

Minister for Education

Our Ref: 28-20268/3

Hon Brian Ellis MLC
Chairman
Standing Committee on Environment and Public Affairs
Legislative Council Committee's Office
Parliament House
PERTH WA 6000

PUBLIC

Dear Mr Chairman

Petition No 68 – Air Conditioning in State Government Schools

Further to previous advice provided by my Office to the Committee, I am pleased to inform the Committee that the review of the Department of Education's Air-Cooling policy has been completed, and the Government has agreed to implement a new Air-Cooling Policy, details of which are attached to this letter for your information.

I commend the Committee for its interest in this important policy, and I thank you for bringing the above Petition to my attention.

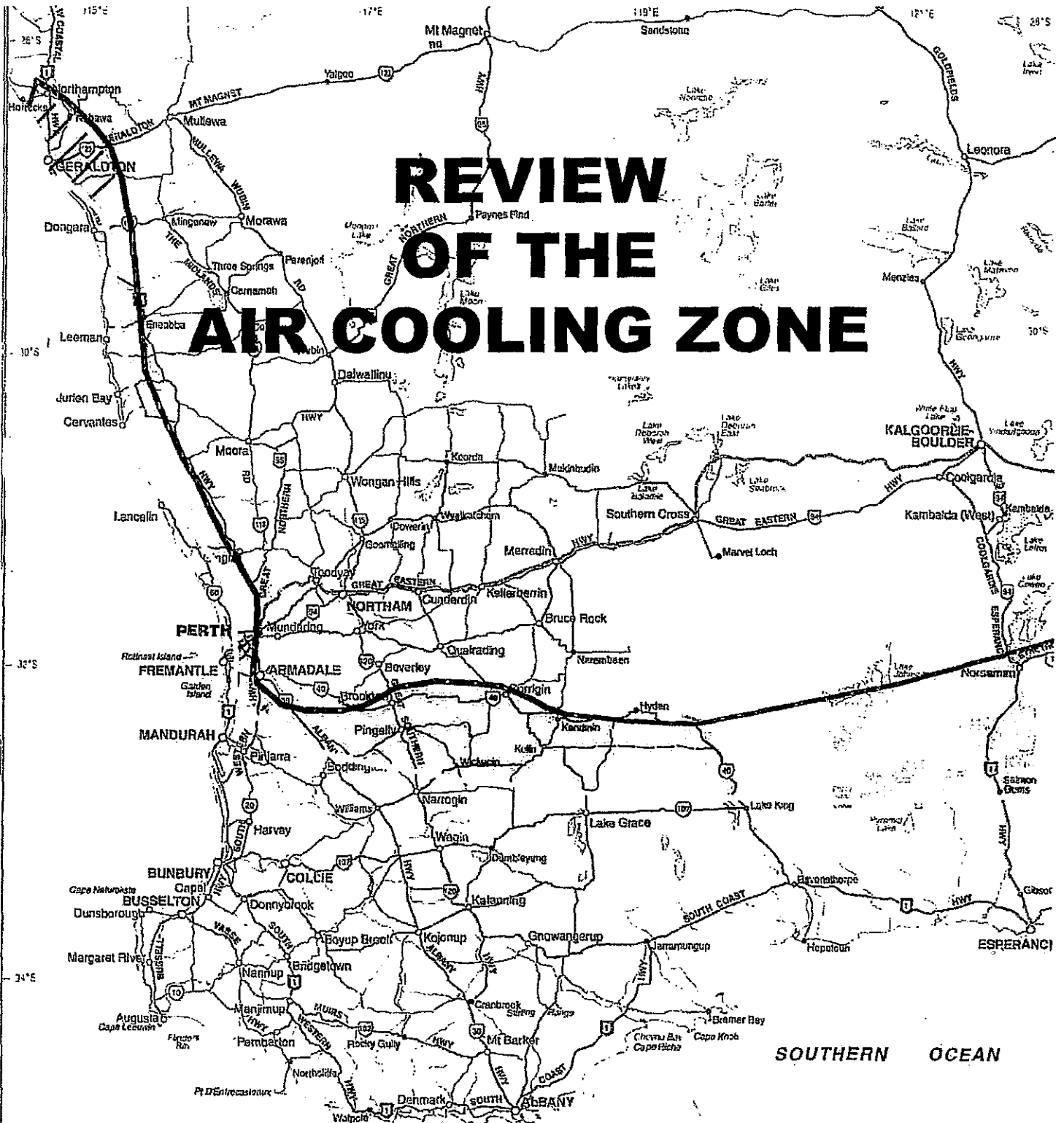
Yours sincerely

**Dr Elizabeth Constable MLA
MINISTER FOR EDUCATION**

att/

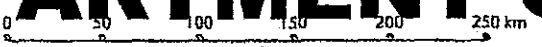
24 JUN 2011

REVIEW OF THE AIR COOLING ZONE



WESTERN AUSTRALIA DEPARTMENT OF EDUCATION

2010



Legend

- Capital City: PERTH
- Population Centres > 6000: O Ar Ar
- Population Centres 1000 - 6000: O Ar Ar
- Population Centres < 500: • Ar Ar
- Primary Roads:
- Secondary Roads:

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INTRODUCTION

The Minister for Education has requested that the Director General of the Department of Education arrange for a review of air cooling/ air conditioning policy and guidelines.

The increased use of air cooling/ air conditioning in houses, public buildings, public and private transport, shopping centres, libraries etc has raised the expectations of children, parents and teachers in terms of the comfort level in classrooms.

This review will complement the knowledge gained by previous reviews undertaken by the Department in 1997 and 2002.

The significant feature of the 2002 review was the redefining of the 25 day relative strain index line by the Bureau of Meteorology. This decision resulted in an additional sixty one schools in the hills and foothills suburbs to the East of Roe Highway being included in the zone and being eligible for air cooling. The Bureau at this time also plotted the 20 day relative strain index line.

With temperatures in recent summers being perceived to be on the rise, parents and teachers in schools outside the existing air cooling zone have expressed an over whelming desire for a new review of the Department's Air Cooling Policy and Guidelines.

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TERMS OF REFERENCE

1. Review the current policy and provision of air cooling/ air conditioning in Western Australian Government Schools.
2. Develop a staged program and cost estimate for the provision of air cooling/ air conditioning with in a redefined zone.
3. Prepare a report recommendation and guidelines outlining the provision of air cooling/ air conditioning for the Minister for Education and the Director General in the redefined zone.

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RECOMMENDED NEW POLICY

1. All new schools will be constructed with environmental considerations reflecting best practice passive design criteria predominating in achieving thermal comfort.
2. All new schools within the 20 day Relative Strain Index boundary will be provided with air cooling/ air conditioning to the extent required.
3. Where a new school is constructed west or south of the Relative Strain Index boundary to replace an older school which had school based funded air cooling/ air conditioning, the new school will have similarly adequate levels of air cooling/ air conditioning incorporated.
4. All existing schools within the 20 day relative strain index boundary will be eligible to have air cooling/ air conditioning installed into classrooms and offices where air cooling/ air conditioning has not previously been installed. The Department of Education will prepare a three year staged program for the provision of air cooling/ air conditioning to schools in the redefined zone.
5. No funding assistance will be provided to self fund air cooling/ air conditioning to schools to the west or south of the 20 day relative strain index boundary.
6. At the completion of the program to provide air cooling/ air conditioning to schools located between the 25 and 20 day relative strain index lines (redefined zone) , the Department of Education will further investigate the extension of the program to schools not covered within the newly defined zone.
7. All new schools opening in 2012 and onwards will be air cooled/ or air conditioned. The Department of Education to initiate a cost benefit analysis to determine the best and most economical solution from the following options: -
 - 7.1 Gas heating and evaporative cooling
 - 7.2 Reverse cycle air conditioning

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IMPLEMENTATION PROPOSAL

With the proposed air cooling zone being defined by the 20 day relative strain index lines, schools in the Geraldton area, North East Metropolitan area, Central Metropolitan area, South East Metropolitan area and the Upper Great Southern Wheatbelt will be eligible for air cooling. An additional 124 schools will be included in the newly defined zone.

The majority of these schools have used school based funding to provide air cooling to their existing classrooms. The number of classrooms with air cooling in these schools ranges from all, to partial, to none.

All primary schools have received additional classrooms through the Commonwealth Government's Building the Education Revolution program (BER). Schools located outside the prescribed air cooling zone at the time were not eligible to have their new classrooms air cooled in this program.

It is the Department's proposal to install air cooling in all non air cooled existing, and BER classrooms located to the east and north of the 20 day relative strain index line.

This program could be delivered over three stages: -

STAGE 1 (List of schools and map - pages)

Geraldton; North East Metropolitan Suburbs and Serpentine/ Jarrahdale areas.

48	schools
203	existing classrooms without air cooling
145	BER classrooms

\$6,475,000 ESTIMATED TOTAL COST

STAGE 2 (List of schools and map - pages)

Central Metropolitan Area

37	schools
117	existing classrooms without air cooling
65	BER classrooms

\$2,400,000 ESTIMATED TOTAL COST

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STAGE 3 (List of schools and map - pages)
South Eastern Metropolitan Area

39	schools
250	existing classrooms without air cooling
82	BER classrooms

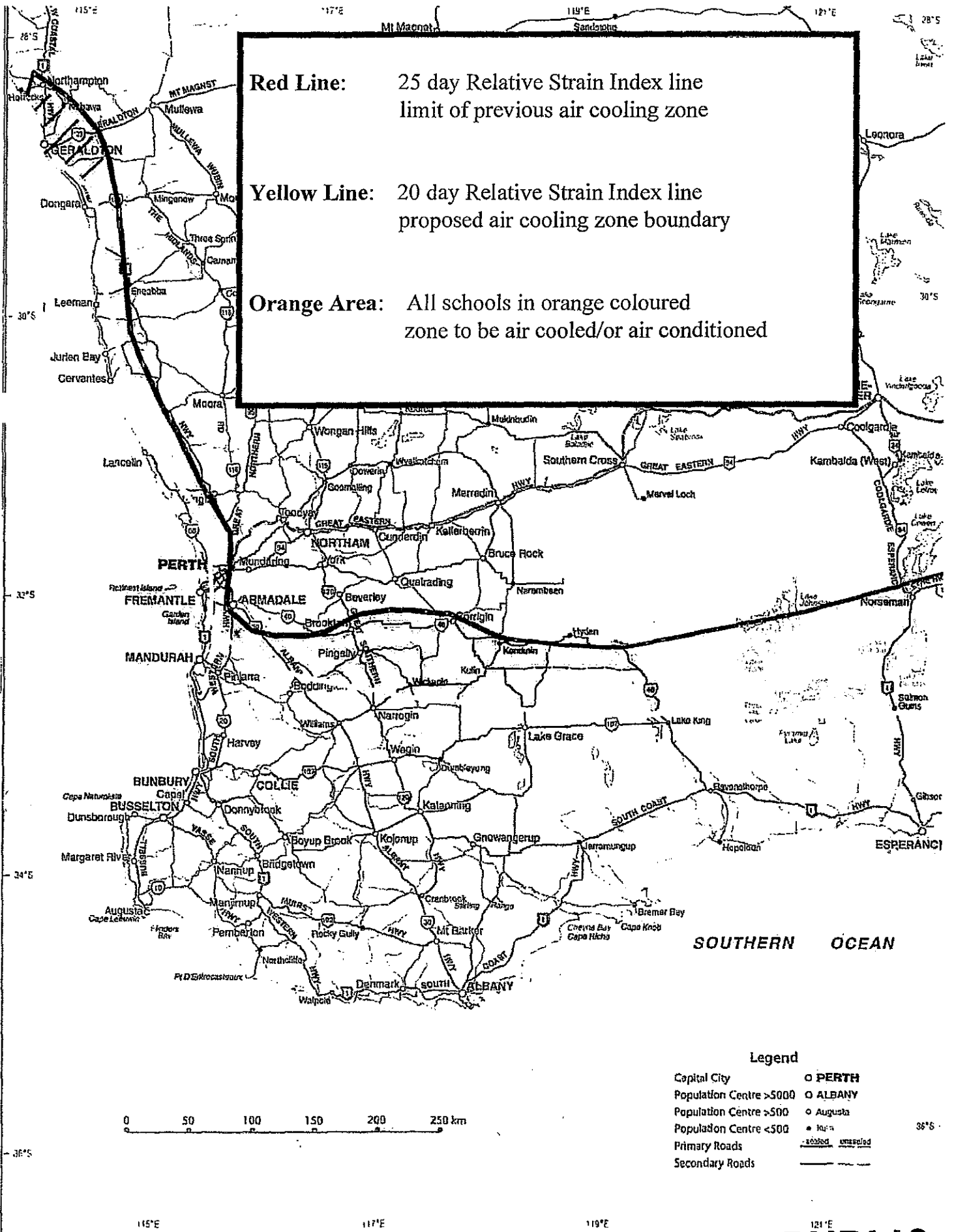
\$4,050,000 ESTIMATED TOTAL COST

SUMMARY

124	schools
570	existing classrooms without air cooling
292	BER classrooms

\$12,925,000 ESTIMATED TOTAL COST

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Red Line: 25 day Relative Strain Index line
limit of previous air cooling zone

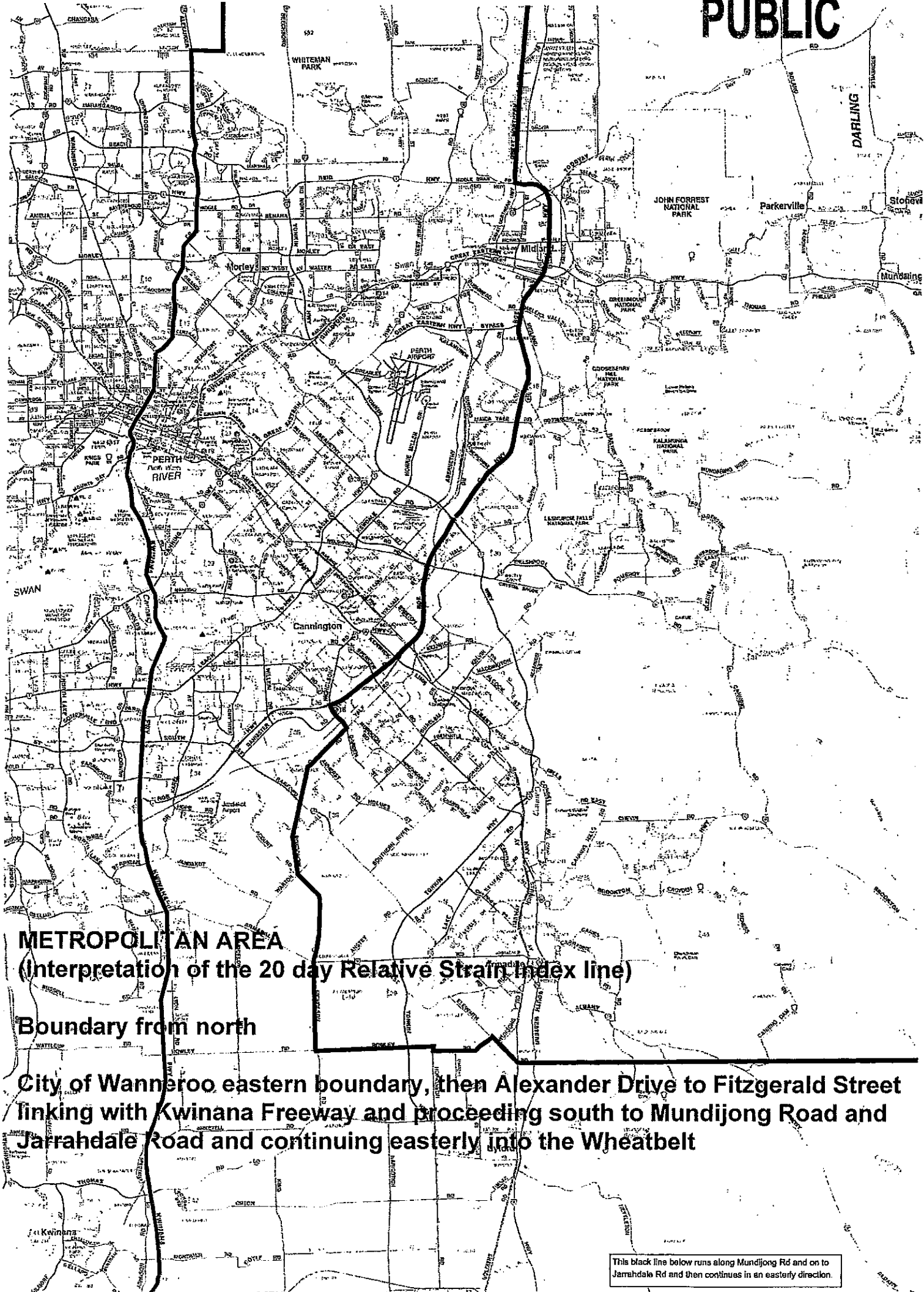
Yellow Line: 20 day Relative Strain Index line
proposed air cooling zone boundary

Orange Area: All schools in orange coloured
zone to be air cooled/or air conditioned

Legend

- Capital City ○ PERTH
- Population Centre >5000 ○ ALBANY
- Population Centre >500 ○ Augusta
- Population Centre <500 ● Injays
- Primary Roads
- Secondary Roads

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METROPOLITAN AREA
(Interpretation of the 20 day Relative Strain Index line)

Boundary from north

City of Wanneroo eastern boundary, then Alexander Drive to Fitzgerald Street linking with Kwinana Freeway and proceeding south to Mundijong Road and Jarrahdale Road and continuing easterly into the Wheatbelt

This black line below runs along Mundijong Rd and on to Jarrahdale Rd and then continues in an easterly direction.

SUMMARY OF STAGES 1, 2 & 3

124 SCHOOLS

570 EXISTING CLASSROOMS

292 BER CLASSROOMS

EXISTING CLASSROOMS \$6,388,000

BER CLASSROOMS \$6,537,000

TOTAL ESTIMATED COSTS \$12,925,000

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EXECUTIVE SUMMARY

The Minister for Education indicated to the Director General a desire to have the Department of Education's existing air cooling/ air conditioning guidelines reviewed. The review was undertaken by officers from Facilities Program Delivery Branch in the Infrastructure Directorate.

Consideration included the question 'What exists and where to in the future?' while being consignant of opportunities to improve the learning environment, the need to be fair and equitable against a background of limited funding and, means by which assessment and prioritisation of air cooling/ air conditioning needs can be implemented.

In undertaking the review the following issues were considered: -

- Considerations to maximise the opportunities for passive cooling in schools and for architects in designing new and refurbishing older schools.
- Examining opportunities for different air cooling/ air conditioning systems in schools.
- The potential for changing the existing air cooling/ air conditioning zone.
- Reviewing the existing air cooling guidelines.

Of significant interest was research indicating that an optimum classroom environment was a positive factor in learning efficiency and, the State and Federal Government policies on greenhouse gas emissions and sustainable buildings, which together with changes to the Building Code of Australian(BCA) would be strong factors towards passive design and energy efficiency. The BCA applies to new schools or upgrades/ refurbishments to older schools.

The Department of Education's guidelines on the provision of air cooling in schools was based on data provided by the Bureau of Meteorology, including a variable called the 'relative strain index' as means for determining geographical zones of higher and lower thermal comfort throughout the state.

The relative strain index is a means for assessing climate with respect to the stress it imposes on people. The index takes into account factors such as air temperature, wind movements, vapour pressure, metabolic rates, and insulating effects of clothing. Most individuals are comfortable when the relative strain value up to 0.2. At around 0.3 there is a noticeable level of discomfort and towards 0.4 approximately fifty percent of the average population would be too hot. At around and above 0.5, signs of distress are evident and action is required to alleviate them. Maximum discomfort generally occurs around 3 pm on days of high temperature, and this is the time used by the Bureau of Meteorology in assessing the relative strain index.

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The Department of Education has used the 25 Day Relative Strain index line as its boundary determinate for the so called 'Air Cooling Zone'. All schools within this zone have been air cooled.

In response to mounting public pressure and perceived global warming the Department of Education requested that the Bureau of Meteorology provide a new map with a line indicating the relative strain index values greater than 0.3 on 20 days of a full year.

The Bureau of Meteorology has advised that 20 Day Relative Straining Index line should not be regarded as fixed, but rather as a guide for heat discomfort that is likely to some yearly variability. Both local and microclimate conditions and the number of years over which readings have been taken at a particular location are among the factors affecting the detailed accuracy of the line.

It is recommended that the current air cooling zone be extended from the 25 to the 20 relative strain index line. The 20 day relative strain index line is to be considered a general guide (rather than a fixed demarcation line) that allows schools east and north of the line to qualify for air cooling/ air conditioning. Schools to the west and south of the line would not qualify for Government assisted funded air cooling/ air conditioning at this time.

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GENERAL INFORMATION

1. It is recommended that maintaining an optimal environment in terms of thermal comfort enhances learning opportunities. There is also some indication that in naturally ventilated buildings occupants are inclined to self-regulate their heat to balance to a greater extent than their counterparts in buildings which are ventilated, heated or cooled by mechanical means.
2. In the context of this document hot weather provisions are measures taken to improve the built environment by lowering thermal stress through passive building design (high ceilings, shading, natural ventilation, optimum building orientation, etc.) or through the inclusion or addition of mechanical measures to introduce artificially cooled air. In parallel with this is the reality that buildings are major contributors to greenhouse gas and that State and Federal Government are legislating to minimise such emissions through applying penalties on one hand and incorporating more environmentally friendly design requirements into the Building Code of Australia.
3. It is clear that the standards which constitute good design in terms of environmental factors are constantly under review and improvement. Modern schools and best design can in many cases reduce and eliminate the need for artificial cooling. The prime target of achieving optimum amelioration of high temperature environment in schools should not be compromised but, this must be achieved in ways which support the Governments' (State and Federal) targets to reduce greenhouse gas emissions.
4. In terms of thermal comfort therefore, factors to be considered include the following: -
 - 4.1 The increased use of air cooling in homes, public and private transport, shopping centres, libraries, etc. has raised the expectation of children, parents and teachers in terms of comfort level in school rooms.
 - 4.2 Environmental considerations are of prime importance in designing schools. In parallel with this is the challenge to communicate the potential for passive methods of achieving comfortable conditions.
 - 4.3 The cost of retrofitting evaporative air cooling varies according to the individual schools design. Of serious consideration in the retrofitting of air cooling into older schools are installing additional water supplies to increasing electrical switchboard capacities. Associated with retrofits in

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general are the disturbance to routine school operations while work progresses.

4.4 A major consideration for all types of ventilation where air (and especially moist air) is recycled is that of health. This is particularly so of evaporative air cooling in relation to Legionella. Other cases include but are not limited to recycled air from laboratories and other facilities or rooms containing equipment which releases or generates gaseous materials.

4.5 The option of using leverage from donated funds, e.g. from parent-based associations, together with Government funding to promote thermal conditioning has been considered in substantial detail. There is obvious potential for inequities if the decision to provide Government funding is linked to external funding where schools serving more affluent communities could have an unfair advantage over those serving less affluent communities. Therefore, donated funds will not have leverage on the allocation of Government funds.

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ENVIRONMENTAL SUSTAINABILITY DESIGN

In the Department of Education's delivery of standard pattern new schools and major refurbishments of existing schools, they will be designed to a 'best practice' environmental standard, equivalent to a 4 star rating from the Green Building Council of Australia's Green Star - Education tool. In the situation where a project is too small to use the Green Star - Education Tool, e.g. a small extension; the Building Management and Works sustainability check list will apply.

The Green Star - Education V1 evaluates the environmental initiatives and/or the potential environmental impact, of new educational facilities, and additions to and major refurbishments of existing education facilities. A 4 Star Green Star Certified Rating recognises and rewards 'Best Practice'.

The Green Star rating system was created to: -

- define green building by establishing a common language and standard of measurement;
- promote integrated, whole building design;
- identify building life cycle impacts;
- raise awareness of green building benefits;
- recognise and reward environmental leadership;
- transform the built environment to reduce the environmental impact of development

(Green Building Council of Australia)

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NEW AIR COOLING ZONE

STAGE 1

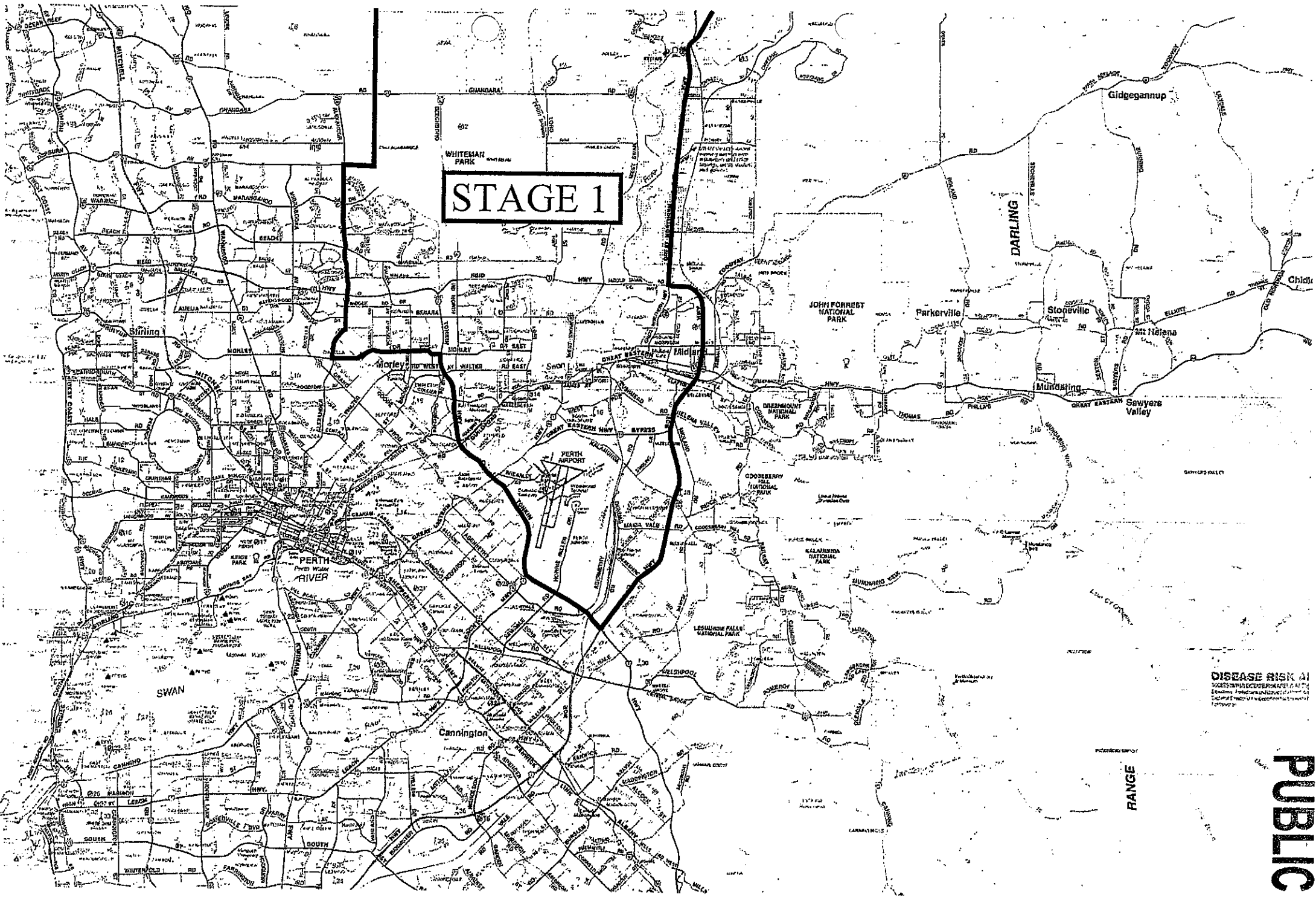
* Maps

* List of schools

* Number of rooms to be air cooled

* Cost estimate

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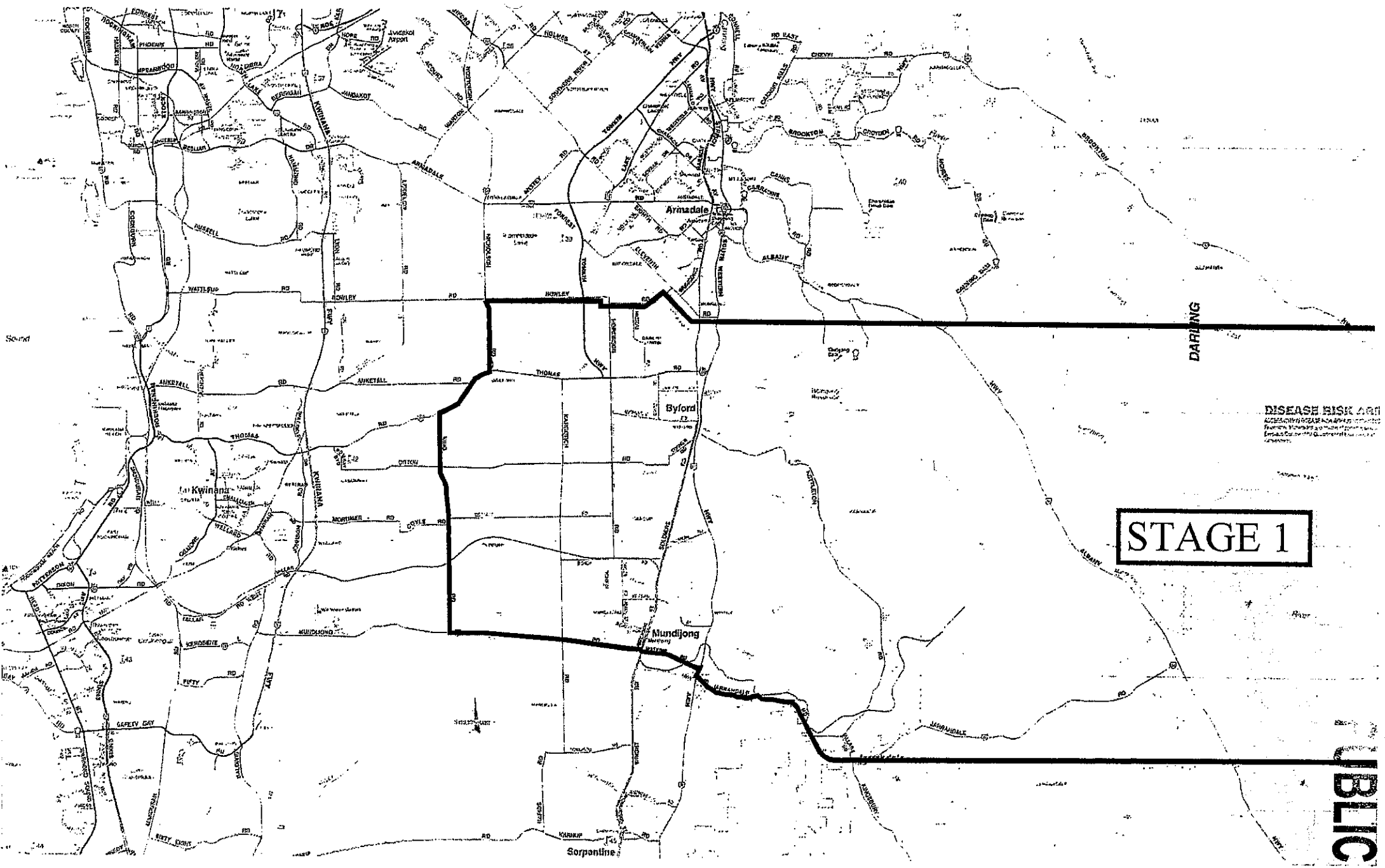


STAGE 1

DISEASE RISK AT
WESTERN DISTRICTS HEALTH DISTRICT
SOUTHERN PERIPHERY DISTRICT
CANTONMENT DISTRICT

RANGE

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DISEASE RISK AREAS
ASSESSING RISK OF DISEASE TRANSMISSION
FROM HOUSES TO OTHER HOUSES
(MAY 2014)

STAGE 1

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AIR COOLING – AMENDED ZONE

Stage 1

SCHOOL	PERMANENT CLASSROOMS NOT AIR COOLED	BER CLASSROOMS
S W A N		
Anzac Terrace	1	3 KPP
Arbor Grove		8 GLAs
Ashfield	4	Library
Ballajura PS		Library + 2GLAs + Art, Craft & Music
Bassendean		3 KPP + Library
Beechboro	6	3 KPP + 2 GLAs + Art, Craft & Music
Camboon		Library + Art, Craft & Music
Caversham	2	2 KPP
East Beechboro	1	5 ECE
Eden Hill	1	5 ECE + Art, Craft & Music
Ellen Stirling	18	5 ECE
Ellenbrook		5 ECE + Art, Craft & Music
Guildford	3	3 KPP + Art, Craft & Music
Hampton Park		3 KPP + Music
Illawarra		Art, Craft & Music
Midvale		5 ECE
Noranda		3 KPP + Art, Craft & Music
North Morley	4	Art, Craft & Music
South Ballajura		3 KPP + Art, Craft & Music + 2 GLAs
West Beechboro		3 KPP + Art, Craft & Music
Woodbridge		3 KPP
C A N N I N G		
Byford		2 GLAs + Art, Craft & Music
Edney		5 ECE
Jarrahdale		Library
Marri Grove		3 KPP + Art, Craft & Music
Mundijong		2 GLAs + Art, Craft & Music
Redcliffe		3 KPP + Art, Craft & Music
M I D W E S T		
Allendale	1	3 KPP
Beachlands		Art, Craft & Music
Bluff Point	1	2 GLAs + Art, Craft & Music
Geraldton	2	2 KPP + Art, Craft & Music
Mount Tarcoola		3 GLAs + Music
Rangeway		5 ECE
Waggrakine	2	3 KPP
Walkaway		Library
TOTAL	46	145
SECONDARY	Ballajura Community College	105
	Geraldton SHS	46
	Hampton SHS	48
	Lockridge SHS	4
	TOTAL	203

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ESTIMATED COST

STAGE 1

EXISTING	CLASSROOMS	\$2,673,000
BER	CLASSROOMS	<u>\$3,802,000</u>
	TOTAL	<u>\$6,475,000</u>

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NEW AIR COOLING ZONE

STAGE 2

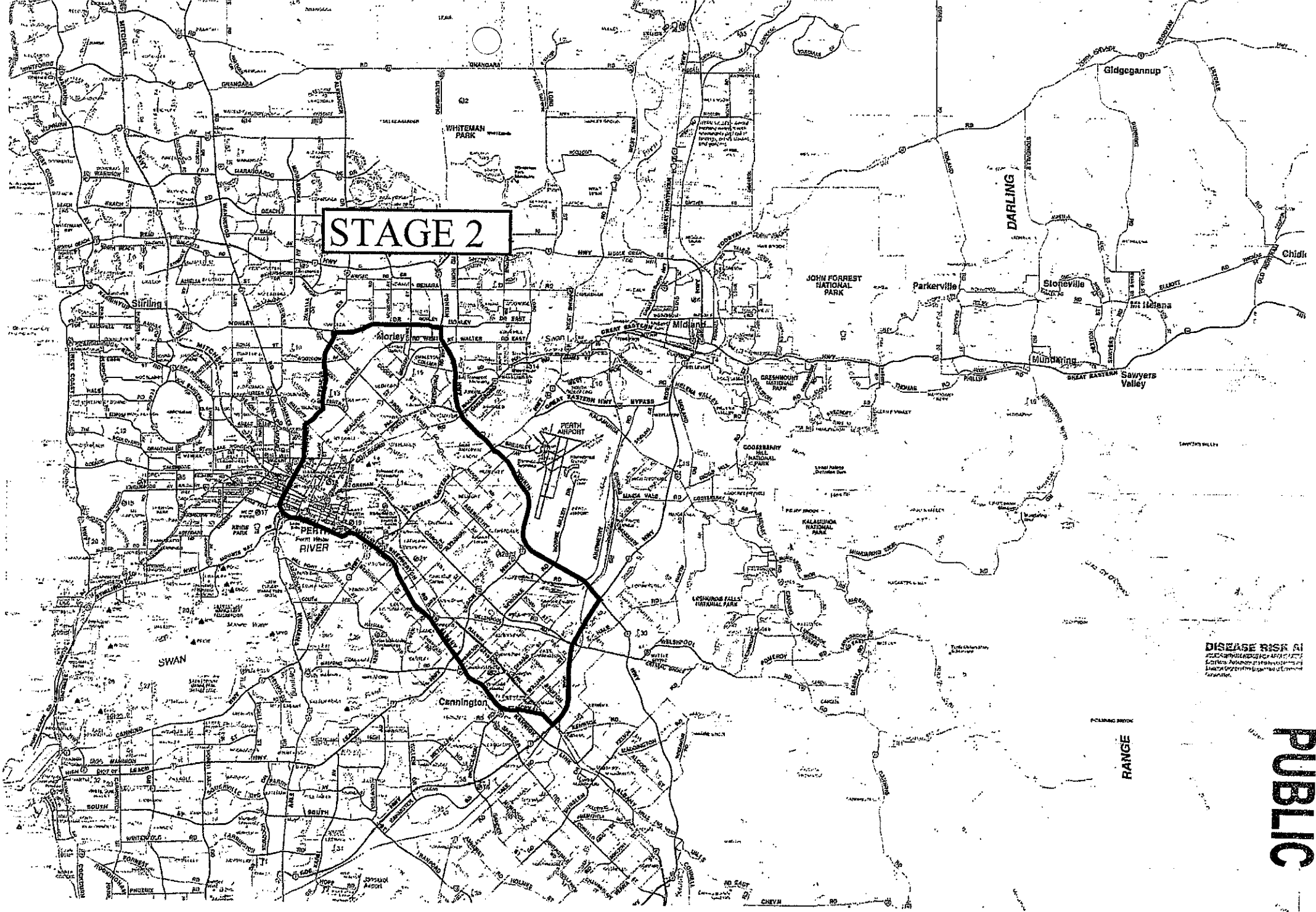
* Maps

* List of schools

* Number of rooms to be air cooled

* Cost estimate

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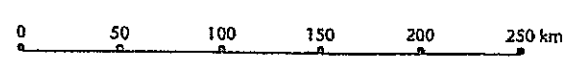
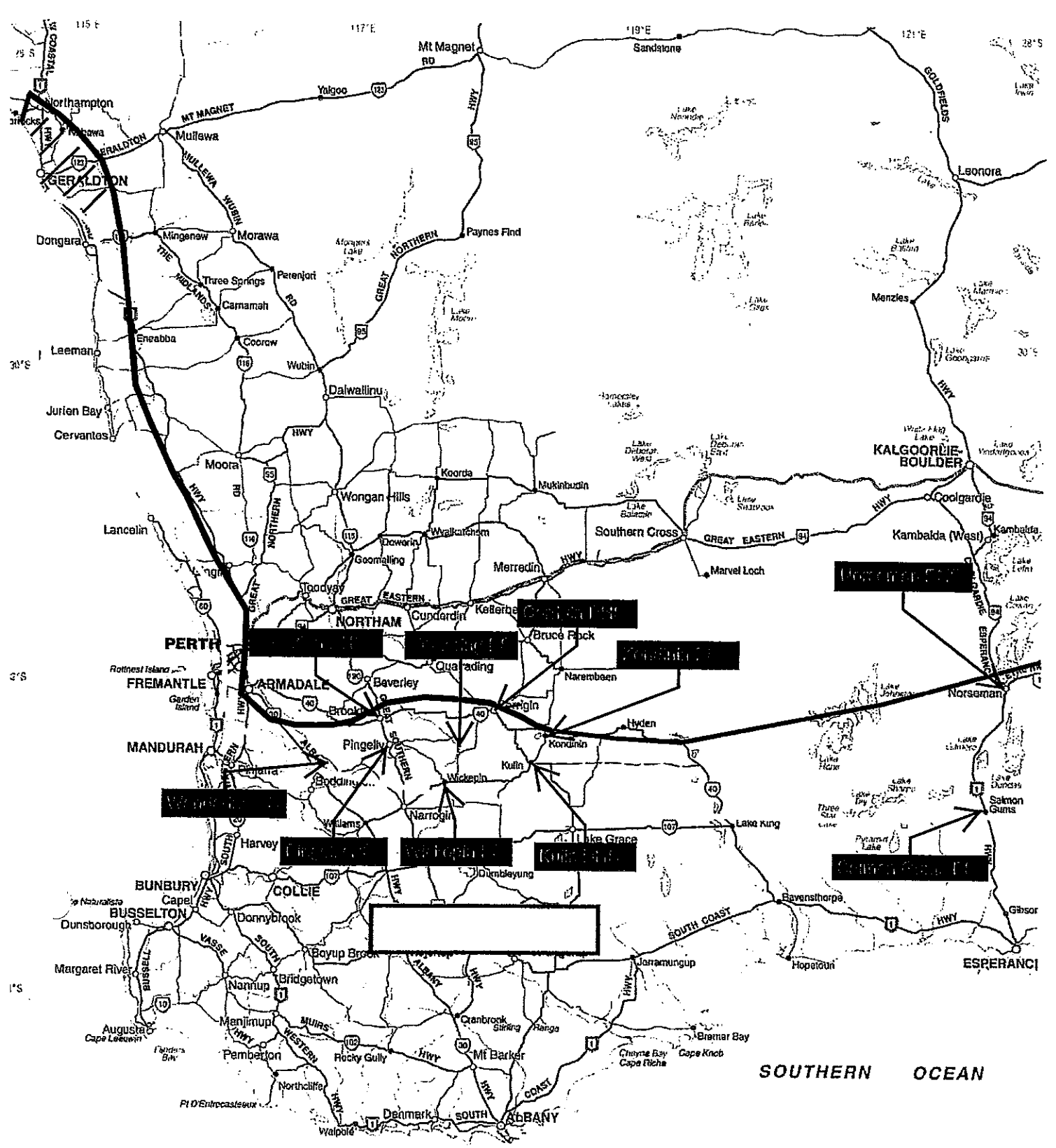


STAGE 2

DISEASE RISK AT
PERTH AIRPORT
CARRIES AIRBORNE
DISEASE RISK AT
PERTH AIRPORT

RANGE

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- Legend**
- Capital City ○ PERTH
 - Population Centre >3000 ○ ALBANY
 - Population Centre >500 ○ Augusta
 - Population Centre <500 ● Kulin
 - Primary Roads solid unsolid
 - Secondary Roads solid unsolid

115°E 117°E 119°E 121°E

36°S

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AIR COOLING – AMENDED ZONE

Stage 2

SCHOOL	PERMANENT CLASSROOMS NOT AIR COOLED	BER CLASSROOMS	
PRIMARY	S W A N		
	Bayswater		Art, Craft & Music +2 KPPs
	Durham Road		No A/C required
	Embleton	5	Library
	Hillcrest	5	Library + Music
	Inglewood	1	4 GLAs + Library
	Maylands Peninsula		5 ECE
	Morley		Art, Craft & Music
	Mount Lawley	2	2 KPPs + Art, Craft & Music
	North East Metro LDC		3 KPPs
	Weld Square		Library + Music
	West Morley		Library
	C A N N I N G		
	Beckenham		Library + 2 GLAs + Art, Craft & Music
	Belmay	6	Library + Art, Craft & Music
	Belmont		Library
	Carlisle	2	3 KPPs + Library
	Cloverdale		2 KPPs + Art, Craft & Music
	East Victoria Park		Library + Art, Craft & Music
	Gibbs Street		3 KPPs + Music
	Kewdale		3 KPPs + Art, Craft & Music
	Lathlain		3 KPPs + Art, Craft & Music
	Queens Park		Library + Art, Craft & Music
	South East Metro LDC		Library + 2KPPs
	Tranby	3	3 KPPs
	E S P E R A N C E		
	Salmon Gums	3	
	N A R R O G I N		
	Kondinin		
	Pingelly		Art, Craft & Music
	Wandering	1	
	Wickepin	2	Art, Craft & Music
	Yealering		
TOTAL	30	64	
DISTRICT HIGH SCHOOLS	Brookton DHS		
	Corrigin DHS	1	
	Kulin DHS	3	Art, Craft & Music
	Norseman DHS	3	
	TOTAL	7	1
SECONDARY	Belmont City College	21	
	Sevenoaks SC	4	
	John Forrest SHS	4	
	Mount Lawley SHS	51	
	TOTAL	80	0
TOTAL	117	65	

AIR COOLING – AMENDED ZONE
Stage 2

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ESTIMATED COST

STAGE 2

EXISTING	CLASSROOMS	\$1,215,000
BER	CLASSROOMS	<u>\$1,185,000</u>
	TOTAL	<u>\$2,400,000</u>

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NEW AIR COOLING ZONE

STAGE 3

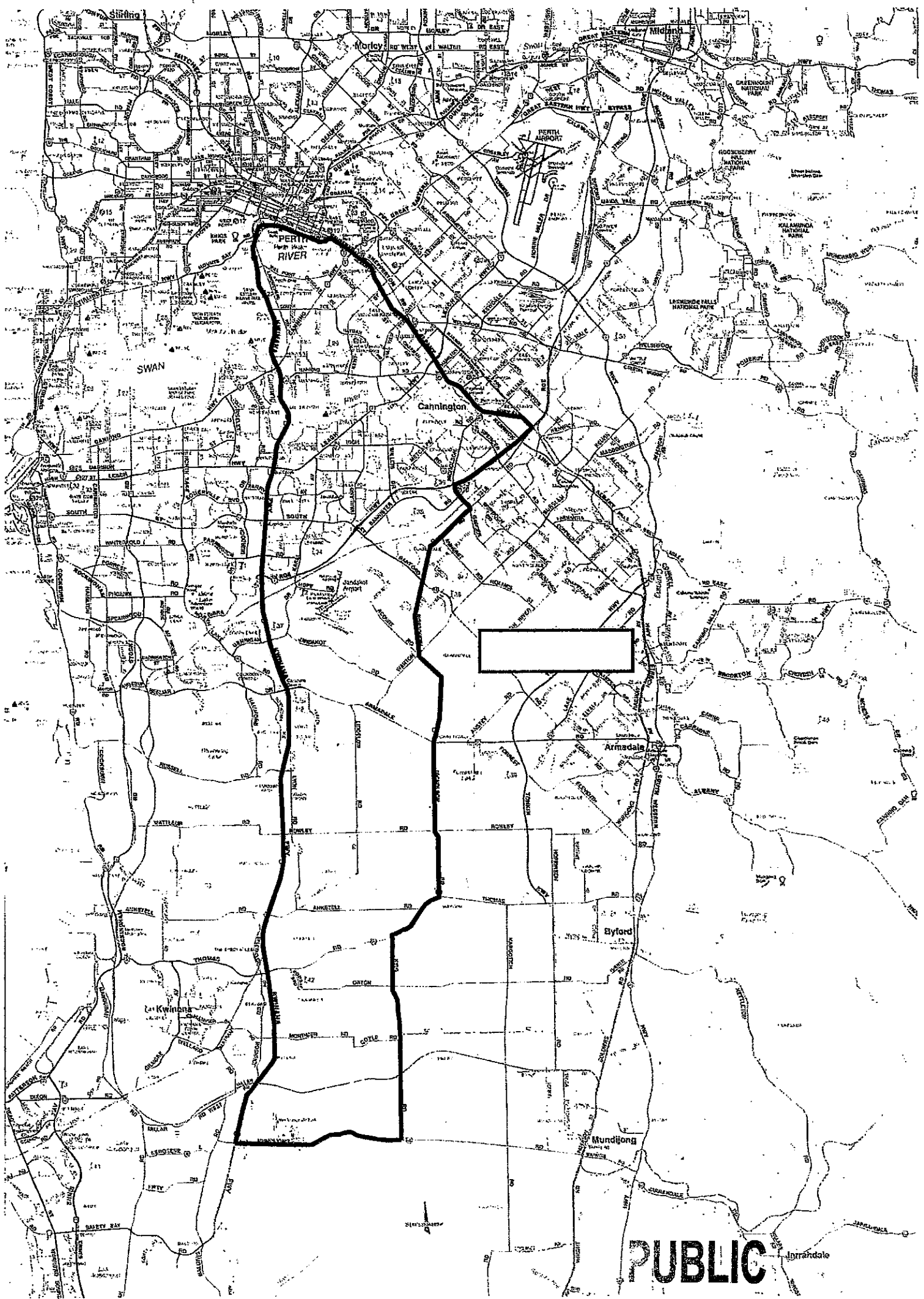
* Maps

* List of schools

* Number of rooms to be air cooled

* Cost estimate

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Armadale

AIR COOLING – AMENDED ZONE

Stage 3

SCHOOL	PERMANENT CLASSROOMS NOT AIR COOLED	BER CLASSROOMS	
PRIMARY	CANNING		
	Carson Street		
	Collier	Library + Art, Craft & Music	
	Como	Information	3 KPPs + Art, Craft & Music
	Curtin		2 KPPs
	Kensington	Not	3 GLAs + Art, Craft & Music + Art, Craft
	Manning		3 KPPs + Art, Craft & Music
	Millen	Available	Library + Art, Craft & Music
	Ranford		3 KPPs + 4 GLAs
	South Perth		3 GLAs + Art, Craft & Music
	Victoria Park		
	Wilson		Art, Craft & Music
	FREMANTLE – P E E L		
	Atwell		Art, Craft & Music
	Banksia Park		4 GLAs
	Bannister Creek		2 KPPs
	Bentley	Information	2 KPPs
	Brookman		3 KPPs
	Bull Creek	Not	2 KPPs + Art, Craft & Music
	Burrendah		Library + Art, Craft & Music + 2 GLAs
	Castlereagh	Available	
	Harmony		4 GLAs
	Leeming		2 KPPs
	Oberthur		Library + Art, Craft & Music
	Parkwood		
	Riverton		Library + 2 GLAs + Art, Craft & Music
	Rossmoyne		8 GLAs
	Rostrata		3 KPPs + Art, Craft & Music
	Shelley		2 KPPs + Art, Craft & Music
	West Leeming		2 KPPs + Art, Craft & Music
	Willetton		Library + Art, Craft & Music
	TOTAL	40??	82
SECONDARY	Atwell College	64	
	Canning College		
	Como SC	6	
	Kensington SS		
	Kent Street SHS	30	
	Leeming SHS	14	
	Lynwood SHS	4	
	Rossmoyne SHS	22	
	Willetton SHS	70	
	210	0	

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ESTIMATED COST

STAGE 3

EXISTING	CLASSROOMS	\$2,500,000
BER	CLASSROOMS	<u>\$1,550,000</u>
	TOTAL	<u>\$4,050,000</u>

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ACKNOWLEDGEMENTS

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Defining the 25 and 20 Relative Strain Index Lines

Department of Education
Reviews of Air Cooling 1997 and 2002

Green Building Council of Australia

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