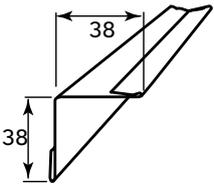
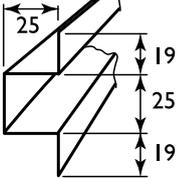
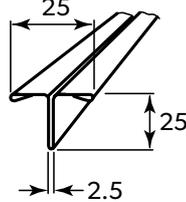
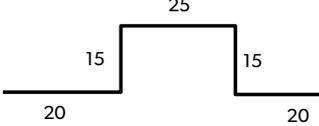
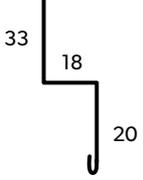
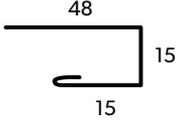
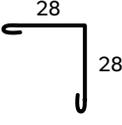
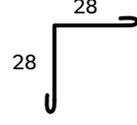
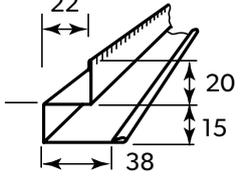
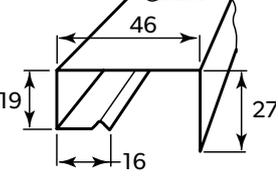
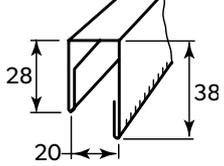
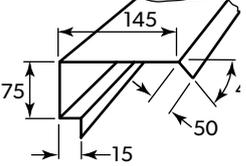


Figure 4.1.3
Types of flashing laps

4.4 Optional wall trims

Available in ZINCALUME® steel or COLORBOND® steel*

 <p>CD 1 Trim Channel Use with MULTICLAD, EASYCLAD</p>	 <p>CD 3 Fascia to Soffit Section, Use with PANELRIB, MINI ORB, EASYCLAD, MULTICLAD</p>	 <p>CD 4 Feature Section Soffit Use with PANELRIB, MINI ORB, EASYCLAD, MULTICLAD</p>	 <p>CD 5 External Corner. Use with PANELRIB, MULTICLAD EASYCLAD and MINI ORB.</p>
 <p>CD 6 Internal Corner. Use with PANELRIB, MULTICLAD EASYCLAD and MINI ORB.</p>	 <p>CD 8 Purlin hat Section Use with MULTICLAD, EASYCLAD</p>	 <p>CD 15 Tee Section. Use with PANELRIB, MULTICLAD EASYCLAD and MINI ORB.</p>	 <p>CD 20 Butt Joint trim - Top Hat. Use with PANELRIB, MULTICLAD and MINI ORB.</p>
 <p>CD 21 Butt Joint Trim - Overlap. Use with MULTICLAD</p>	 <p>CD 22 Edge Trim Use with MULTICLAD and MINI ORB. (Enquiry only in S.A.)</p>	 <p>CD 23 External Corner. Use with PANELRIB, MULTICLAD EASYCLAD and MINI ORB.</p>	 <p>CD 24 Internal Corner. Use with PANELRIB, MULTICLAD EASYCLAD and MINI ORB.</p>
 <p>CD 27 Fascia to Soffit Section. Use with PANELRIB, MULTICLAD, EASYCLAD and MINI ORB.</p>	 <p>CD 30 Fascia Capping. Use with PANELRIB, MULTICLAD, TRIMWALL, EASYCLAD and MINI ORB.</p>	 <p>CD 39 Trim Channel Use with EASYCLAD.</p>	 <p>EC 3 Fascia Capping. Use with PANELRIB, MULTICLAD, TRIMWALL, EASYCLAD and MINI ORB.</p>

Our range of wall trims are available for the range of LYSAGHT cladding profiles to provide an attractive compliment to walls, ceilings or soffits.

Some trims are used to start the installation of the walling panels whilst others provide the perfect finishing touch.

Made from COLORBOND® or ZINCALUME® steel*, they are an attractive, long lasting addition to any walling installation.

Not all trims are available in all locations and some dimensions may vary from state to state - for local availability of wall trims, contact your local sales office.

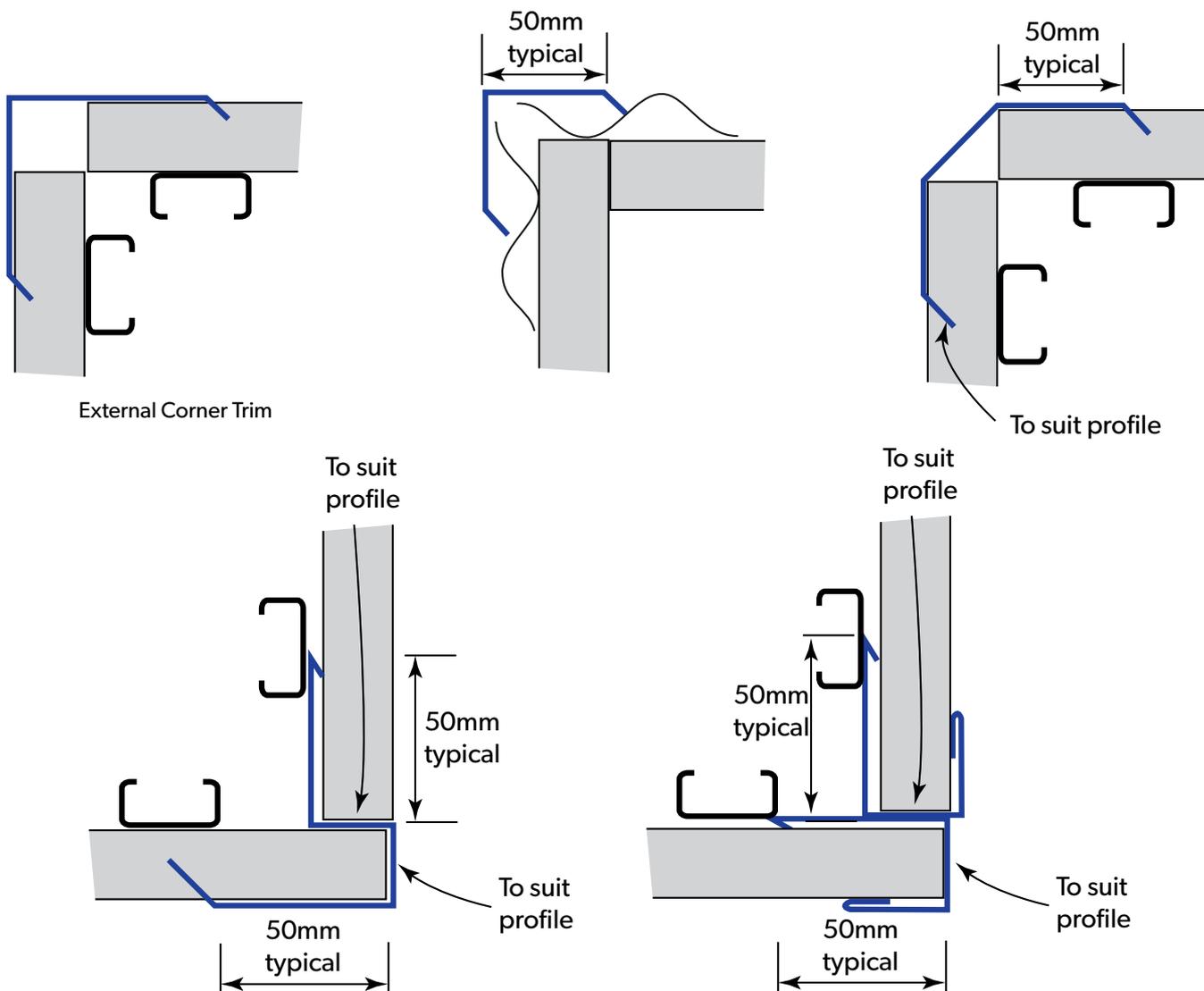
*Other materials, such as stainless steel and COLORBOND® Ultra are available, subject to enquiry.

 <p>CD 40 Starter Clip Use with EASYCLAD.</p>
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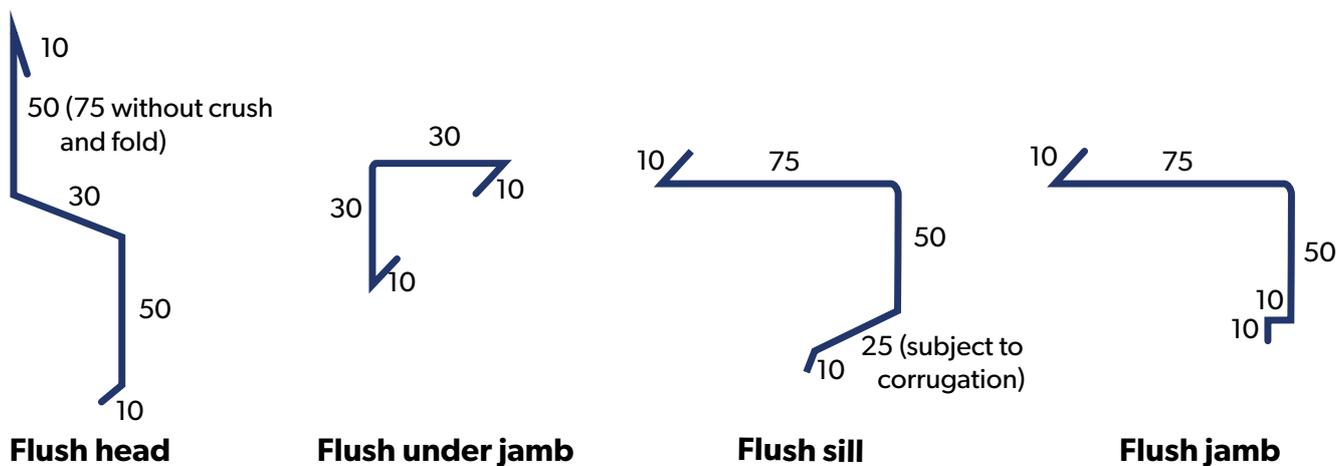
4.5 Mid wall connections

4.6 Internal wall connections

4.7 External corner connections



4.8 Flashing for horizontal cladding



4.9 Flashings for horizontal corrugate cladding

Extra care and attention to the detailing and fixing of horizontally oriented corrugate cladding is required. Designers using horizontally fixed corrugate sheets as a design feature should recognise that there are a number of requirements which differentiate horizontal from vertical profiled cladding.

Horizontal cladding exposes the defects in the visual appearance of the framing to a much greater extent than vertical cladding does. The plane of the supports both horizontally and vertically should be straight within a very limited tolerance (5mm in 10 metres) The vertical and horizontal planes of framing members should exhibit little or no twist. Therefore, the standard of framing should be inspected and approved the before the commencement of any cladding installation.

Horizontal cladding should be fixed in the pan as this provides a stronger, more economical and aesthetic fastening than crest or rib fixing. The wind design load for the building will determine the number, spacing and the position of the fasteners. A butt detail to join horizontal cladding which is simple and aesthetically pleasing is to provide a vertical break at structural steel frame centres. Use a top hat or tee flashing section at the joint, but ensure the exact sheet length required is used. These sheets must be cut accurately to within 1mm to provide a neat joint.

Condensation is likely when horizontal metal cladding is directly fixed to a lined or insulated wall. Therefore it is recommended that horizontal laps are sealed with sealant or lap tape.

4.10 Flashings for vertical cladding

Detailing flashing for vertical cladding is similar to detailing roof cladding penetrations. This is because the water from the 'under' has to drain over at the window or door head. Automatic weathering is provided by a sheet lap at the head flashing. Either profile the vertical upstand of the head flashing or flatten the lap.

This detail can be used for corrugated, ribbed and trapezoidal cladding. Do not stop end the flashing but turn it down as per drawings 4.10.1 and 4.10.2

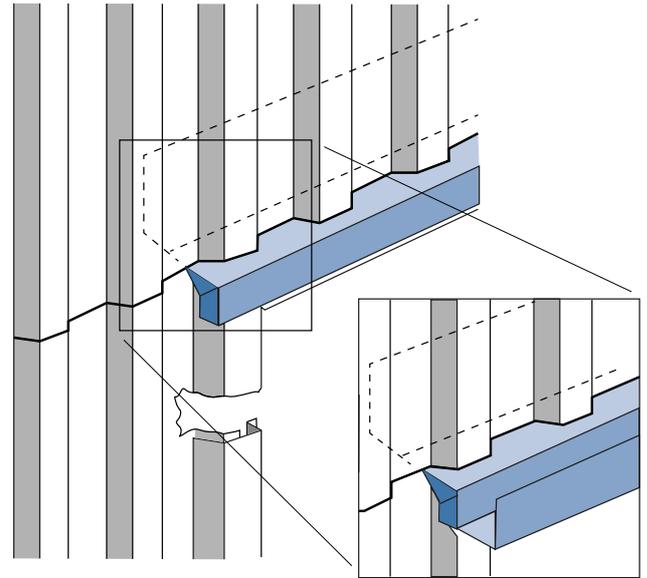


Figure 4.10.1
Flashings for vertical cladding

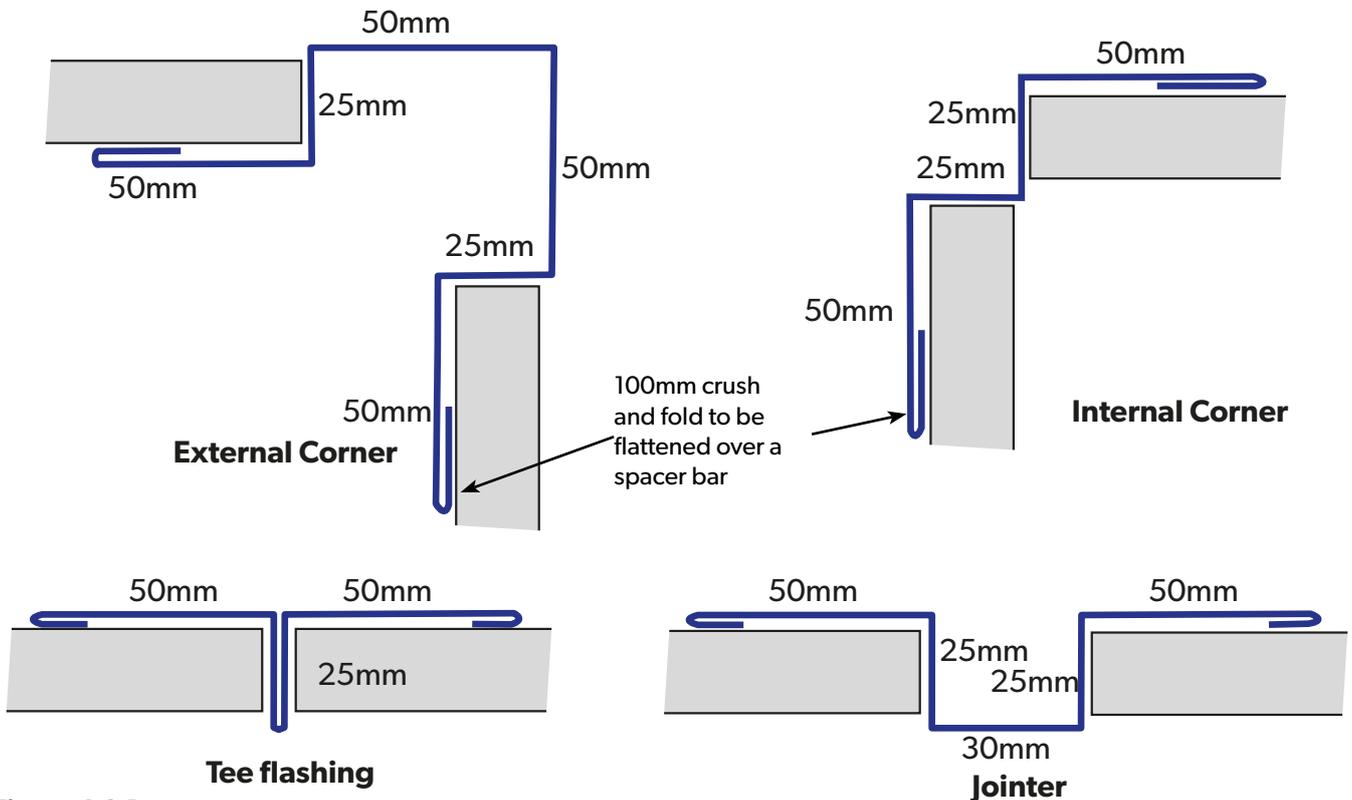


Figure 4.9.1
Butt details

 These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

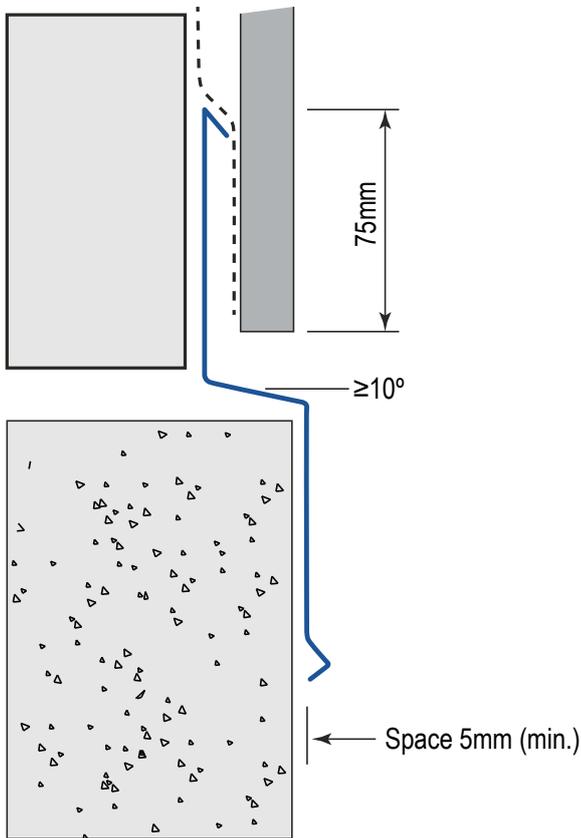


Figure 4.10.2
Flashings for vertical cladding

4.11 Toe-mould type flashings

Flashing at wall footings should include a fall on "horizontal" planes & be of a sufficient size to ensure good drainage away from the sheeting & to avoid potential build-up of debris.

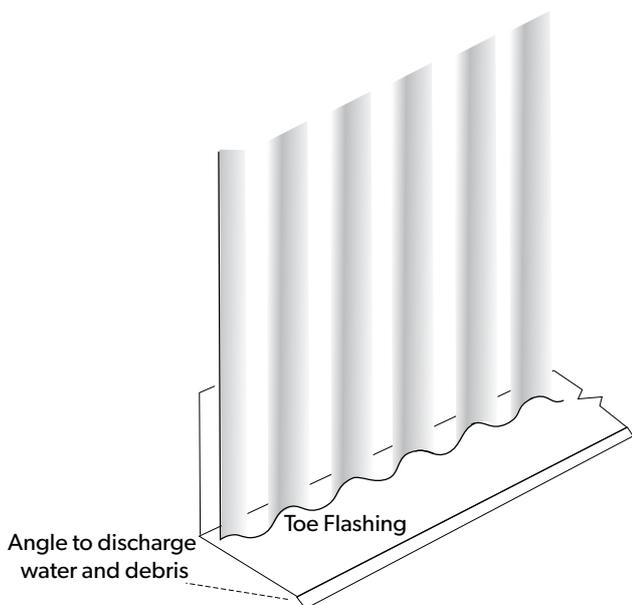


Figure 4.10.3
Toe-Mould Type Flashing

4.12 Window flashing types

There are three types of window flashings:

- (a) flush mounted
- (b) recessed (or reveal)
- (c) butt

The module set-out of horizontal cladding should be determined by the height of the window.

Generally speaking, to achieve good weathering characteristics, window and door detailing should be performed after the cladding and other flashing has been fitted.

However, the installation of a head flashing, for example, requires that it is behind the cladding and protects the window by exiting over the cladding. The depth of the cladding determines the offset. A fall to the front of 10° (minimum) is recommended.

Lap the cladding at the window or door head height when lapping horizontal cladding.

If the window is within the depth of the wall of the building, the flashings are termed 'reveal or recessed flashings'. Windows and doors can be recessed to the front of the frame or flush in line with the cladding. Either way, they both have the same overflashing design, however a recessed design has the advantage of a better weathering detail. A recessed design can result in unwashed areas of metal, which will require some maintenance for durability.

Because they do not overflash the metal cladding, butt flashing details are not considered suitable for residential closed cavity construction.

To avoid ponding and the build up of dirt and debris, all exposed horizontal metal flashings (including the head or sill flashings) must have a minimum 10° pitch.

To provide a weather-tight joint, all sills should be riveted and sealed.

4.13 Window flashings for metal cladding

Metal clad buildings such as sheds and garages have generally been unlined and as such, the wall cavity is naturally vented. In such cases minor amounts of water penetration are acceptable. However, if the building is lined then greater moisture resistance is required. Cavity construction is required for lined and insulated buildings in higher risk areas for this reason. Buildings situated in a very high wind design load areas (<1.5.kPa.) and buildings that are two stories or more are considered to be higher risk.

The flashings that protect the sheets and any penetrations in horizontal cladding are the prime factor controlling weather-resistance. A cavity is required for all lined buildings because they are susceptible to the accumulation of condensation.

Some provision to remove condensation is required for all metal wall cladding. Condensation can occur when the humidity is high or when there is a large daily temperature differential. The frequency of condensation forming on the metal cladding will increase if the wall is insulated and the building is heated.

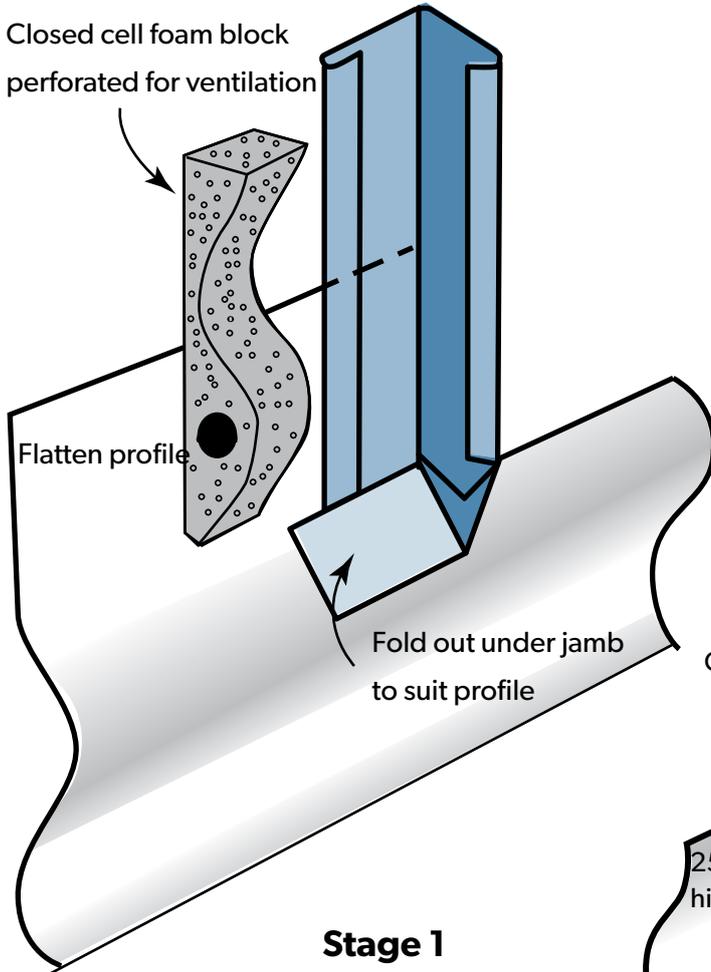


Figure 4.13.1
Flush window flashings

4.14 Flush window flashings

The position of the profile rib may require the height of the sill flashing may have to be adjusted slightly.

Flush mounted windows or doors permit a wide choice of flashings to be utilised. You can choose to have the window frame is mounted externally to the cladding, or timber facings, or any number of other designs.

An under jamb and a front or face jamb is used for both the flush and recess flashings.

Add 10mm on the jamb liner size to the trim sizes for aluminium windows. Add 15mm vertically to the trim size for a flush flashing design as this allows for a 10mm packer.

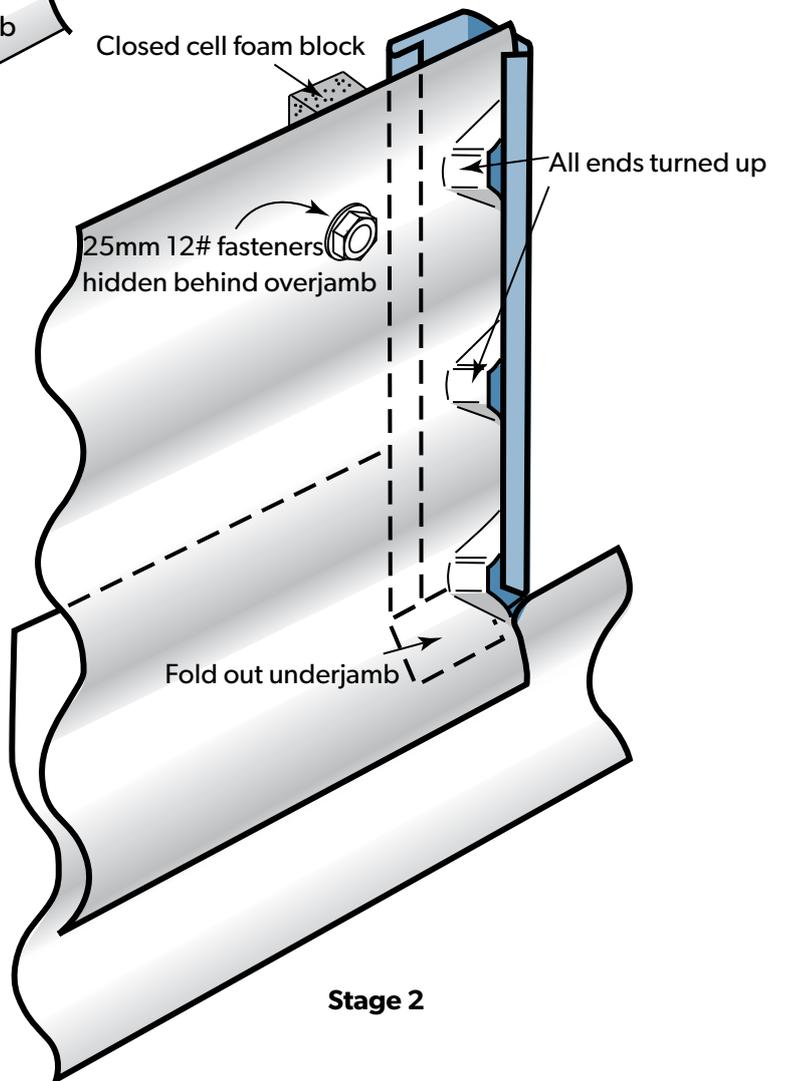


Figure 4.14.1
Flush window flashings

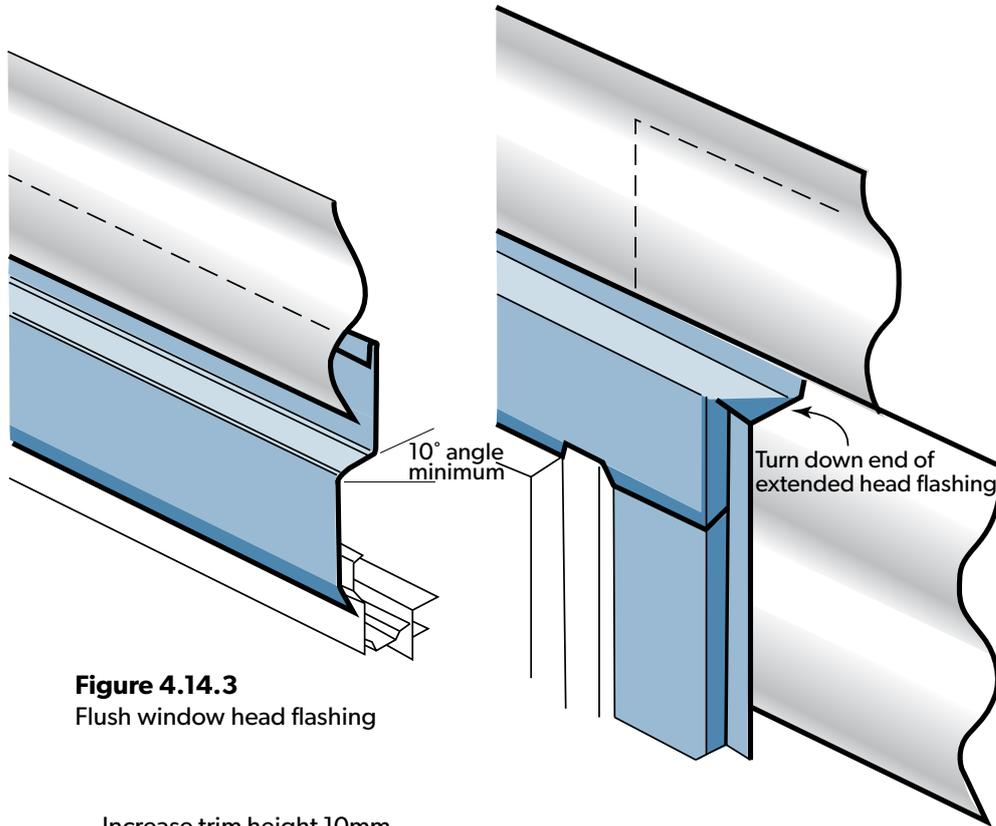


Figure 4.14.3
Flush window head flashing

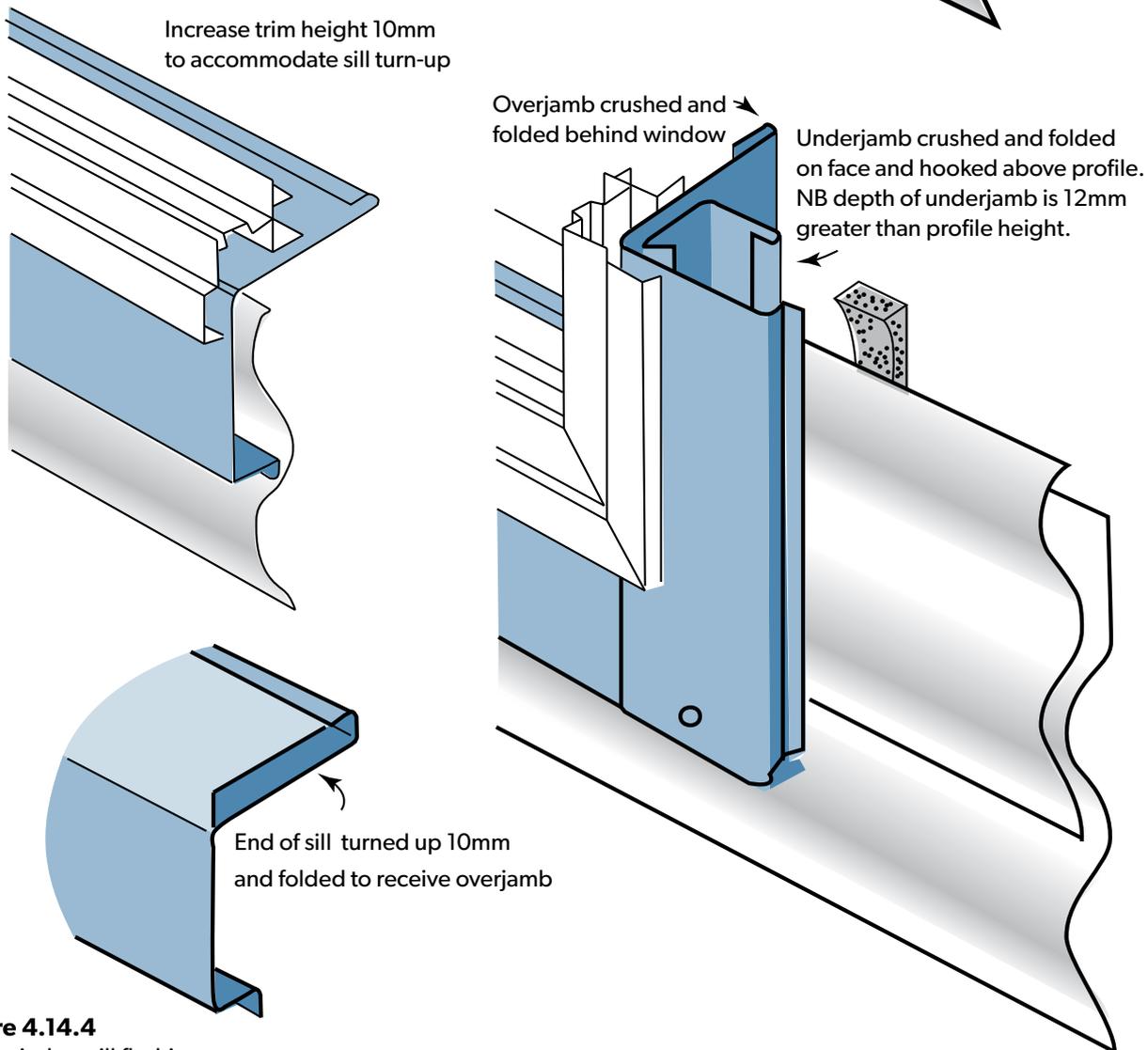


Figure 4.14.4
Flush window sill flashing

4.15 Recessed window flashings

A recessed window flashing design is considered the best option for horizontal cladding but accurate flashing measurement and installation are required to provide weather-tightness.

N.B. For lined buildings a cavity is required for horizontal metal cladding.

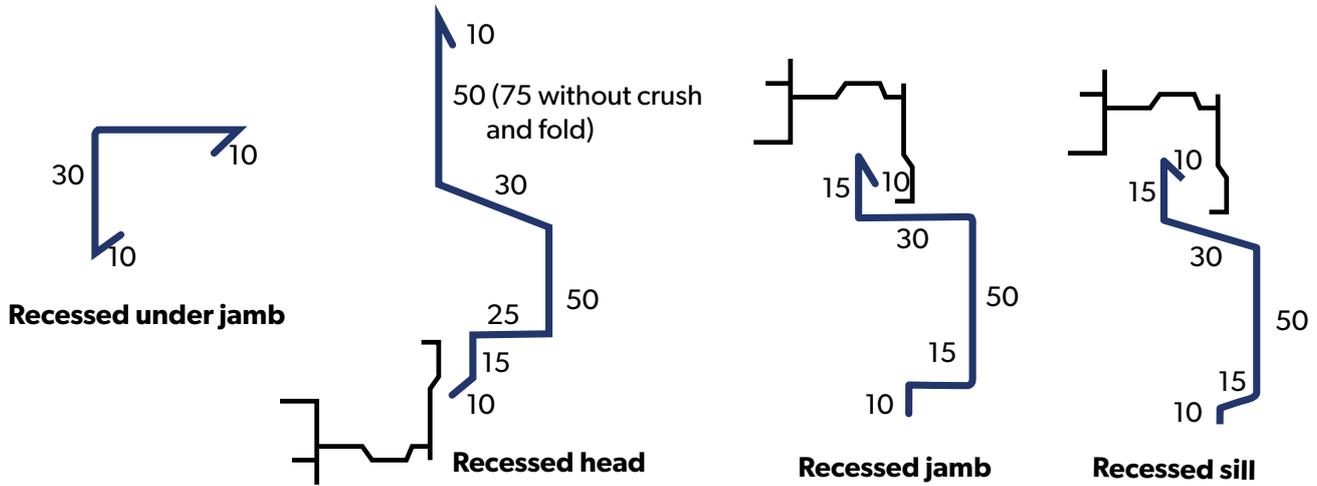


Figure 4.14.1
Recessed window flashings

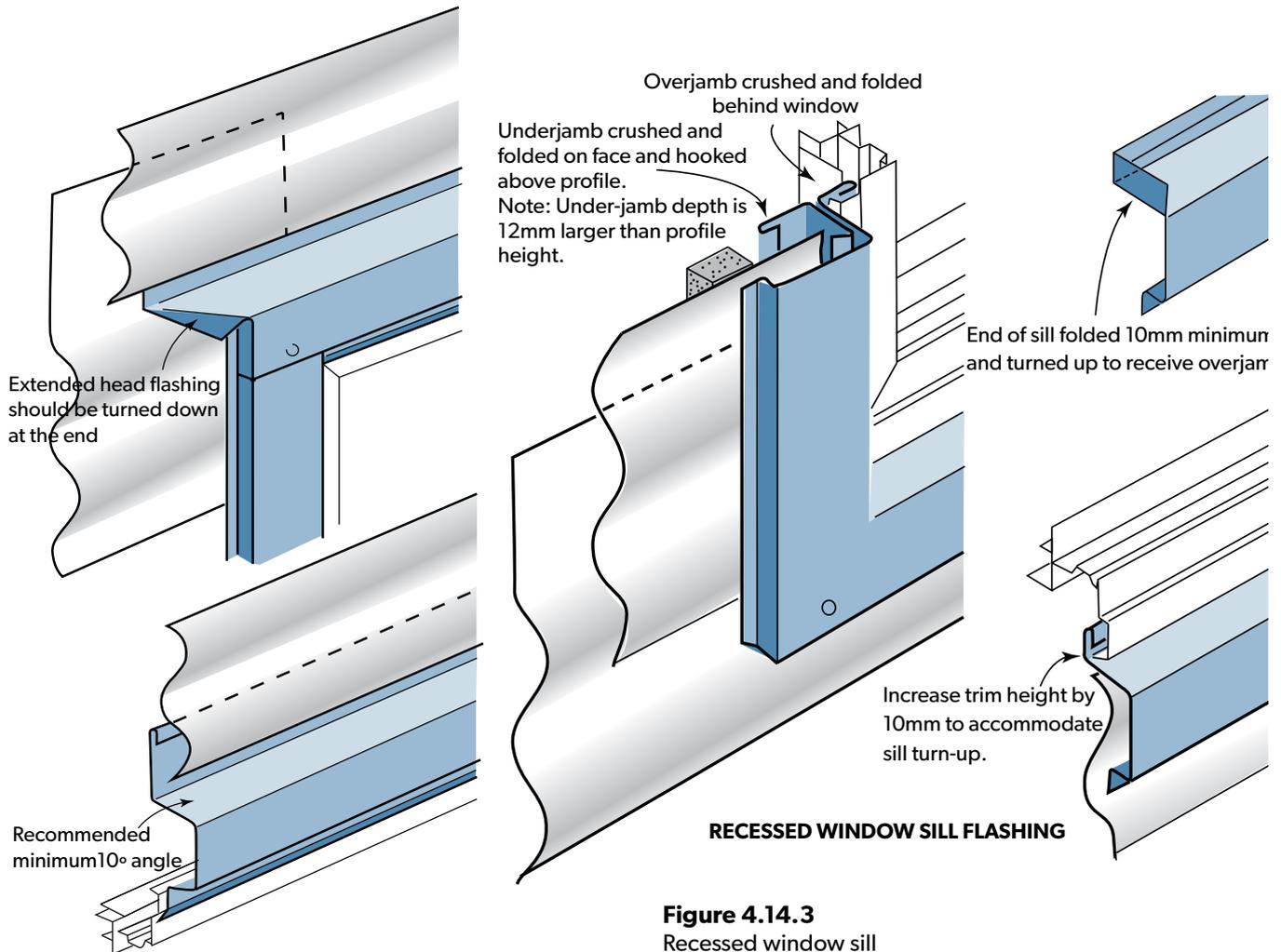


Figure 4.14.3
Recessed window sill

Figure 4.14.2
Recessed window head

These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

4.16 Butt window flashings

In some instances, the cladding can terminate up to a flashing without overflashing, but this requires accurate fitting to be weather-resistant. (see Figure 4.15.2). Called 'butt flashings' they can be used on flush or recess designs with a one-piece jamb. They are not suitable for areas with high wind design loads. Careful attention to design, measurement and precision manufacture are all necessary to provide a weather-resistant solution.

Additionally, butt flashings require precise and accurate installation to provide an aesthetically agreeable solution. Consideration should be given to the size of the catchment area they drain and whether adequate framing structure exists to fix them correctly. Given all these factors, they are not a preferred detail.

Drainage from multi-storey building can be considerable. A rule-of-thumb is to calculate this by multiplying the width of the window opening by half the height. Treat water disposal at a butt flashing as you would a penetration.

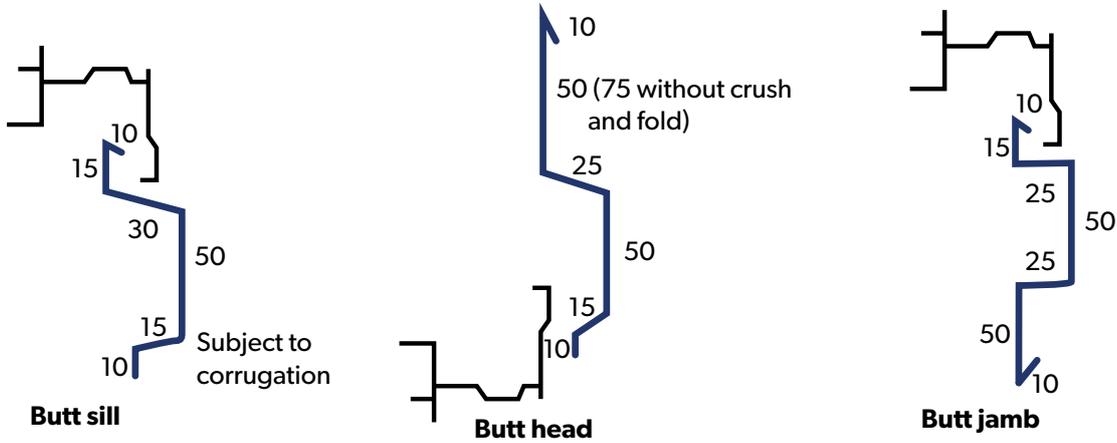


Figure 4.15.1
Butt window flashings (underlay is omitted for clarity)

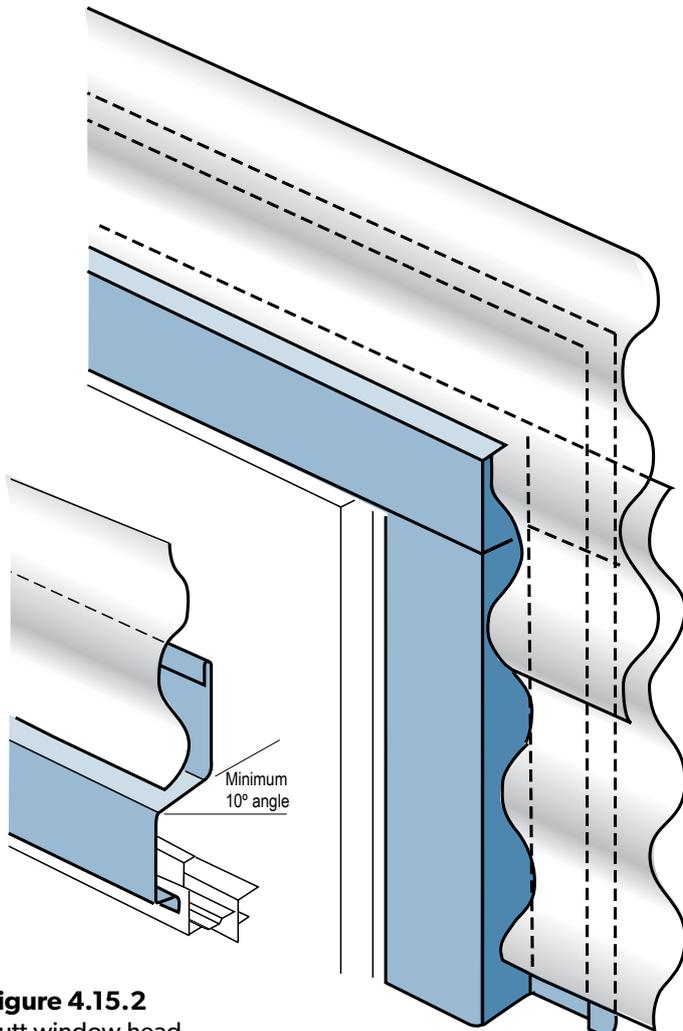


Figure 4.15.2
Butt window head

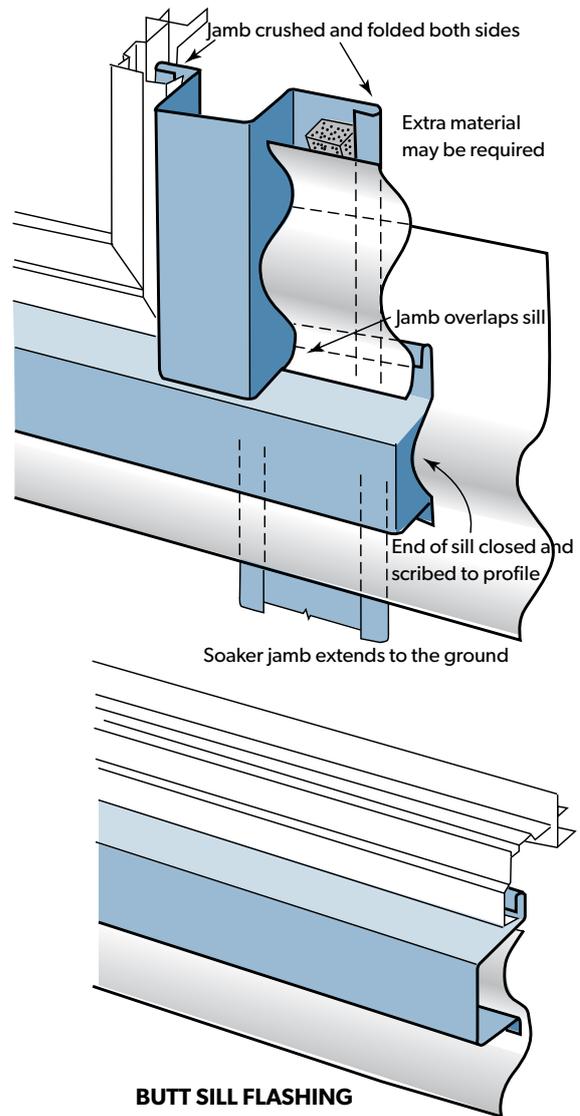


Figure 4.15.3
Butt window sill flashing



These drawings are based on drawings from the NZ METAL ROOF AND WALL CLADDING CODE OF PRACTICE (Version 2.2: 2012).

A cavity is not required for vertical cladding. Window and door flashings for vertical or horizontal cladding are similar. The main difference is that the module is running horizontally.

Some flexibility is required if the flashings are to be equal on both sides. Therefore, the trimming size of the window opening should have an additional 50% of the module dimension to allow for adjustment to equalise both sides.

Corrugation must be flattened at lap

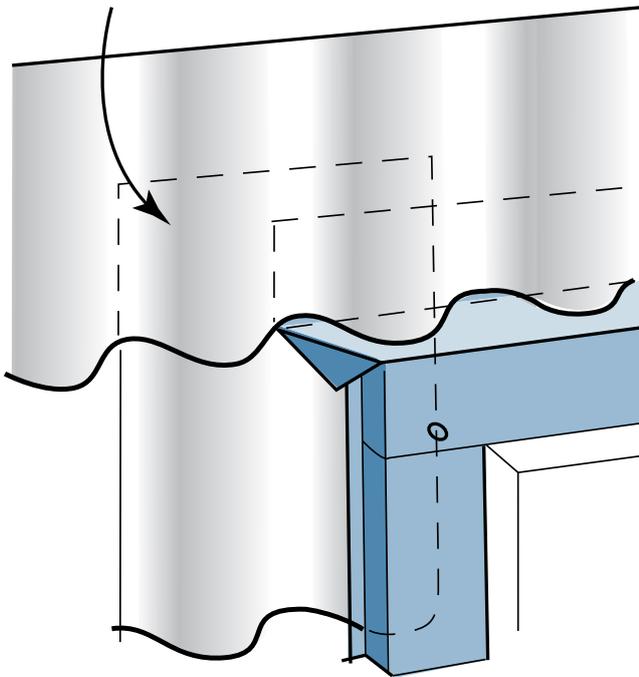


Figure 4.16.1
Head flashing for vertical cladding

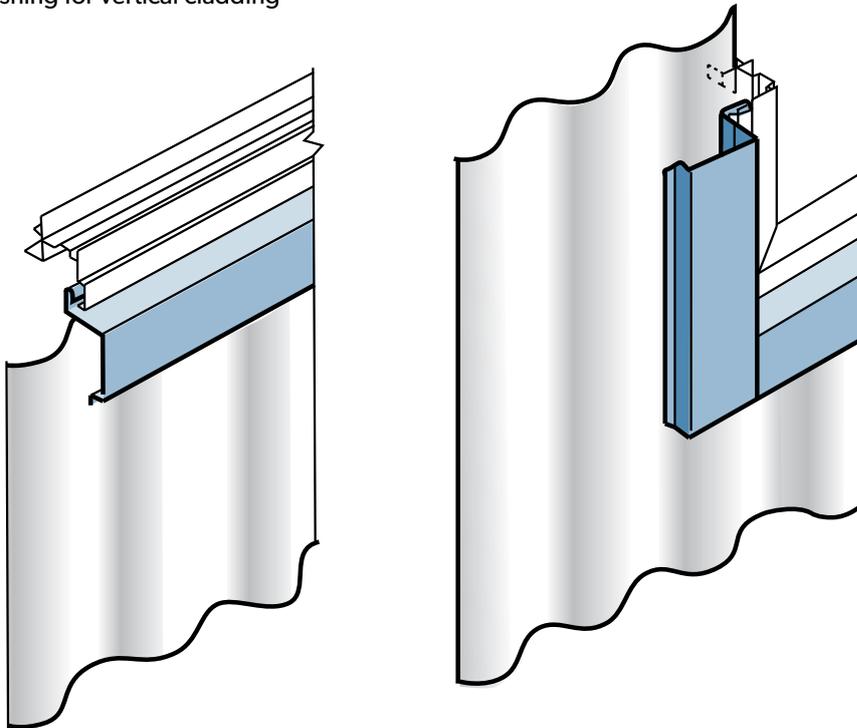


Figure 4.16.2
Sill flashing for vertical cladding

4.17 Alternative Flashing designs

This document does not claim to be comprehensive - there are many alternate ways to successfully use butt flashings to to weather-proof a window.

If it is a 'panelised' opening, the vertical jamb flashing can be extended from soffit to the ground for single storey buildings or to a module break in a multi-storey building as shown in drawing 4.16.1.

This alternative provides the opportunity to use the same or an alternative material at the head and sill areas and a top hat flashing is used to obtain a module break.

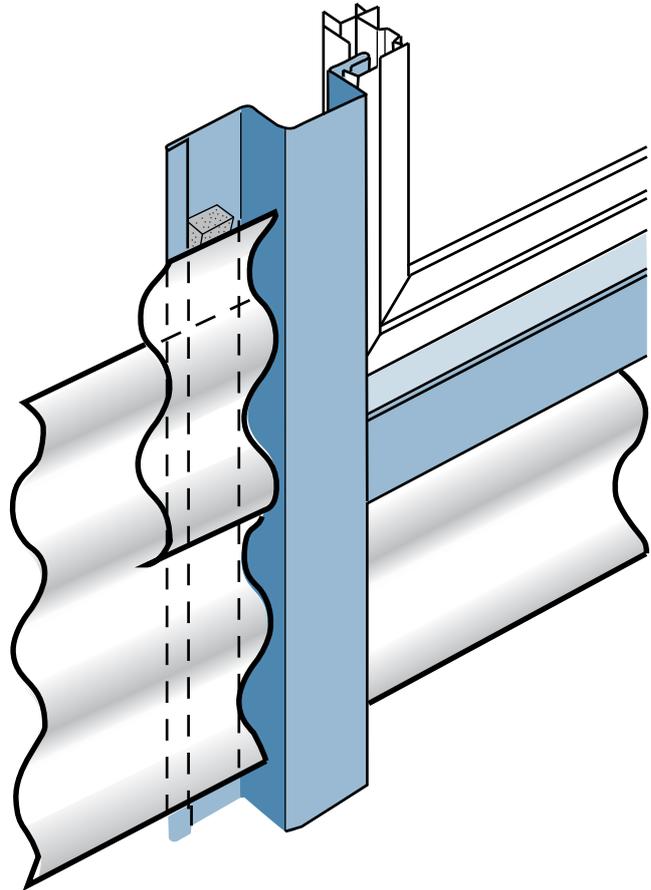


Figure 4.17.1
Alternative flashing designs

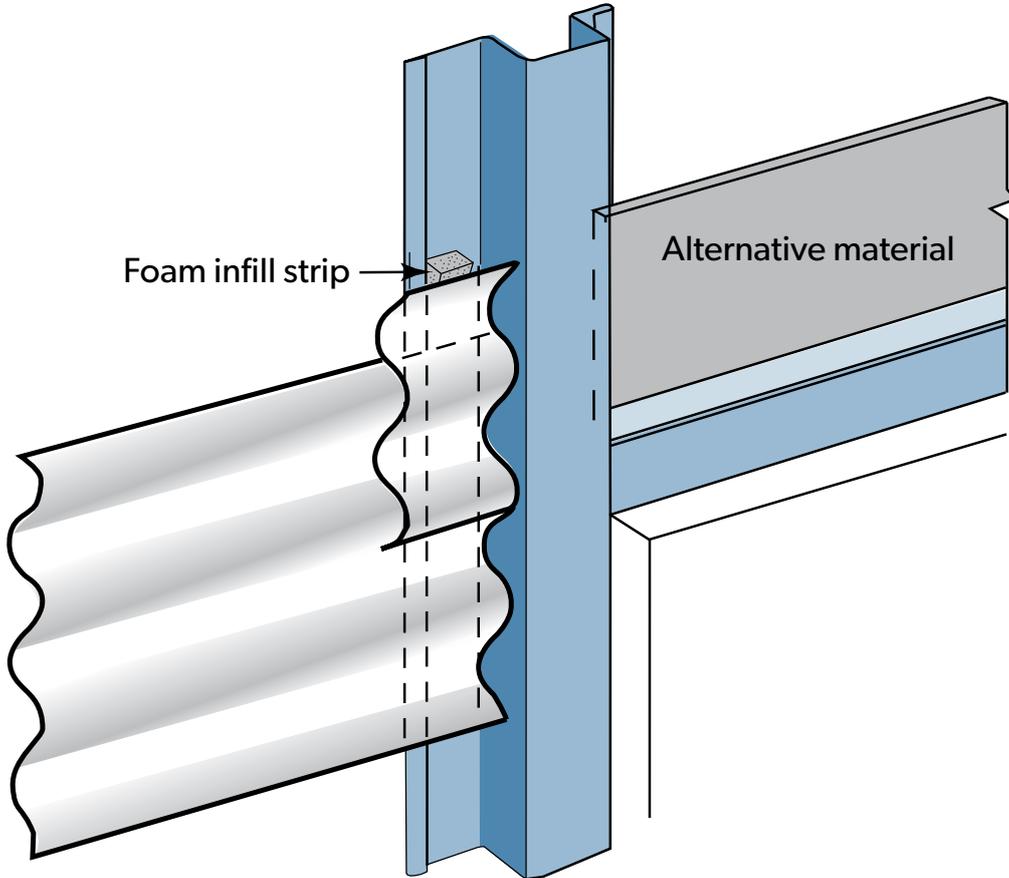


Figure 4.17.2
Alternative flashing designs

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Summary of Actions from Pritchard Francis ORSC Roof Structural Condition Report

1. Original Building external roof		
	Recommendation	Action:
1.1.1	Tek screws showing signs of weathering are to be replaced and adequately sealed.	ORSC
1.2.1	All sealed areas (around mechanical plant and ventilation) are to be resealed and monitored to ensure adequate water tightness.	ORSC
1.2.2	All areas where water ponding is evident are to be provided with alternative paths for water to flow to the box gutters and off the roof structure.	ORSC
1.2.3	Areas where flashing has been installed (around mechanical plant and ventilation) are to ensure the flashing is installed in such a manner as to avoid and water ponding.	ORSC
1.3.1	Seal any holes in roof sheeting. Monitor for signs of corrosion	ORSC
1.4.1	Box gutters re resealed and monitored to ensure adequate water tightness.	ORSC
1.4.2	The box gutters continuously monitored and cleaned to ensure there are no leaves or debris in the gutter.	ORSC
2. Function Centre Extension External Roof		
2.1.1	All tek screws are to be replaced and adequately sealed.	ORSC
2.2.1	Install the roof flashing to ensure it covers the sheeting lap which will ensure that any future issues that may arise are visible and easily maintained.	SWEK
2.3.1	Install the roof flashing to ensure it takes all water away from the parapet wall and onto the roof sheeting to be discharged through the box gutter.	SWEK
2.4.1	Mount conduit to the parapet wall.	ORSC
2.4.2	The roof sheeting should be monitored for any signs of water ingress. If any water ingress occurs the sheeting should be replaced or adequately flashed over.	ORSC
3 Original Building Internal Roof Space		
3.1.1	Rectify roof vent cap installation.	ORSC
3.1.2	Area is to be monitored for any signs of further water ingress.	ORSC
3.1.3	Replace ceiling tiles as required.	SWEK
3.2.1	Re-seal the area around the rotary roof vent.	ORSC
3.2.2	Area is to be monitored for any signs of further water ponding or water ingress.	ORSC
3.2.3	Replace ceiling tiles as required.	SWEK
3.3.1	Re-seal the box gutter above.	ORSC

3.3.2	Area is to be monitored for any signs of further water ingress.	ORSC
3.3.3	Replace ceiling tiles as required.	SWEK
3.4.1	Rectify roof tek screws as noted above (actions 1.1.1 and 2.1.1). Ensure all water on the roof can flow to the box gutter and off the roof structure. Area is to be monitored for any signs of further water ingress.	ORSC
3.4.2	Replace ceiling tiles as required.	SWEK
3.5.1	All areas where water ponding is evident are to be provided with alternative paths for water to flow to the box gutters and off the roof structure.	ORSC
3.5.2	Areas where flashing has been installed are to ensure the flashing is installed in such a manner as to avoid and water ponding.	ORSC
3.5.3	Area is to be monitored for any signs of further water ponding and water ingress.	ORSC
4 Function Centre Extension Internal Roof Space		
4.1.1	Rectify roof gutter as noted above.	ORSC
4.1.2	Sealed area is to be monitored for any signs of water ingress. If there is any sign of further water ingress the area is to be re-sealed appropriately.	ORSC
4.1.3	Replace ceiling tiles as required.	SWEK
4.2.1	Rectify roof tek screws as noted in 2.1.1. Area is to be monitored for any signs of further water ingress.	ORSC
4.2.2	Replace ceiling tiles as required.	SWEK