DEPARTMENT OF PUBLIC HEALTH

REPORT OF A

MOSQUITO SURVEY

ALONG THE SWAN, CANNING & HELENA RIVERS

Compiled by

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1963

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C O N T E N T S

M O S Q U I T O S U R V E Y

A SURVEY OF THE POTENTIAL MOSQUITO BREEDING SITES OF THE SWAN, CANNING AND HELENA RIVERS

INTRODUCTION.

Following the results of two previous limited mosquito surveys along part of the Swan River, made by Officers of the Public Health Department in March, 1961, and January, 1963, the Commissioner of Public Health instructed that a survey of the mosquito potential breeding sites along the Swan, Canning and Helena rivers be carried out.

OBJECT.

The object was to assist Local Authorities to control and eradicate mosquito breeding along the Swan, Canning and Helena rivers.

LIMITS OF SURVEY.

The rivers were traversed between the 18th March and the 10th May, 1963, as follows :-

A. Swan, both sides, from Fremantle to Barrett Street, Herne Hill.

B. Canning, both sides, from Canning Bridge to Royal Street, Kenwick.

C. Helena, both sides, from the Swan river junction to Scott Street, Helena Valley.

Due to heavy rains early in May, the survey of the Canning river was terminated at Royal Street, Kenwick.

POTENTIAL SITES.

There are sixty three (63) potential sites, ranging from ¼ to 400 acres, totalling 2,347 acres.

They are situated along the three rivers in fourteen (14) Local Authority areas. Tables I and II show their distribution along the rivers and in the Local Authority areas.

Site locations will be found in appendix I, while the details of the sites will be found in appendix II.

Permanent pools are on the sites but many more pools will be found after high tides.

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The surface waters on most sites are tidal, but in addition, tidal flats sometimes also receive water from springs, drainage systems, seepage and rains. These latter sources, for the purpose of brevity, will be all grouped under the heading "Natural". Sites above tidal influence receive their surface water from "Natural" sources.

TABLE I.

DISTRIBUTION OF BREEDING AND POTENTIAL BREEDING SITES ALONG THE RIVERS

RIVER	Breeding Sites		Potential Breeding Sites		Combined Breeding and Potential Breeding Sites	
	Number of Sites	Acreage	Number of Sites	Acreage	Number of Sites	Acreage
Swan	24	1005¾	14	511½	38	1517¼
Canning	11	724½	5	40	16	764½
Helena	7	56½	2	9½	9	66
TOTAL	42	1786¾	21	561	63	2347¾

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TABLE II.

DISTRIBUTION OF BREEDING AND POTENTIAL BREEDING SITES

LOCAL AUTHORITY	Breeding Sites			Potential Breeding Sites			Combined Breeding and Potential Breeding Sites		
	River	Number of Sites Involved	Acre-age	River	Number of Sites Involved	Acre-age	River	Number of Sites Involved	Acre-age
Canning Shire Council	Canning	7	560½	Canning	4	34	Canning	11	594½
Perth City Council	Swan	3	118¼	Swan	3	363	Swan	6	481¼
South Perth City Council	Swan Canning	2 3	128 142	Canning	1	6	Swan Canning	2 4 6	128 148 276
Belmont Shire Council	Swan	3	223	Swan	4	33	Swan	7	256
Swan-Guildford Shire Council	Swan Helena	8 6	123 46½	Swan Helena	3 2	46 9½	Swan Helena	11 8 19	169 56 225
Perth Shire Council	Swan	3	119	Swan	2	22	Swan	5	141
Bayswater Shire Council	Swan	2	137				Swan	2	137
Melville Town Council	Swan Canning	2 1	105 8				Swan Canning	2 1 3	105 8 113
Bassendean Shire Council	Swan	2	51	Swan	1	36	Swan	3	87
Midland Town Council	Helĕna	4	8½	Swan	1	10	Swan Helena	1 4 5	10 8½ 18½
Gosnells Shire Council	Canning	2	14				Canning	2	14
Subiaco City Council	Swan	1	1½				Swan	1	1½
Mundaring Shire Council	Helena	1	1½				Helena	1	1½
Mosman Park Town Council				Swan	1	1½	Swan	1	1½
		50	1786¾		22	561		72	2347¾

N.B. Nine (9) sites each involve two adjoining Local Authorities.

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TIDES.

Tides are of major importance in mosquito breeding and control.

There are two "Tidal Recorders" on the Swan river; at the Western end of "A" Shed, Victoria Quay, Fremantle, and on the Western jetty at Barrack Street, Perth.

Copies of the daily tidal recording sheets, from the 1st January, 1960, to the 30th April, 1963, have been obtained and are available for perusal. Arrangements have been made for future monthly copies as available; this will be about the middle of the following month.

Due to the small lunar influence on tides in the Fremantle area, it is not possible at the present time to predict high or low tides, nor times of tidal variations for the Swan river. Meteorological conditions are the major influences.

Although copies of tidal recording sheets are on hand showing all tides recorded at Barrack Street, from the 1st January, 1960, to the 30th April, 1963, insufficient information is available, nevertheless it appears that with unpredictable occasional exceptions, reasonable tides can be expected during late spring and early summer.

From late December, unpredictable high tides flood the low lying river flats. When the water recedes, unless effective control measures are immediately put into operation, with the optimum conditions prevailing - shallow pools of warm water - a mosquito plague occurs.

By observation during the survey, the Swan river is at all times an unbroken sheet of water from Fremantle to Herne Hill. Herne Hill residents state that the unbroken stretch continues to Upper Swan. In summertime the level of the river is affected by the rise and fall over the whole of the unbroken stretch.

The Canning river is tidal to Kent Street Weir, Cannington, and the Helena river for one mile east of the Swan river junction.

Insufficient information is available on the tidal levels in relation to the flooding of the breeding and potential breeding sites.

VEGETATION COVERAGE.

Vegetation is of great importance in mosquito control. It can and does prevent access, not only for treatment, but for the effective treatment of the water underneath. The oils and larvicides settle on the vegetation instead of reaching the water.

The vegetation found on some sites excluded effective control as it was with great difficulty penetration through it on foot, without any equipment, was made.

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In contrast, some grasses growing in water up to three feet deep, were so matted near the surface they provided footways across the water. This prevented access to larvae predators as they were unable to penetrate the weed and invariably larvae were found in visible water.

Attempts have been made to control vegetation growth, but to date with very little success as the re-growth rate is rapid.

Experiments should be carried out to ascertain if a suitable material can be used to control vegetation growth.

The most common types of vegetation on the sites were rushes, reeds, low scrub and grass. Trees were numerous. Medium scrub and some blackberry bushes were also sighted.

BREEDING.

Mosquito breeding of varying density, stages and species, was found in all but one of the fourteen (14) Local Authority areas listed.

The infestations ranged from light to extremely heavy.

On two large sites the adult mosquitoes were so prevalent that it was not possible to enter one without the use of liquid repellent; whilst on the other, no larvae would have been collected but for this protection. On many other sites adult mosquitoes were very prevalent.

The larvae collected from the breeding sites were identified as :-

a. Aedes alboannulatus
b. Aedes camptorhynchus
c. Aedes vigilax
d. Anopheles annulipes
e. Culex annulirostris
f. Culex fatigans
g. Culex globocoxitus
h. Culex pipiens australicus
i. Theobaldia atra.

PRESENT CONTROL MEASURES.

Control measures were being carried out with varying degrees of success.

No matter what current control measures were used on some sites, due to their area, inaccessibility, inability to drain, or type and density of vegetation, only partial control could be expected.

Some Local Authorities anticipate spending approximately £2,000 during the current financial year on mosquito control along their river foreshores.

Amongst the control measures at present in use are :-

a. Adequate and effective drainage systems.

b. Predators - Gambusia affinis and other fish. Some water beetles, water boatmen, back swimmers, acquatic larvae of other insects and bird life.

c. Treatment of water surface with oils - malariol, sump oil and distillate.

d. Treatment with insecticides and larvicides. These are being mixed mainly by private companies and include, Pyrethrins, D.D.T. Lindane, Dieldrin and Baytex.

Equipment availabe for the dispersal of oils, distillate, insecticides and larvicides, includes:-

a. 1 Todd Insecticidal Fog Applicator (T.I.F.A.) owned and operated by the Public Health Department Pest Control Unit.

b. 10 Swing Fogs.

c. 4 Holder Supra mechanical sprays.

At present experiments are being carried out with a portable compressor spray unit, from which long hoses will be used.

RECLAMATION.

The reclamation of most sites is the only satisfactory, sure and permanent method of eradicating mosquito breeding. Some reclamation has already been carried out along the rivers by Central and Local Governments.

Reclamation can be carried out by dredging from the river, by transporting fill, or by sanitary landfill disposal of rubbish.

Dredging from the river is much cheaper than transporting fill. The rate of sanitary landfill is about fifty (50) acres per year. Reclamation of foreshores has been made by this method in the past, but it would appear that with the number of depressions away from the rivers requiring reclamation, that little aid from this source can be expected for many years.

The Canning Shire Council has recently reclaimed low lying areas along the south bank of the Canning River west of Riverton Bridge. The area filled consisted of developed and undeveloped land.

By referendum, permission was obtained from land owners to resume the land in order to carry out reclamation.

The developed land was returned to the owners. The undeveloped land was sold, in some cases to the original owners, to cover costs of reclamation.

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DRAINAGE.

This term is used widely in mosquito control. Not only does it drain water off a site, it also allows water to remain in channels on a site.

Adequate and effective drainage systems, in conjunction with fish, are considered next in line to reclamation in the defence against mosquito breeding.

Channels are used to drain surface waters even in very low lying areas.

No doubt more water will flow on to a site from the river, but in doing so the channels will enable more fish to come in and remain, and when the tide turns, the water on the site will return much quicker to the river.

To be effective, the drainage system should be laid to a pattern, and the right type of drain, wide or narrow, and shallow or deep, constructed to suit local conditions and the normal river level.

Permanent or semi-permanent pools can be deepened and channels constructed from the back waters into them and thence to the river.

An effective drainage system requires continuous maintenance.

Effective drainage systems are in use on some river sites, but much more use could be made of them.

PREDATORS.

Mosquito fish, both the native species and the imported gambusia affinis, even without drainage, play a major role in the control of mosquito breeding.

It was found by introducing mosquito fish into swamps at Durban in South Africa that the annual cost of mosquito control dropped to one-fifth that of previous years, and it is expected to be less in the years to follow.

Information can be obtained by local observation of control measures given by fish and other predators such as water beetles, water boatmen, back swimmers, acquatic larvae of other insects and bird life.

Some pools never seem to contain fish even though they are covered at high tides. These pools are always a problem. Other pools may or may not contain fish after high tides. Several pools were free of larvae and fish but contained large numbers of water beetles, water boatmen or back swimmers.

Reservoirs of fresh water gambusia affinis are available but it may be necessary to establish reservoirs of the salt water adapted gambusia affinis.

Fish and no doubt other predators are affected by insecticides and larvicides.

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Further information is required on biological control as it is felt that with drainage it should be the first line of attack on mosquito breeding whilst awaiting reclamation.

ACCESSIBILITY.

The necessity to consider the use of insecticides and larvicides on a large scale can only be achieved economically by the use of the Todd Insecticidal Fog Applicator (T.I.F.A.), either in a vehicle, or on a shallow draft boat or pontoon with an outboard motor.

Difficulty could be experienced in approaching sufficiently close to carry out effective treatment. Some areas are considered too wide for verge application only. The approach, by land, to many sites would depend on the moisture content of the ground surface.

It may be possible whilst awaiting the filling of a site, to construct solid based strips through it, thereby enabling the regular use of a T.I.F.A. mounted on a vehicle.

As engineering problems would be involved it is suggested that this matter be referred to the appropriate engineers.

OIL AND INSECTICIDES.

Oil based films spread over the surface of water are important in mosquito control as the larvae of the species of mosquitoes found along the rivers must rise to the surface to breathe. Oil prevents the successful intake of oxygen and damages the tissues, resulting in death.

Experiments conducted in the field overseas show that eighteen (18) microms (1/1430 of an inch) is attainable in practice and gives good results. This thickness of oil will enable 2750 square feet to be covered with one (1) gallon of malariol. The spray equipment used was in good condition and controlled by an experienced operator.

The most common oils in use along the rivers were malariol, dieselene, sump oil and kerosene.

Natural oil films were sighted on many pools containing mosquito larvae and pupae. Whilst they may reduce their numbers they do not eradicate the larvae.

Insecticides are also important in mosquito control, but only as a last line of defence. They are used in fogging machines to control adults and as larvicides to control and eradicate larvae.

Unfortunately there is always the possibility they will also eradicate mosquito predators, and the adults and larvae will become resistant to them.

Two badly infested sites had, within weeks, been previously treated with insecticides for the eradication of argentine ants.

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Both oil films and insecticides are rendered ineffective by high tides. They are spread out and then taken away by the receding waters.

It would appear that the use of insecticides, in some cases, did prevent fish coming in on the following high tides whereas oil films did not.

More information is required on the use of insecticides, both liquid and powder, in mosquito control as the use of a suitable one in correct proportions could be a useful aid.

DISCUSSION.

A very serious problem of mosquito breeding exists along the three rivers. The most numerous and widespread type of mosquito being the Aedes vigilax which was found breeding along the tidal flats.

Attempts have been made, with varying degrees of success, to control the mosquito breeding by reclamation, drainage, fish, oils and insecticides.

Reclamation is the only satisfactory permanent method of eradicating mosquito breeding on the tidal flats. In addition, it results in enabling the reclaimed land to be used for parks, gardens, recreational centres, and in some instances, even building allotments.

Temporary measures of control, awaiting reclamation, can best be brought about by the construction of adequate and effective drainage systems, stocking with gambusia fish, supplemented where necessary with oils or insecticides. To enable any degree of temporary control, constant vigilance must be maintained at all times.

SUMMARY AND CONCLUSIONS.

A survey of the foreshores along the Swan, Canning and Helena rivers was carried out between the 18th March and the 10th May, 1963. It revealed mosquito breeding in forty two (42) sites, comprising 2,347 acres and twenty one (21) potential breeding sites comprising 561 acres. Nine (9) species of mosquitoes were identified.

Owing to the varied extensiveness and the peculiarities of the areas concerned, mosquito control presents many difficulties which need to be closely examined by experts. It would appear that the solution to the problem will require major engineering works such as, dredging, filling, clearing and drainage.

It is suggested that the task of planning both a short and a long term control programme could best be carried out by the appointment of a special committee, which could examine the suitability of the various anti-mosquito measures in relation to the precise localities involved.

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ACKNOWLEDGEMENTS.

The Survey was conducted and the report compiled under the guidance of Dr. D.J.R. Snow, Deputy Commissioner of Public Health.

In the compilation of this information, the Department is indebted to the following, whose valuable assistance and advice is gratefully acknowledged.

Mr. C.F.H. Jenkins	-	Government Entomologist.
Mr. N.J. Henry	-	Public Works and Country Water Supply, Sewerage and Drainage Department.
Mr. J.S.H. Le Page	-	Public Works and Country Water Supply, Sewerage and Drainage Department.
Mr. D.I. Glendinning	-	Lands and Surveys Department.
Mr. J. Pericles	-	Swan River Conservation Board.
Mr. J. Tomlinson	-	Government Printing Office.
Mr. R. McKay	-	Fisheries Department.

Special mention must be made of Local Authorities and their Officers, without whose wholehearted support the survey would not have been possible.

Also various Officers of the Public Health Department (especially, Mr. A. Pilbeam, Mr. J. Fowler, Mr. E.J. Britten, Mr. J. Slattery and Mr. R. Plummer), whose willing co-operation made the task far less difficult than it might otherwise have been.

APPENDICES.

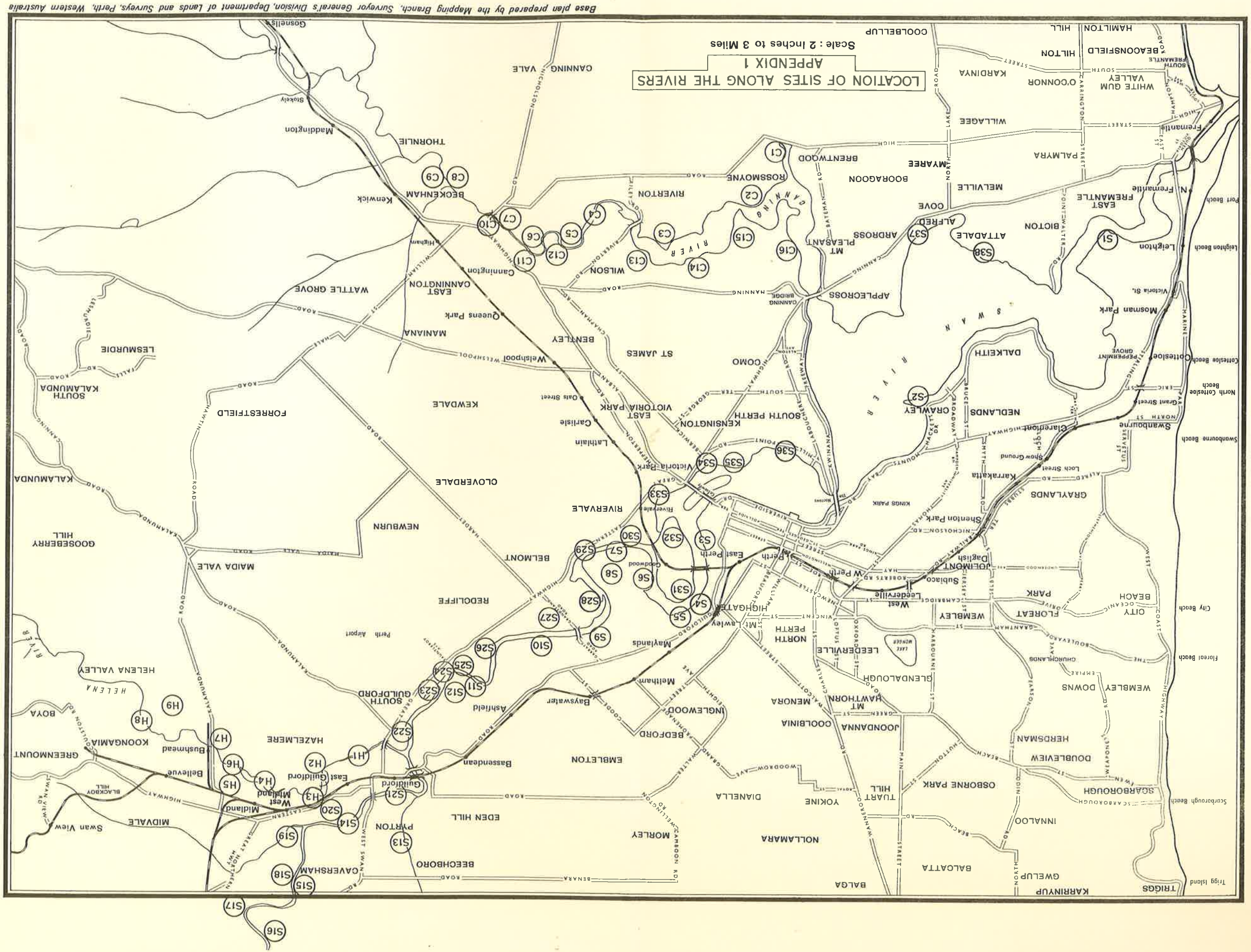
I. Location of sites along the rivers.

II. Breeding and potential breeding sites.

LOCATION OF SITES ALONG THE RIVERS

APPENDIX 1

Scale : 2 Inches to 3 Miles



S Swan
C Canning
H Helena

BREEDING AND POTENTIAL BREEDING SITES.

APPENDIX II.

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance.
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.1	Point Roe Mosman Pk.	Mosman Park Shire Council	Colonial Sugar Refinery Co. and Mosman Pk. Shire Council.	1½	14	1	Heavy Coverage of reeds.	Tidal	River	Nil	Nil	No evidence of breeding. Further observation required to ascertain if pools remain and for how long after flooding.
S.2	Point Currie (Pelican Point)	Subiaco City Council	State Govt. (Bird Sanctuary)	1½	10	1 to 2	Heavy Coverage of reeds and some low scrub.	Tidal	Land	Extremely heavy	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S.3	Sewerage Pumping Station Trafalgar Rd.East Perth.	Perth City Council	State Govt.	¼	3	½	Reeds and grass	Tidal	Land & river	Light	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S.4	Joel Tce. Mt. Lawley	Perth City Council	Private	6	30	2	Reeds and rushes. Some trees.	Tidal	River	Light	Aedes vigilax	a. Drainage b. Fish. c. Oil or insecticides.
S.5	St.Anne's Hospital to East St. Jetty, Mount Lawley.	Perth Shire Council	Private and Perth Shire Council	3	20	1 to 2	Heavy coverage of rushes and grass. Difficult walking access.	Natural (sources other than tidal).	River	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.6	East St. Jetty to Western Boundary of Aerodrome, Maylands.	Perth Shire Council	Private, Perth Shire Council & Commonwealth Govt.	100	80	2 to 30	Heavy coverage of reeds and low scrub. Some dead trees.	Tidal and Natural	Land & river-limited.	Extremely heavy. Light	Aedes vigilax Culex annulirostris Culex fatigans	a. Drainage b. Fish c. Oil or insecticides
S.7	Aerodrome and foreshore to eastern boundary.Res. No.9323.Maylands.	Perth Shire Council	Private, Perth Shire Council and Commonwlth. Govt.	12	90	1 to 2	Low scrub	Tidal and natural	River. Land - limited.	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
S.8	Clay holes Peninsula Rd. Maylands.	Perth Shire Council	Private	19	30	4 to 8	Reeds, rushes and grass.	Natural	Land	Nil	Nil	a. Fish b. Oil or insecticides
S.9	Stone Street to Garrett Road, Maylands and Bayswater	Perth Shire Council and Bayswater Shire Council	Private and Perth Shire Council	31	46	3 to 9	Heavy coverage of rushes, reeds and grass. Some trees	Tidal and natural	River - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or

H Helena -

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance.
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.1	Point Roe Mosman Pk.	Mosman Park Shire Council	Colonial Sugar Refinery Co. and Mosman Pk. Shire Council.	1½	14	1	Heavy Coverage of reeds.	Tidal	River	Nil	Nil	No evidence of breeding. Further observation required to ascertain if pools remain and for how long after flooding.
S.2	Point Currie (Pelican Point)	Subiaco City Council	State Govt. (Bird Sanctuary)	1½	10	1 to 2	Heavy Coverage of reeds and some low scrub.	Tidal	Land	Extremely heavy	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S.3	Sewerage Pumping Station Trafalgar Rd.East Perth.	Perth City Council	State Govt.	¼	3	½	Reeds and grass	Tidal	Land & river	Light	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S.4	Joel Tce. Mt. Lawley	Perth City Council	Private	6	30	2	Reeds and rushes. Some trees.	Tidal	River	Light	Aedes vigilax	a. Drainage b. Fish. c. Oil or insecticides.
S.5	St.Anne's Hospital to East St. Jetty, Mount Lawley.	Perth Shire Council	Private and Perth Shire Council	3	20	1 to 2	Heavy coverage of rushes and grass. Difficult walking access.	Natural (sources other than tidal).	River	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.6	East St. Jetty to Western Boundary of Aerodrome, Maylands.	Perth Shire Council	Private, Perth Shire Council & Commonwealth Govt.	100	80	2 to 30	Heavy coverage of reeds and low scrub. Some dead trees.	Tidal and Natural	Land & river-limited.	Extremely heavy. Light	Aedes vigilax Culex annulirostris Culex fatigans	a. Drainage b. Fish c. Oil or insecticides
S.7	Aerodrome and foreshore to eastern boundary.Res. No.9323.Maylands.	Perth Shire Council	Private, Perth Shire Council and Commonwlth. Govt.	12	90	1 to 2	Low scrub	Tidal and natural	River. Land - limited.	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
S.8	Clay holes Peninsula Rd. Maylands.	Perth Shire Council	Private	19	30	4 to 8	Reeds, rushes and grass.	Natural	Land	Nil	Nil	a. Fish b. Oil or insecticides
S.9	Stone Street to Garrett Road, Maylands and Bayswater	Perth Shire Council and Bayswater Shire Council	Private and Perth Shire Council	31	46	3 to 9	Heavy coverage of rushes, reeds and grass. Some trees Difficult walking access.	Tidal and natural	River - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides
S.10	Garrett Rd. to Katanning St. Bayswater	Bayswater Shire Council	Private and Bayswater Shire Council	113	90	1 to 30	Reeds and low scrub.Some trees	Tidal and natural	Land. River - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides

S Swan
C Canning
H Helena

BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.11	Ashfield Pde. Bassendean	Bassendean Shire Council	Private & Bassendean Shire Council	13	27	2 to 9	Reeds & scrub. Some trees N.B. Ashfield drain discharges onto river flats.	Tidal and natural.	Land & river - limited	Extremely heavy	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
									N.B. No predators were sighted. Argentine Ant eradication treatment carried out prior to survey.			
S.12	Ti tree swamp, Ashfield Pde. Bassendean	Bassendean Shire Council	Private and State Govt.	36	18	20	Low scrub	natural.	Land - limited	Nil (dry at time of survey)	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.13	Bennett's Brook, Pyrton.	Bassendean Shire Council. Swan-Guildford Shire Council.	State Govt.	128	46	28	Reeds, low scrub and trees.	Tidal and natural	Land - limited	Extremely heavy	Aedes vigilax Aedes camptorhynchus	a. Drainage b. Fish c. Oil or insecticides.
										N.B. No predators were sighted. Argentine Ant eradication treatment carried out in Southern section prior to survey.		
S.14	Northern and Eastern sides of river. Bennetts Brook, Pyrton, to Woodbridge Creek Caversham	Swan-Guildford Shire Council	Private and State Govt.	3	60	⅓ to 1	Reeds	Tidal	River. Land-limited	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides
				N.B. Overall length 120 chains. Intermittent potential breeding sections.								
S.15	Western side of river Woodbridge Creek, Caversham, to Middle Swan Bridge.	Swan-Guildford Shire Council	Private	2	40	⅓ to 1	Reeds and grass	Tidal and natural	River. Land-limited.	Moderate	Anopheles annulipes Aedes alboannulatus Culex annulirostris Culex fatigans Culex pipiens australicus	a. Drainage b. Retaining wall on fresh water springs to allow stocking with fish. c. Fish d. Oil
				N.B. Overall length 140 chains. Intermittent potential sections						N.B. Collected from fresh water pools on river flats.		
S.16	Western side of river, Middle Swan Bridge to River Road, Herne Hill.	Swan-Guildford Shire Council	Private	2	12	1 to 2	Grass and trees	Tidal and natural	River. Land-limited.	Moderate	Culex annulirostris Culex fatigans Culex globocoxitus Culex pipiens australicus	a. Drainage b. Retaining walls on fresh water springs to allow stocking with fish. c. Fish d. Oil
				N.B. Made up of 3 isolated small sites - 2 Natural water 1 Tidal "								
S.17	Inlet and clay holes, Middle Swan	Swan-Guildford Shire Council	Private	23	41	1 to 10	Some reeds and grass	Natural	Land	Nil	Nil	a. Drainage b. Fish 3. Oil
S.18	Eastern side of river, Middle Swan to Woodbridge Creek, Midland	Swan-Guildford Shire Council	Private	2	20	1	Grass and trees	Natural	Land	Light	Aedes vigilax	a. Drainage b. Fish c. Oil
				N.B. 2 isolated small sites.								

Index No.	Location	Authority Involved	or Controller	Acreage	Length Chains	Width Chains	Vegetation	Water Origin	Accessibility	Density	Types	with constant vigilance
S.11	Ashfield Pde. Bassendean	Bassendean Shire Council	Private & Bassendean Shire Council	13	27	2 to 9	Reeds & scrub. Some trees N.B. Ashfield drain discharges onto river flats.	Tidal and natural.	Land & river - limited	Extremely heavy	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
									N.B. No predators were sighted. Argentine Ant eradication treatment carried out prior to survey.			
S.12	Ti tree swamp, Ashfield Pde. Bassendean	Bassendean Shire Council	Private and State Govt.	36	18	20	Low scrub	natural.	Land - limited	Nil (dry at time of survey)	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.13	Bennett's Brook, Pyrton.	Bassendean Shire Council. Swan-Guildford Shire Council.	State Govt.	128	46	28	Reeds, low scrub and trees.	Tidal and natural	Land - limited	Extremely heavy	Aedes vigilax Aedes camptorhynchus	a. Drainage b. Fish c. Oil or insecticides.
									N.B. No predators were sighted. Argentine Ant eradication treatment carried out in Southern section prior to survey.			
S.14	Northern and Eastern sides of river. Bennetts Brook, Pyrton, to Woodbridge Creek Caversham	Swan-Guildford Shire Council	Private and State Govt.	3	60	$\frac{1}{3}$ to 1	Reeds	Tidal	River. Land-limited	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides
				N.B. Overall length 120 chains. Intermittent potential breeding sections.								
S.15	Western side of river Woodbridge Creek, Caversham, to Middle Swan Bridge.	Swan-Guildford Shire Council	Private	2	40	$\frac{1}{3}$ to 1	Reeds and grass	Tidal and natural	River. Land-limited.	Moderate	Anopheles annulipes Aedes alboannulatus Culex annulirostris Culex fatigans Culex pipiens australicus	a. Drainage b. Retaining wall on fresh water springs to allow stocking with fish. c. Fish d. Oil
				N.B. Overall length 140 chains. Intermittent potential sections						N.B. Collected from fresh water pools on river flats.		
S.16	Western side of river, Middle Swan Bridge to River Road, Herne Hill.	Swan-Guildford Shire Council	Private	2	12	1 to 2	Grass and trees	Tidal and natural	River. Land-limited.	Moderate	Culex annulirostris Culex fatigans Culex globocoxitus Culex pipiens australicus	a. Drainage b. Retaining walls on fresh water springs to allow stocking with fish. c. Fish d. Oil
				N.B. Made up of 3 isolated small sites - 2 Natural water 1 Tidal "								
S.17	Inlet and clay holes, Middle Swan	Swan-Guildford Shire Council	Private	23	41	1 to 10	Some reeds and grass	Natural	Land	Nil	Nil	a. Drainage b. Fish 3. Oil
S.18	Eastern side of river, Middle Swan to Woodbridge Creek, Midland	Swan-Guildford Shire Council	Private	2	20	1	Grass and trees	Natural	Land	Light	Aedes vigilax	a. Drainage b. Fish c. Oil
				N.B. 2 isolated small sites.								
S.19	Eastern side of river, Woodbridge Creek Junction, West Midland	Midland Town Council and Swan-Guildford Shire Council	**Private, Midland Town Council and State Govt.**	30	5 to 30	10 to 20	Low scrub. Some trees	Tidal and natural	Land-limited	Nil	Nil	a. Fish b. Oil

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BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.20	Guildford Grammar School, Guildford	Swan-Guildford Shire Council	Private	7	30	2 to 5	Rushes and grass	Natural & overflow from swimming pool.	Land	Moderate	Culex annulirostris	a. Drainage b. Fish c. Oil
S.21	Southern side of river, Guildford Grammar School to Railway Bridge Guildford	Swan-Guildford Shire Council	Private	8	40	2	Rushes and grass	Tidal and natural	River. Land-limited	Moderate	Aedes vigilax	a. Drainage b. Fish c. Oil
S.22	Wilkie Street, South Guildford	Swan-Guildford Shire Council	Private	3	10	3	Reeds, rushes and grass	Tidal	Land and river - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.23	Beverley Terrace, South Guildford. (Lime Creek)	Swan-Guildford Shire Council	Private	9	28	3	Rushes, reeds, grass and trees	Tidal and natural	Land - limited	Light	Aedes vigilax Culex pipiens australicus	a. Drainage b. Fish c. Oil
S.24	Ivy Street, Redcliffe	Belmont Shire Council	Private	8	20	3 to 7	Rushes, reeds and trees	Tidal and natural	Land and river - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil
S.25	Fauntleroy Avenue, Redcliffe (Clay holes)	Belmont Shire Council	Private	11	16	4 to 10	Light timber on verges	Tidal and natural	Land. River-limited.	Nil	Nil	a. Fish b. Oil
S.26	Central Avenue, Redcliffe.	Belmont Shire Council	Private	75	2 to 36	2 to 24	Rushes, reeds, grass and trees	Tidal and natural	River - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.27	Ascot Racecourse Belmont	Belmont Shire Council	Private	10	12	1 to 12	Rushes, reeds and grass. Some trees	Tidal and natural	Land. River-limited	Nil	Nil	a. Drainage b. Fish c. Oil
S.28	Ascot Racecourse to Great Eastern H'way, Belmont	Belmont Shire Council	Private	140	108	7 to 38	Low scrub and reeds. Some trees	Tidal and natural	River - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.29	Hardey Park, Belmont	Belmont Shire Council	Private	2	28	½ to 1	Reeds, grass and bamboos	Tidal and natural	River	Nil	Nil	a. Drainage and clearing of vegetation
S.30	Riversdale Road, Rivervale	Belmont Shire Council	Private and Belmont Shire Council	10	50	½ to 10	Blackberry bushes reeds, rushes, grass & trees. Impassable through blackberry bushes	Tidal and natural	River	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides
S.31	Burswood Island. North of Railway line, Goodwood	Perth City Council	Private and State Govt.	112	40	28	Low scrub	Tidal	Land & river - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides
S.32	Burswood Island	Perth City	State Govt.	251	90	10 to	Low scrub	Tidal	Land & river-	Nil	Nil	a. Drainage

SITE		Local Authority Involved	Owner or Controller	Area			Vegetation	Surface Water Origin	Accessibility	Density	Types	Other than Fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains						
S.20	Guildford Grammar School, Guildford	Swan-Guildford Shire Council	Private	7	30	2 to 5	Rushes and grass	Natural & overflow from swimming pool.	Land	Moderate	Culex annulirostris	a. Drainage b. Fish c. Oil
S.21	Southern side of river, Guildford Grammar School to Railway Bridge Guildford	Swan-Guildford Shire Council	Private	8	40	2	Rushes and grass	Tidal and natural	River. Land-limited	Moderate	Aedes vigilax	a. Drainage b. Fish c. Oil
S.22	Wilkie Street, South Guildford	Swan-Guildford Shire Council	Private	3	10	3	Reeds, rushes and grass	Tidal	Land and river - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.23	Beverley Terrace, South Guildford. (Lime Creek)	Swan-Guildford Shire Council	Private	9	28	3	Rushes, reeds, grass and trees	Tidal and natural	Land - limited	Light	Aedes vigilax Culex pipiens australicus	a. Drainage b. Fish c. Oil
S.24	Ivy Street, Redcliffe	Belmont Shire Council	Private	8	20	3 to 7	Rushes, reeds and trees	Tidal and natural	Land and river - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil
S.25	Fauntleroy Avenue, Redcliffe (Clay holes)	Belmont Shire Council	Private	11	16	4 to 10	Light timber on verges	Tidal and natural	Land. River-limited.	Nil	Nil	a. Fish b. Oil
S.26	Central Avenue, Redcliffe.	Belmont Shire Council	Private	75	2 to 36	2 to 24	Rushes, reeds, grass and trees	Tidal and natural	River - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.27	Ascot Racecourse Belmont	Belmont Shire Council	Private	10	12	1 to 12	Rushes, reeds and grass. Some trees	Tidal and natural	Land. River-limited	Nil	Nil	a. Drainage b. Fish c. Oil
S.28	Ascot Racecourse to Great Eastern H'way, Belmont	Belmont Shire Council	Private	140	108	7 to 38	Low scrub and reeds. Some trees	Tidal and natural	River - limited	Heavy	Aedes vigilax	a. Drainage b. Fish c. Oil
S.29	Hardey Park, Belmont	Belmont Shire Council	Private	2	28	½ to 1	Reeds, grass and bamboos	Tidal and natural	River	Nil	Nil	a. Drainage and clearing of vegetation
S.30	Riversdale Road, Rivervale	Belmont Shire Council	Private and Belmont Shire Council	10	50	½ to 10	Blackberry bushes reeds, rushes, grass & trees. Impassable through blackberry bushes	Tidal and natural	River	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides
S.31	Burswood Island. North of Railway line, Goodwood	Perth City Council	Private and State Govt.	112	40	28	Low scrub	Tidal	Land & river - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides
S.32	Burswood Island South of Railway line, Goodwood	Perth City Council	State Govt.	251	90	10 to 40	Low scrub	Tidal	Land & river-limited	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.

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BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.33	Cement Works to Causeway, Victoria Park (incl. Rubbish tip)	Perth City Council	State Govt.	94	94	10	Heavy coverage of rushes, reeds & grass. Some low scrub near causeway. Difficult access on foot in North Eastern corner.	Tidal and natural	Inaccessible by land or river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides. N.B. Planned to fill area north of Causeway in near future.
S.34	Ellam-Taylor Sts., Victoria Park	Perth City Council	Perth City Council	18	12	18	Rushes and grass	Natural	Land	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.35	Hurlingham, Ellam St. to Douglas Ave., South Perth	South Perth City Council	South Perth City Council and State Govt.	85	68	8 to 16	Extremely heavy coverage of rushes on Western section - difficult access on foot. Remainder reeds and grass	Natural	Land - limited	Moderate	Culex fatigans Culex pipiens australicus	a. Drainage b. Fish c. Oil or insecticides. N.B. The river section of this site has been filled from the river and by rubbish depositing.
S.36	Sir James Mitchell Park, South Perth	South Perth City Council	South Perth City Council and State Govt.	43	36	12	Rushes	Natural	Land and river - limited	Light	Culex fatigans	a. Covering with top soil, as sand. b. Oil or insecticides. N.B. Filled mainly with mud from river. This has dried out leaving deep wide cracks in which rain water lays. Covering with sand has commenced.
S.37	Cunningham St., Alfred Cove	Melville Town Council	Melville Town Council	15	39	1 to 6	Reeds and some trees	Tidal and natural	Land	Moderate	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides. N.B. This site is being reclaimed by sanitary landfill. To be completed by 30.6.64.
S.38	Burke Drive, Pt.	Melville Town	Private &	90	194	1 to 14	Mostly reeds.	Tidal	Land &	Moderate	Aedes vigilax	a. Drainage

Index No.	Location	Authority Involved	Authority or Controller	Acreage	Length Chains	Width Chains	Vegetation	Water Origin	Accessibility	Density	Types	Control with constant vigilance
S.33	Cement Works to Causeway, Victoria Park (incl. Rubbish tip)	Perth City Council	State Govt.	94	94	10	Heavy coverage of rushes, reeds & grass. Some low scrub near causeway. Difficult access on foot in North Eastern corner.	Tidal and natural	Inaccessible by land or river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides. N.B. Planned to fill area north of Causeway in near future.
S.34	Ellam-Taylor Sts. Victoria Park	Perth City Council	Perth City Council	18	12	18	Rushes and grass	Natural	Land	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
S.35	Hurlingham, Ellam St. to Douglas Ave., South Perth	South Perth City Council	South Perth City Council and State Govt.	85	68	8 to 16	Extremely heavy coverage of rushes on Western section - difficult access on foot. Remainder reeds and grass	Natural	Land - limited	Moderate	Culex fatigans Culex pipiens australicus	a. Drainage b. Fish c. Oil or insecticides. N.B. The river section of this site has been filled from the river and by rubbish depositing.
S.36	Sir James Mitchell Park, South Perth	South Perth City Council	South Perth City Council and State Govt.	43	36	12	Rushes	Natural	Land and river - limited	Light	Culex fatigans	a. Covering with top soil, as sand. b. Oil or insecticides. N.B. Filled mainly with mud from river. This has dried out leaving deep wide cracks in which rain water lays. Covering with sand has commenced.
S.37	Cunningham St., Alfred Cove	Melville Town Council	Melville Town Council	15	39	1 to 6	Reeds and some trees	Tidal and natural	Land	Moderate	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides. N.B. This site is being reclaimed by sanitary landfill. To be completed by 30.6.64.
S.38	Burke Drive, Pt. Walter, Attadale & Alfred Cove	Melville Town Council	Private & Melville Town Council	90	194	1 to 14	Mostly reeds. Rushes & grass East of Lenton St. Some trees. N.B. Bird Sanctuary - 9 acres river foreshore vicinity of Bricknell Rd. Attadale	Tidal and natural	Land & river - limited	Moderate	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.

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BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
C.1	Bull Creek, Brentwood-Rossmoyne	Melville Town Council and Canning Shire Council	Private, Melville Town Council and Canning Shire Council	11	55	1 to 4	Reeds, heavy scrub with creepers and trees.	Tidal and natural	Land and River - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
C.2	Riverton Drive. Central Rd. to 5th Avenue, Rossmoyne	Canning Shire Council	Canning Shire Council	8	80	1	Reeds and trees	Tidal	Land & river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
C.3	Zenith St. West, to North end of Riverton Drive Riverton.	Canning Shire Council	Canning Shire Council	14	70	1 to 4	Reeds	Tidal	Land & river - limited	Light	Aedes vigilax	a. Fish b. Oil or insecticides. Arrangement in hand to fill this site.
C.4	Riverton Bridge to Kent St.Weir, Wilson & Cannington. Both sides of river included.	Canning Shire Council	Private and Canning Shire Council	400	160	12 to 40	Reeds,rushes, grass, low scrub and trees	Tidal and natural	River - limited	Extremely heavy. Light	(Aedes vigilax (Aedes camptorhynchus (Aedes alboannulatus (Culex annulirostris	a. Drainage b. Fish c. Oil or insecticides. Aircraft spraying has been used during the last two summers.
C.5	Kent St. Weir Cannington. South of & upstream	Canning Shire Council	Private	4	10	4 to 6	Trees	Natural	Land and river - limited	Light	Culex pipiens australicus	a. Drainage b. Fish c. Oil
C.6	West of Wilcox St. Cannington	Canning Shire Council	Private	35	35	10	Rushes, Grass & Trees.	Natural	Land & river - limited	Moderate	Culex fatigans Culex annulirostris Culex pipiens australicus	a. Drainage b. Fish c. Oil
C.7	West of Nicholson Rd. Cannington.	Canning Shire Council	Private	12	30	2 to 7	Rushes & trees	Natural	Land-limited	Nil	Nil	a. Drainage b. Fish c. Oil
C.8	Sth. of river, Nicholson Rd. Cannington to Spring Road, Kenwick.	Gosnells Shire Council	Private	5	Comprising two small sites and numerous pools on river flats.		Blackberry bushes, rushes,scrub grass & trees.	Natural	Land & river-limited	Light	Aedes alboannulatus	a. Drainage b. Fish c. Oil

Index No.	Location	Authority Involved	Authority or Controller	Acreage	Length Chains	Width Chains	Vegetation	Origin		Density	Types	With constant vigilance
C.1	Bull Creek. Brentwood-Rossmoyne	Melville Town Council and Canning Shire Council	Private, Melville Town Council and Canning Shire Council	11	55	1 to 4	Reeds, heavy scrub with creepers and trees.	Tidal and natural	Land and River - limited	Light	Aedes vigilax	a. Drainage b. Fish c. Oil or insecticides.
C.2	Riverton Drive. Central Rd. to 5th Avenue, Rossmoyne	Canning Shire Council	Canning Shire Council	8	80	1	Reeds and trees	Tidal	Land & river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.
C.3	Zenith St. West, to North end of Riverton Drive Riverton.	Canning Shire Council	Canning Shire Council	14	70	1 to 4	Reeds	Tidal	Land & river - limited	Light	Aedes vigilax	a. Fish b. Oil or insecticides. Arrangement in hand to fill this site.
C.4	Riverton Bridge to Kent St.Weir, Wilson & Cannington. Both sides of river included.	Canning Shire Council	Private and Canning Shire Council	400	160	12 to 40	Reeds,rushes, grass, low scrub and trees	Tidal and natural	River - limited	Extremely heavy. Light	(Aedes vigilax (Aedes camptorhynchus (Aedes alboannulatus (Culex annulirostris	a. Drainage b. Fish c. Oil or insecticides. Aircraft spraying has been used during the last two summers.
C.5	Kent St. Weir Cannington. South of & upstream	Canning Shire Council	Private	4	10	4 to 6	Trees	Natural	Land and river - limited	Light	Culex pipiens australicus	a. Drainage b. Fish c. Oil
C.6	West of Wilcox St. Cannington	Canning Shire Council	Private	35	35	10	Rushes, Grass & Trees.	Natural	Land & river - limited	Moderate	Culex fatigans Culex annulirostris Culex pipiens australicus	a. Drainage b. Fish c. Oil
C.7	West of Nicholson Rd. Cannington.	Canning Shire Council	Private	12	30	2 to 7	Rushes & trees	Natural	Land-limited	Nil	Nil	a. Drainage b. Fish c. Oil
C.8	Sth. of river, Nicholson Rd. Cannington to Spring Road, Kenwick.	Gosnells Shire Council	Private	5	Comprising two small sites and numerous pools on river flats.		Blackberry bushes, rushes,scrub grass & trees.	Natural	Land & river-limited	Light	Aedes alboannulatus	a. Drainage b. Fish c. Oil

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BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
C.9	North of river, Royal St.Kenwick to Nicholson Rd. Cannington	Gosnells Shire Council	Private	9 Comprising three small sites and numerous pools on river flats			Blackberry bushes, scrub,grass & trees	Natural	Land and river-limited	Light	Aedes alboannulatus	a. Drainage b. Fish c. Oil
C.10	Nicholson Rd. Bridge,Cannington. North of & downstream.	Canning Shire Council	Private	2	7	1 to 3	Rushes, scrub & trees	Natural	Land and river - limited.	Nil	Nil	a. Drainage b. Fish c. Oil
C.11	East of Wharf St. Cannington (Disused loam pits)	Canning Shire Council	Private	½	5	1	Rushes	Natural	Land and river - limited	Moderate	Culex annulirostris Culex pipiens australicus	a. Fish b. Oil
C.12	Kent St. Weir Cannington. North of & upstream	Canning Shire Council	Private	12	50	1 to 3	Rushes, scrub & trees. Difficult walking access.	Natural	River - limited	Nil	Nil	a. Drainage b. Fish c. Oil
C.13	Riverton Bridge to Eastern Building line, Clontarf -including freshwater swamp.	Canning Shire Council & South Perth City Council	Private	109	80	2 to 25	Rushes, reeds, scrub & grass. Some trees.	Tidal and natural	Land and river - limited	Extremely heavy Heavy	(Aedes vigilax (Aedes camptorhynchus (Culex annulirostris (Culex pipiens australicus	a. Drainage b. Fish c. Oil or insecticides.
C.14	Clontarf	South Perth City Council	Private	77	88	1 to 12	Reeds, scrub and trees.	Tidal and natural	Land and river - limited	Heavy Moderate	(Aedes vigilax (Aedes camptorhynchus (Culex annulirostris (Culex pipiens australicus (Culex globocoxitus (Theobaldia atra	a. Drainage b. Fish c. Oil or insecticides.
C.15	Western boundary Clontarf to Salters Point.	South Perth City Council	South Perth City Council	60	80	5 to 12	Reeds, scrub and trees.	Tidal and natural	Land and river - limited	Light	(Aedes vigilax (Aedes alboannulatus	a. Drainage b. Fish c. Oil or insecticides.
C.16	Mt. Henry to Cloister Avenue, Canning Bridge	South Perth City Council	Private and South Perth City Council	6	90	½ to 1	Reeds, scrub & trees	Tidal	Land & river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.

Index No.	Location	Authority Involved	or Controller	Acreage	Length Chains	Width Chains	Vegetation	Water Origin	Accessibility	Density	Types	with constant vigilance
C.9	North of river, Royal St.Kenwick to Nicholson Rd. Cannington	Gosnells Shire Council	Private	9 Comprising three small sites and numerous pools on river flats			Blackberry bushes, scrub,grass & trees	Natural	Land and river-limited	Light	Aedes alboannulatus	a. Drainage b. Fish c. Oil
C.10	Nicholson Rd. Bridge,Cannington. North of & downstream.	Canning Shire Council	Private	2	7	1 to 3	Rushes, scrub & trees	Natural	Land and river - limited.	Nil	Nil	a. Drainage b. Fish c. Oil
C.11	East of Wharf St. Cannington (Disused loam pits)	Canning Shire Council	Private	½	5	1	Rushes	Natural	Land and river - limited	Moderate	Culex annulirostris Culex pipiens australicus	a. Fish b. Oil
C.12	Kent St. Weir Cannington. North of & upstream	Canning Shire Council	Private	12	50	1 to 3	Rushes, scrub & trees. Difficult walking access.	Natural	River - limited	Nil	Nil	a. Drainage b. Fish c. Oil
C.13	Riverton Bridge to Eastern Building line, Clontarf -including freshwater swamp.	Canning Shire Council & South Perth City Council	Private	109	80	2 to 25	Rushes, reeds, scrub & grass. Some trees.	Tidal and natural	Land and river - limited	Extremely heavy Heavy	(Aedes vigilax (Aedes camptorhynchus (Culex annulirostris (Culex pipiens australicus	a. Drainage b. Fish c. Oil or insecticides.
C.14	Clontarf	South Perth City Council	Private	77	88	1 to 12	Reeds, scrub and trees.	Tidal and natural	Land and river - limited	Heavy Moderate	(Aedes vigilax (Aedes camptorhynchus (Culex annulirostris (Culex pipiens australicus (Culex globocoxitus (Theobaldia atra	a. Drainage b. Fish c. Oil or insecticides.
C.15	Western boundary Clontarf to Salters Point.	South Perth City Council	South Perth City Council	60	80	5 to 12	Reeds, scrub and trees.	Tidal and natural	Land and river - limited	Light	(Aedes vigilax (Aedes alboannulatus	a. Drainage b. Fish c. Oil or insecticides.
C.16	Mt. Henry to Cloister Avenue, Canning Bridge	South Perth City Council	Private and South Perth City Council	6	90	½ to 1	Reeds, scrub & trees	Tidal	Land & river	Nil	Nil	a. Drainage b. Fish c. Oil or insecticides.

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BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
H.1	Great Eastern H'way to Swan St. Bridge, E. Guildford	Swan-Guildford Shire Council	Private	7	140	½	Rushes, grass & trees.	(a) Tidal to 1 mile east of Swan River junction (b) Natural	Land - limited	Light	Anopheles annulipes Culex fatigans Aedes alboannulatus	a. Drainage b. Fish c. Oil
				N.B. Intermittent pools after 1 mile East of Swan River Junction								
H.2	South Stream, Swan Street bridge to rear of Govt.Railways Workshops, Midland.	Swan-Guildford Shire Council	Private	6½	130	½	Grass	Natural	Land	Nil	Nil	a. Clearing of grass. b. Fish c. Oil
H.3	North Stream (backwater), Swan Street Bridge to rear Govt.Railways Workshops, Midland.	Midland Town Council & Swan-Guildford Shire Council	Private	3	130	½	Grass, bamboos & trees	Natural	Land	Light	Culex fatigans Aedes alboannulatus	a. Clearing of grass b. Fish c. Oil
				N.B. Intermittent pools								
H.4	Rear of Govt. Railways Workshops to Kalamunda Rd.Midland	Midland Town Council & Swan-Guildford Shire Council	Private & State Govt.	11	80	½ to 3	Grass & trees	Natural & drainage from Railway Workshops	Land	Light	Culex fatigans Culex pipiens australicus Culex annulirostris Anopheles annulipes	a. Drainage b. Clearing of grass. c. Fish d. Oil
H.5	W.A.G.R. Stock truck washout & trade wastes drainage disposal area, Midland	Midland Town Council	State Govt.	1	5	2	Rushes & grass	Drainage from railway Stock-truck washout area & Army Depot	Land - limited	Moderate	Culex fatigans Culex annulirostris	a. Clearing of grass b. Fish c. Oil
H.6	Abattoirs, Midland	Midland Town Council & Swan-Guildford Shire Council	Midland Abattoirs Board	(a) 1½ (north of river)	4	4	Grass	Liquid wastes Disposal System.	Land	Heavy	Culex fatigans	a. Oil
				(b) 20 (south of river)	20	10	"		"	Moderate	(Culex fatigans (Culex pipiens australicus	
H.7	South of river adjacent Kalamunda Road, Bushmead.	Swan-Guildford Shire Council	Private & State Govt.	3	10	3	Rushes & grass	Natural	Land - limited	Nil	Nil	a. Drainage b. Fish c. Oil
H.8	Kalamunda Road, Bushmead to Scott St. Helena	Swan-Guildford & Mundaring Shire Councils	Private	3	60	½	Trees on river banks, also scrub at Scott St.end	Natural	Land - limited	Extremely heavy	Aedes alboannulatus (Anopheles annulipes	a. Fish b. Oil
				N.B. Overall length 240 chains. Intermittent								

Index No.	Location	Local Authority Involved	Owner or Controller	Acreage	Length Chains	Width Chains	Vegetation	Water Origin	Accessibility	Density	Types	with constant vigilance
H.1	Great Eastern H'way to Swan St. Bridge, E. Guildford	Swan-Guildford Shire Council	Private	7	140	½	Rushes, grass & trees.	(a) Tidal to 1 mile east of Swan River junction (b) Natural	Land - limited	Light	Anopheles annulipes Culex fatigans Aedes alboannulatus	a. Drainage b. Fish c. Oil
				N.B. Intermittent pools after 1 mile East of Swan River Junction								
H.2	South Stream, Swan Street bridge to rear of Govt.Railways Workshops, Midland.	Swan-Guildford Shire Council	Private	6½	130	½	Grass	Natural	Land	Nil	Nil	a. Clearing of grass. b. Fish c. Oil
H.3	North Stream (backwater), Swan Street Bridge to rear Govt.Railways Workshops, Midland.	Midland Town Council & Swan-Guildford Shire Council	Private	3	130	½	Grass, bamboos & trees	Natural	Land	Light	Culex fatigans Aedes alboannulatus	a. Clearing of grass b. Fish c. Oil
				N.B. Intermittent pools								
H.4	Rear of Govt. Railways Workshops to Kalamunda Rd.Midland	Midland Town Council & Swan-Guildford Shire Council	Private & State Govt.	11	80	½ to 3	Grass & trees	Natural & drainage from Railway Workshops	Land	Light	Culex fatigans Culex pipiens australicus Culex annulirostris Anopheles annulipes	a. Drainage b. Clearing of grass. c. Fish d. Oil
H.5	W.A.G.R. Stock truck washout & trade wastes drainage disposal area, Midland	Midland Town Council	State Govt.	1	5	2	Rushes & grass	Drainage from railway Stock-truck washout area & Army Depot	Land - limited	Moderate	Culex fatigans Culex annulirostris	a. Clearing of grass b. Fish c. Oil
H.6	Abattoirs, Midland	Midland Town Council & Swan-Guildford Shire Council	Midland Abattoirs Board	(a) 1½ (north of river)	4	4	Grass	Liquid wastes Disposal System.	Land	Heavy	Culex fatigans	a. Oil
				(b) 20 (south of river)	20	10	"		"	Moderate	(Culex fatigans (Culex pipiens australicus	
H.7	South of river adjacent Kalamunda Road, Bushmead.	Swan-Guildford Shire Council	Private & State Govt.	3	10	3	Rushes & grass	Natural	Land - limited	Nil	Nil	a. Drainage b. Fish c. Oil
H.8	Kalamunda Road, Bushmead to Scott St. Helena Valley	Swan-Guildford & Mundaring Shire Councils	Private	3	60	½	Trees on river banks, also scrub at Scott St.end	Natural	Land - limited	Extremely heavy Light	Aedes alboannulatus (Anopheles annulipes (Culex pipiens australicus	a. Fish b. Oil
				N.B. Overall length 240 chains. Intermittent breeding & potential breeding pools.								
H.9	Brickworks Helena Valley	Swan-Guildford Shire Council	Private	10	14	2 to 10	Rushes & scrub. Some trees.	Natural	Land - limited	Heavy	Aedes alboannulatus	a. Fish b. Oil